Euro-zone equity returns: country versus industry effects

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Abstract

This paper investigates whether Euro-zone equity returns are driven by country or industry effects over the 1990 to 2008 period. Using a style analysis approach, we find that before the introduction of the Euro country effects dominate, while industry effects prevail after 1999. This reversal at the aggregate level is driven mainly by countries that were least integrated in the EMU and world markets prior to the Euro launch. For markets with stronger economic linkages, such as Germany and France, industry effects dominate both in the nine years before and in the nine years after the introduction of the Euro.

Keywords: International financial markets, style analysis, EMU, currency risk, financial market integration

JEL classification: G11, G15

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Abstract

This paper investigates whether Euro-zone equity returns are driven by country or industry effects over the 1990 to 2008 period. Using a style analysis approach, we find that before the introduction of the Euro country effects dominate, while industry effects prevail after 1999. This reversal at the aggregate level is driven mainly by countries that were least integrated in the EMU and world markets prior to the Euro launch. For markets with stronger economic linkages, such as Germany and France, industry effects dominate both in the nine years before and in the nine years after the introduction of the Euro.

1 Introduction

Since the early 1970's, the international finance literature provides ample evidence of the benefits that investors can derive from cross-border investment strategies (e.g., Levy and Sarnat, 1970; Solnik, 1974; De Santis and Gerard, 1997). However, to take full advantage of international diversification opportunities a clear understanding is required of the factors driving international equity returns, such as geographic and industry factors. Lessard (1974) was the first to study the influence of industry factors on national equity returns. Today, more than 30 years later, the country-industry debate carries on vividly.[1]

The introduction of the Euro in 1999 has sparked further re-examination of the relative importance of country and industry factors. Due to the strong regional impact of the monetary and economic convergence process that preceded and accompanied the transition to the single currency, the current evidence on the relative importance of industry and country factors extracted from global markets is difficult to extrapolate to the markets of the European Economic and Monetary Union (EMU). The Euro launch has effectively eliminated intra Euro-zone currency risk. Moreover, foreign exchange rate risk exposure of Euro-zone countries has decreased (Bartram and Karolyi, 2006). De Santis and Gerard (1998) show that currency risk premiums are large and economically significant. Different exchange rate exposures across countries lead to varying currency risk premiums, and may result in lower cross-country correlations. Conversely, the elimination of currency risk in the EMU may induce higher correlations between Euro-countries, and potentially reduce the benefits of cross-country diversification. Indeed, Adjaouté and Danthine (2001) document a significant increase in cross-country correlations within the Euro-zone.

So far, the relative importance of country and industry factors in the Euro-zone is still an open question, as recent studies remain inconclusive. Some papers find an increasing importance of industry factors (Adjaouté and Danthine, 2003b; Ferreira and Ferreira, 2006; Moerman, 2008),

[1] Traditionally, country factors have been considered to be the dominant driving forces for international equity returns (amongst others, Grinold, Rudd and Stefek, 1989; Heston and Rouwenhorst, 1994; Griffin and Karolyi, 1998; Brooks and del Negro, 2004; Bekaert, Hodrick and Zhang, 2008). Nevertheless, a number of papers suggest the increasing importance of industry factors (Roll, 1992; Baca, Garbe and Weiss, 2000; Cavaglia, Brightman and Aked, 2000; Isakov and Sonney, 2004; Carrieri, Errunza and Sarkissian, 2004b; Baele and Inghelbrecht, 2005).

while others find evidence in favour of the continuing dominance of country factors (Rouwenhorst, 1999; Ehling and Ramos, 2006). However, in the portfolio management practice, the Euro has induced a radical revision of the asset allocation process of many EMU-area fund managers. A survey by Goldman Sachs/Watson Wyatt (1998)[2] suggests that over 60% of fund managers have switched their allocation strategy from country- to industry-based.

This paper aims to shed new light on the country-industry debate in the Euro-zone area. We consider monthly returns on eleven country and ten Euro-wide industry indices between 1990 and 2008.[3] A method commonly used to compare country and industry factors is based on a multi-factor model with country and industry dummy variables (Heston and Rouwenhorst, 1994; Griffin and Karolyi, 1998). However, this approach assumes a unit exposure to the global market shock for all assets, while the literature provides evidence that market betas are time-varying (see, for instance, Bekaert and Harvey (1997) and Ng (2000)). Assuming unit betas may bias the comparison of country and industry factors (Baele and Inghelbrecht, 2005). We take an alternative approach and perform returns based style regressions to investigate whether the volatility of the countries' market returns can be fully captured by a Euro-wide industry replicating portfolio and vice versa. If country factors are the dominant determinants of Euro-zone equity returns, we expect country returns to be able to mimic Euro-zone industry returns reasonably well, while industry replicating portfolios would leave a larger portion of country return variances unexplained. An advantage of style analysis is that it focuses only on the returns covariance structure, which can be estimated more accurately than mean returns. To assess pure country and industry effects, we repeat all our tests excluding overlapping components from the benchmark returns.[4]

We document a significant change in the structure of EMU-zone equity returns around the introduction of the Euro. Prior to 1999, country composition accounts for a significantly larger fraction of industry volatility than vice versa. In contrast, after 1999 it is considerably more difficult

[2] http://www.watsonwyatt.com/europe/pubs/investment/articles/1998_08_05.asp, visited on February 16, 2004.

[3] We consider all countries that adopted the Euro in January 1999, but exclude Luxembourg and include Greece that adopted the Euro in January 2001.

[4] Based on a similar argument Rouwenhorst (1999) computes the correlation of a country (industry) with the European market index excluding that country (industry).

to replicate Euro-wide industry portfolios with country benchmarks. This pattern is strengthened when the assets included in the portfolio being replicated are excluded from the benchmark indices. This suggests that while before the adoption of the single currency country effects dominate, in the post-Euro period industry effects become more important.

Further insights about the impact of the adoption of the Euro are delivered by dividing the countries in our sample into two groups, based on the strength of their economic linkages before the Euro launch. The first group (France, Germany, the Netherlands, Belgium, Finland and Austria) had pre-Euro currencies and interest rates that were tightly linked to those of the region's largest market, Germany. The second group of countries includes Italy, Portugal, Spain, Greece and Ireland, which all had weaker currency and economic linkages with Germany and more volatile currencies before the EMU. Therefore, ex-ante the impact of the Euro on the monetary and economic conditions and hence on financial markets is expected to be stronger for the second group of countries than for the first.

We find remarkably different results for the two groups. In the first group of countries with strong economic linkages and low currency volatility pre-EMU, industry effects dominate throughout our entire sample period. In sharp contrast, for the second group, country effects are more important prior to the adoption of the Euro, while subsequently, industry effects become dominant. These findings are robust to a set of potential confounding factors. First, our results are confirmed when conducting 'pseudo style regressions' in which the actual local industry (country) weights in country (Euro-wide industry) indices are used as time-varying and observable regression coefficients. Furthermore, our conclusions remain unchanged when controlling for the internet bubble and time-varying aggregate volatility.

We investigate whether the different patterns in the two groups of countries can be attributed to changes in currency risk or changes in market integration. While the elimination of intra Euro-zone currency risk in 1999 accounts for part of these patterns, we find that it cannot fully explain the reported changes. As markets become more integrated, country-specific risks matter less and regional or global risks become more important. Amongst others, Fratzscher (2002) and Baele et al. (2004) show an increase in European financial market integration. We examine Euro-zone regional and global integration by estimating the shares of country return variance that can be captured by a Euro-zone market factor and a world market factor. We find that prior to the launch of the Euro, countries in the first group are on average more highly integrated within both the Euro-zone and global markets than countries in the second group. This is consistent with our result that during this period Euro-wide industry effects dominate for the first group countries, while country effects are still more important for the second group two. For both groups of countries, the total share of country return variance due to both Euro-zone and global market factors increases over time, although the upward trend is much steeper for the second group of countries.

In conclusion, the change from country to industry factors as main determinants of Euro-zone equity returns around the turn of the century is predominantly due to the less integrated markets. In countries that were already highly integrated in the EMU and world markets before 1999, industry effects dominate during the nine years before as well as the nine years after the adoption of the Euro. Our findings have important implications for international investors, as the evidence suggests that optimal diversification strategies are likely to switch to industry-based after the Euro launch.

The remainder of the paper is organized as follows. Section 2 discusses the methodology. Section 3 describes the data. We report and discuss our main results in Section 4. Section 5 provides a discussion on pre-1999 currency risk and financial market integration. Section 6 concludes. An appendix contains details on the Monte Carlo simulations we perform to test the statistical significance of differences between style regressions' R^2s.

2 Methodology

Our main methodology to examine the relative importance of country and industry factors is returns based style analysis (Sharpe, 1988, 1992). If industry factors are at the root of cross-country differences in returns, it ought to be easy to construct from Euro-wide industry portfolios a portfolio that mimics the country returns, while the reverse would be more difficult. Style analysis provides a tool for studying mimicking portfolios. The objective is to find a positive weight portfolio of the benchmark assets, which mimics as closely as possible the returns on a target fund, the test asset. Style analysis focuses on covariance structures only and does not require the estimation of mean returns. This is an advantage of our methodology as the estimates of covariances are more accurate than those of means.

Throughout, countries will be denoted by x and industries by y. We consider K countries, N industries and T monthly observations. In total we have $K \times N$ local industry returns, which constitute our base assets. We construct value-weighted Euro-wide industry (country) portfolios by aggregating local industry returns across countries (industries).

The style of country i in terms of the Euro-zone industries is determined by estimating the regression:

$$\begin{aligned} R^x_{i,t} &= \alpha_i + \sum_{j=1}^{N} \beta_{i,j} R^y_{j,t} + e^x_{i,t} \qquad (1) \\ \text{s.t. } \sum_{j=1}^{N} \beta_{i,j} &= 1, \text{ and} \\ \beta_{i,j} &\geq 0, j = 1, ..., N, \end{aligned}$$

where $R^x_{i,t}$ ($R^y_{j,t}$) is the return on country i (industry j) portfolio over month t. The specification of the style regression for industries in terms of countries is similar. The restrictions that the coefficients $\beta_{i,j}$ are all positive and that they sum to one imply that they form a positive weight portfolio, which is known as the *style* of the country return. This yields the industry portfolio which mimics country i best, in the sense that this is the portfolio which minimizes the variance of the tracking error. To the extent that a particular industry is concentrated in that country, we may also expect that the coefficient $\beta_{i,j}$ for this industry will be relatively large. The R^2 of the style regression gives us an estimate of how well country returns can be mimicked by industry returns and vice versa. The style coefficients together with the R^2 provide information on the risk characteristics of countries in terms of industries and vice versa.

The country and Euro-wide industry indices are all based on the same universe of local industry returns. Hence a portfolio of all country indices comprises the same base assets as all industry indices combined. This allows us to directly compare the benefits of using Euro-wide industries or countries as intermediate portfolio construction blocks. However, by construction, each country and Euro-wide industry portfolio pair includes one common local industry. These common components could be an important source of the covariance between industry and country portfolios.

Hence, in a next step we recompute the Euro-wide industry returns excluding each country component and country returns excluding each industry component. All our recomputed indices are value-weighted across their remaining components. We implement what we term the 'exclusive' style analysis. When we regress for instance France on the Euro-wide industry returns, none of the industry returns will include French stocks. This allows us to examine the pure country and pure industry effects. It implies that the different test assets now have different benchmark portfolios. The 'exclusive' style regressions are given by the following equations:

$$R^x_{i,t} = \alpha_i + \sum_{j=1}^{N} \beta_{ij} R^{y\backslash i}_{j,t} + \epsilon^x_{i,t} \tag{2a}$$

$$R^y_{j,t} = \alpha_j + \sum_{i=1}^{K} \beta_{ji} R^{x\backslash j}_{i,t} + \epsilon^y_{j,t} \tag{2b}$$

Here, $R^{y\backslash i}_{j,t}$ ($R^{x\backslash j}_{i,t}$) is the return on the index of industry j (country i) excluding country i (industry j) from that index. The style regressions of Equation (1) (based on full indices) are referred to as 'simple' style analysis.

We measure the relative importance of country versus industry effects as determinants of Euro-zone equity returns by comparing the equally and value-weighted average R^2s of style regressions. If variation in country returns is mainly driven by their industry compositions, we expect the average R^2 of the style regressions using industry returns as benchmark assets to be higher than when country returns are used as benchmark assets. In other words, industry returns would have better replicating abilities than country returns. The literature does not provide formal tests of whether average style regression R^2s differ across different sets of benchmark assets. Therefore, to evaluate the statistical significance of differences in R^2s we use a Monte Carlo approach to simulate the empirical distributions of the average R^2s of the style regressions. The details of these Monte Carlo simulations can be found in the appendix.

3 Data

We use monthly returns on ten EMU-zone industry indices and eleven country indices from February 1990 to May 2008, a total of 220 months. From the eleven countries that adopted the Euro in 1999, we exclude Luxembourg because a large fraction of its equity flows (and hence its equity returns) is tax motivated. In addition, we include Greece which adopted the Euro in January 2001. Returns on ten local industry indices in each country and market values are provided by Datastream. We use total return indices with dividends reinvested. These indices are denominated in German Mark until January 1, 1999 and in Euro afterwards. The market values of the indices are denominated in Euro. We aggregate local industry returns to create country returns and Euro-wide industry returns. To investigate how our results change over time, we subdivide our sample period into two sub samples: the pre-Euro sample period (from February 1990 to December 1998) and the post-Euro sample period (from January 1999 to May 2008). In addition, to allow for time-varying volatilities and correlations we perform our analyses for 60-month rolling windows.

3.1 Economic Linkages Before the EMU

The adoption of the single currency in 1999 is unlikely to have the same effect on monetary and financial conditions in each of the Euro-zone countries. To shed more light on the changing importance of country versus industry effects around the introduction of the Euro, we extend our analysis by dividing the Euro-zone countries into two groups, based on their economic linkages before the EMU. To do so, we compare the relations between the countries' local pre-Euro currencies and interest rates with those of the region's largest market: Germany.

First, we calculate the cumulative depreciation (or appreciation) of the local currencies with respect to the German Mark before the start of our sample period, between January 1972 and January 1990. Table 1 Panel A reports the results in the seventh column named "cum. depr.". When ranking the countries based on their cumulative depreciation we can clearly distinguish between two groups. The first group includes six countries with relatively low cumulative depreciation, ranging from -0.03 (Austria) to 1.15 (France). The other four countries in this group are Belgium, Germany, Finland and The Netherlands. The pre-Euro currencies of the remaining five countries have remarkably higher cumulative depreciation with respect to the German Mark, ranging from 2.17 (Ireland) to 9.60 (Portugal). Greece, Italy, and Spain are also part of the second group.

The next column in Panel A reports the annualized standard deviation of the monthly local currency/ German Mark exchange rate changes over the January 1972 to January 1990 period. Except for Finland, all countries in group one have lower exchange rate volatilities than the countries in the second group. On average, exchange rate volatility for the countries in group one is 4.23% per annum, while for the countries in group two it is 8.86% per annum. Next, we calculate the correlation between changes in local pre-Euro exchange rates and the German Mark exchange rate changes, where the British Pound is the numeraire. The results are reported in the ninth column ("corr(dem)"). Over the period from January 1972 to January 1990, the currencies of the countries in group one are more highly correlated with the German Mark than the currencies of the countries in group two. The only exception is Finland: the Finnish Markka has a slightly lower correlation with the German Mark than the Irish Pound (0.71 versus 0.74). Finally, we consider the average interest rate differentials of the local interest rates compared to the German interest rate. We consider the period from May 1994 to December 1998, for which Datastream provides one-month interbank rates for all countries in our sample. The last column reports for all countries the average of the interest rate differentials over this time period. Indeed, the countries in the first group have substantially lower interest rate differentials with respect to the German interest rate (ranging from -0.15% to 0.64% per annum) than the countries in the second group (ranging from 1.88% to 19.94% per annum).

These statistics allow us to divide the eleven Euro-zone countries into two groups: the first group includes six countries with relatively low exchange rate volatilities and stronger economic linkages with Germany pre-EMU. We expect the impact of the adoption of the Euro on economic and financial conditions in these countries to be smaller than for the five countries in group two. For this latter group, we expect the impact to be more substantial, as their pre-Euro currencies and interest rates diverge much more from those prevalent in Germany and in the first group. In the remainder of the paper, we perform all analyses for the complete set of eleven Euro-zone countries, as well as for each of the two country groups. Therefore, in addition to the Euro-wide industry returns, we construct two additional sets of industry returns using only local industries from countries in group one and from countries in group two.

3.2 Summary Statistics of Euro-Zone Equity Returns

Further, Table 1 displays the monthly returns summary statistics over the full sample period for the country portfolios (Panel A) and for the Euro-zone industry portfolios (Panel B). Panel A shows that the country with the highest mean return is Finland. Its mean return is 1.44% per month, while the average over all countries in group one is 0.96% and in group two it is 0.98% per month. The Finnish index performance mostly reflects the performance of Nokia and the technology and telecommunication industry, as Nokia accounts for a large share of the index capitalization.[5] On average, the country returns in group two have higher means but also higher standard deviations than in group one. The panel also reports the average market value weights of the countries in the Euro-wide market index. It shows that group one includes four of the five largest countries (except for Italy). Next, the table gives the $p-$values of the Wald test of the null hypotheses that all country mean returns are zero and that they are all equal. The first hypothesis can be rejected for both groups, at the 5% and 10% significance levels respectively. The second hypothesis cannot be rejected. Finally, Panel A shows the average correlations of each country with all other country returns on group one and in group two. Also, it shows the average correlation of each country return with all industry returns (based only on the local industries of the countries in groups one or two respectively). The summary statistics show that over the full sample period, the average cross-country correlations as well as the correlations between the country and industry returns are slightly higher for group one.

Panel B reports the summary statistics for the Euro-wide industry returns. The industry with the highest mean return of 1.33% per month per year is technology. The null hypothesis that all mean returns are jointly equal to zero is rejected at the 1% level, while the null hypothesis that all industry mean returns are equal cannot be rejected. Among all industries, the financial sector has the largest capitalization and accounts for 29.91% of the Euro-wide market index.

Panel C reports the summary statistics for the pre- and post-Euro periods separately. To save space, we only report averages over all countries or industries. The panel shows that on average,

[5] Note that in the exclusive analysis we will remove overlapping components between country and industry indices. We also exclude the technology and telecommunications sectors as a robustness check.

the mean country and industry returns are lower in the post-Euro period. Whereas in the pre-Euro period, on average the countries in group one have lower mean returns and standard deviations than the countries in group two, this reverses in the post-Euro period.

The time-variation in cross-country and cross-industry correlations is displayed in Figure 1, which plots average correlations for 60-month rolling windows. Panel A reports the results for all eleven Euro-zone countries. The figure shows that for the first half of the sample period (i.e. windows ending before 2000), cross-industry correlations clearly exceed cross-country correlations. Then, average cross-country correlations increase while cross-industry correlations decrease. As a result, in the second half of the sample period the correlations between country returns are on average about the same as correlations between industry returns. Panels B and C report the results for groups one and two. When calculating the cross-industry correlations for group one, we use returns on ten industry indices that only include base assets from the six countries included in group one. Similarly, for group two we consider industry returns that only include assets from the five countries in group two. Panel B shows that for the first group, cross-industry correlations only exceed cross-country correlations in a few windows at the beginning of the sample period. In all windows ending after 1997, country returns are more highly correlated than industry returns. The pattern is similar for the countries in group two, but the reversal takes place much later: in windows ending after July 2002. Although very preliminary, the plots show that cross-country and cross-industry correlations vary over time and that there might be important differences between the patterns observed in the countries with strong pre-EMU economic links (group one) and countries with weaker pre-EMU linkages (group two).

4 Results

We examine the relative importance of country and industry effects in Euro-zone equity returns using style analysis. We consider the following questions: to what extent is the time series volatility of country returns accounted for by their industry mimicking portfolios or is there a large fraction of country return volatility that is country-specific and unrelated to industry structure? And what is the fraction of Euro-wide industry returns that is industry-specific and unrelated to their country composition? We first compare country and industry replicating portfolios for the full set of Euro-zone equity returns.

4.1 Country versus Industry Effects in Euro-Zone Equity Returns

Table 2 shows the compositions of the Euro-zone country and industry replicating portfolios for all eleven countries, estimated over the full sample period. The columns 'Smpl.' report the coefficients of the simple style regressions, while the columns 'Excl.' report the coefficients of the exclusive analysis, for which the assets included in a test index are excluded from the benchmark portfolios used to replicate it.

By comparing the coefficients of the simple and the exclusive style analyses, we can infer whether a certain benchmark has a large weight in the replicating portfolio because of large overlapping components with the test asset or because its ability to mimic its returns. Indeed, we find that in some cases large coefficients disappear after the elimination of overlapping elements, whereas in other cases the weights remain large. For instance, the results displayed in Table 2, Panel A show that in the simple style analysis the Financial industry portfolio generally receives large weight in the replicating portfolios for individual countries. In the exclusive style analysis, when the country test asset is removed from the benchmark industry indices, the coefficients of the Financial industry remain large. This suggests that Financials are important for replicating country returns. Germany and France, the two main economies in our sample, are important elements of the replicating portfolios for most industries, as can be seen in Panel B. Conversely, the weight of the Technology industry in the replicating portfolio of Finland drops from 69% to 20% after exclusion of the Finnish components. Similarly, the weight of the Dutch index in the replicating portfolio for the Oil and Gas industry decreases from 64% to 14% when the Oil and Gas stocks are excluded from the Dutch index returns.

Overall, most coefficients do not seem to be affected much by the exclusion of test asset-specific components from the benchmarks. To shed some light on this, we compute the Spearman rank correlation between the coefficients of the simple style regressions and those of the exclusive style regressions. These are presented in the last rows of Panels A and B. A large positive rank correlation coefficient implies that the elimination of the overlapping components has not affected the relative importance of the benchmark indices much. For all countries except for Italy, the estimated rank correlation is positive. Moreover the positive rank correlations are all statistically significant except for Germany, France and Spain. The coefficients of the country benchmark returns in the industry style portfolios are affected less by the exclusion of overlapping components. Panel B shows that the estimated rank correlation coefficients are all positive and except for Oil and Gas they are significant at the 1% level.

We evaluate the replicating abilities of country and industry portfolios by considering the value- and equally weighted average R^2s over all (industry- or country-) test assets, which are reported in columns two and five of Table 3. Panel A reports the results of the simple style regressions. We first discuss the value-weighted averages of the individual style regressions' R^2s, where the weights are based on the average weights of the countries and industries in the Euro-wide market index over the estimation period. When country styles are replicated by industry benchmark assets, the value-weighted average R^2 is 82%. Replicating industry styles in terms of country benchmark returns leads to an average R^2 of 76%. After removal of overlapping components, Panel B shows that the average R^2s both decrease (by about 10% and 9% respectively), as it is more difficult to mimic a test portfolio if the benchmark indices do not contain any assets included in that test portfolio. Next, we test whether the difference in average R^2s is significant. Table 3 shows that the difference in average R^2s is statistically significant both for the simple style regressions (the p-value is 0.004) and the exclusive style regressions (the p-value is 0.021). These value-weighted average R^2s suggest that over the full sample period, industry benchmark portfolios can explain a larger fraction of country variance than vice versa, even when excluding overlapping components.

When considering equally weighted average R^2s, the picture is different. For both the simple and the exclusive regressions, the equally weighted average R^2s are always lower than the value-weighted averages. This indicates that the returns on the larger (i.e. in terms of market capitalization) countries and industries are generally easier to replicate. Additionally, in contrast to the value-weighted average R^2s, based on equally weighted averages, country benchmark portfolio can better explain industry variance than vice versa. For instance, in the simple regressions, the equally weighted average R^2s taking countries or industries as benchmark assets are 72% and 66% respectively. We simulate the empirical distributions of the equally weighted average R^2s and find that the difference is significant at the 5% level. For the exclusive regressions, the difference is not statistically significant. As we discuss below, there is only one more situation in which the conclusions based on equally or value weighted averages differ: style regressions for group two based on the full sample period. However, all other conclusions are similar for equally and value-weighted average R^2s. In addition, these differences only occur for style regressions based on the full sample period, while our main interest is in how the comparison of country and industry effects changes over time. In the remainder of the paper we focus mostly on value-weighted averages as these account for differences in market capitalization across countries and industries.

During our sample period from 1990 to 2008, the Euro-zone countries underwent significant changes in terms of their monetary and economic policies. In particular, in January 1999 the Euro was adopted. Hence, assuming that Euro-zone equity returns have constant exposures to country or industry factors over this period is likely to be overly stringent. Therefore, we perform our style analysis for the pre-Euro period (up to December 1998) and post-Euro period (as of January 1999) separately. In order to test whether the differences in average R^2s are statistically significant, we simulate their empirical distributions in the two sub sample periods separately to allow for changes in covariances over time. Table 3 reports the results.

We find that before the introduction of the single currency country returns can better replicate industry returns than vice versa. For both the simple and exclusive style regressions the difference in value-weighted average R^2s is small (e.g. 84% versus 80% in the simple style regressions) and it is not statistically significant. The difference in equally weighted average R^2s is more substantial (64% versus 80% in the simple style regression) and statistically significant in both Panels A and B. In the post-Euro period however, we find that industry can better replicate country styles than vice versa. The value-weighted average R^2 for the simple style regressions is 88% when industry portfolios are benchmark assets, while it is only 74% when country returns are used as benchmark assets. The difference is statistically significant at the 1% level. Similar conclusions hold for the exclusive style regressions. For this sub sample period, the difference in equally weighted average

R^2s is smaller, and is only statistically significant for the exclusive regressions.

Next, rather than investigating two specific sub sample periods, we allow for time variation in volatilities and correlations by using 60-month rolling windows. Figure 2 Panel A displays the time series of value-weighted average R^2 for the simple style analysis. The weights depend on the average index weights of the test assets in the Euro-wide index during the particular window. Panel A shows that in the first one-third of the rolling windows, industry styles can be replicated more closely with country portfolios than country styles with Euro-wide industries, suggesting that during this period country effects dominate. The average R^2s are about 86% and 80% when using the countries and industries respectively as benchmark assets. However, in all windows ending after March 1999 (which is two months after the introduction of the Euro) the situation is reversed and industry effects appear to be more important. On average, during this period the regressions for country styles in terms of industry benchmarks yield an average R^2 of 87%, which is about 11 percentage points above that of the industry styles in terms of country benchmarks. Unreported results show that the exclusive style analysis yields similar results. The averages R^2s are slightly lower and the differences in mimicking abilities are even more pronounced. Also, based on equally weighted average R^2s, we observe a similar reversal. However, in line with the results in Table 3, after the two lines reverse the difference in average R^2s between country and industry benchmark portfolios is smaller.

4.2 Analyzing Two Subsets of Euro-Zone Countries

Our results suggest that before 1999 country effects dominate, while after 1999 industry effects are more important. Interestingly, this reversal takes place around the adoption of the Euro. We aim to shed more light on the role of the single currency by distinguishing between two groups of countries based on their pre-EMU economic linkages. If the introduction of the Euro affects which factors drive Euro-zone equity returns, the relative importance of country versus industry factors may be different for countries with stronger pre-Euro linkages (group one) and countries with weaker pre-Euro linkages (group two). The ex-ante expected impact of the introduction of the Euro on monetary and financial markets is lower for countries in group one than in group two. Therefore, in this section we perform our style analyses for the two groups of countries separately. We use two different sets of industry portfolios; when investigating group one, our industry returns are based only on assets from the six countries in group one. For group two we make similar adjustments to the industry returns.

Table 3 Panel A reports the simple style regressions' average R^2s. Columns two and five show that over the full sample period, industry portfolios can significantly better replicate country returns than vice versa for group one. The same holds for group two, based on value-weighted average R^2s. However, based on equally weighted average R^2s, country returns can better replicate industry returns for group two, although the difference is not significant.

Performing the style regressions for the pre- and post-Euro periods separately reveals important differences between groups one and two. When considering only assets from the countries with stronger pre-EMU economic linkages, we find that both in the pre-Euro period and in the post-Euro period industry returns have significantly better replicating abilities than country returns. The value-weighted average R^2s when replicating country styles using industry benchmark portfolios are 88% in the pre-Euro period and 93% in the post-Euro period. When country benchmark returns are used to replicate industry returns, the average R^2s are lower in both periods: 80% and 70% respectively. The results based on equally weighted averages are similar. In all cases, the difference in average R^2s taking countries or industries as benchmark assets is statistically significant.

In contrast, for countries with relatively weaker pre-EMU linkages (group two), we find that in the pre-Euro period country returns have slightly better replicating abilities than industry returns. The value-weighted average R^2 is 85% when industries are benchmark returns and 87% when countries are used as benchmark assets. The difference is marginally significant at the 10% level. In the post-Euro period however, this reverses and industries have significantly better replicating abilities. The value-weighted average R^2s are 85% and 64% respectively. Results based on equally weighted average R^2s are similar. Panel B reports the results of the exclusive regressions in which overlapping components between test and benchmark assets have been removed. These results confirm our previous findings and even show larger and more highly significant differences in average

R^2s.[6]

Panels B and C of Figure 2 reports the 60-month rolling window results of the value-weighted average R^2s of the simple style regressions for the two groups of countries. They confirm our findings: for group one, industry returns have superior replicating abilities in all windows. On the other hand, for group two we observe a reversal. Prior to March 1999, industry returns are easier to replicate with country portfolios than vice versa, while the reverse holds in windows ending after March 1999.[7]

These results suggest that the reversal in the relative importance of country and industry factors that we observe for the full set of Euro-zone countries is mainly due to the subset of countries for which the expected impact of the Euro is the largest. Indeed, the rolling window results show that the window in which the relative importance of country versus industry factors reverses is exactly the same for the countries in group two as for the complete set of Euro-zone countries. For the other set of countries, industry factors dominate country factors already before the single currency is introduced.

Before we further examine what causes the difference in results for groups one and two, we investigate the robustness of our results with respect to several issues: estimation error in the style coefficients, time-varying market volatility and the internet bubble.

4.3 Pseudo Style Regressions

In the style analysis, the weights of the benchmark assets in the test asset's replicating portfolio are estimated and they are assumed to be constant over the estimation period. As a robustness check,

[6] For the exclusive style regressions our sample period starts a few months later. The reason is that in group two, the technology sector only consists of Italian stocks up to that date. Hence, we cannot compute the return on this index excluding Italy. To make the results comparable for groups one and two, we start the exclusive style regressions for both groups of countries in August 1991.

[7] Unreported results show that the 60-month rolling window results of the exclusive style regressions are similar. The main difference is that for group one, in the first few windows country returns now have slightly better replicating abilities than industry returns. The reversal takes place in the window from September 1993 to August 1998. For group two the reversal takes place in the window from November 1996 to October 2001. Results based on equally weighted averages are similar as well.

in this section we propose an alternative methodology with time-varying and observable weights. We refer to this approach as 'pseudo style regressions.' We construct a mimicking industry portfolio for a specific country i by using as coefficients the weights of the local industries in that country index:

$$R_{i,t}^{x} = c_i + \sum_{j=1}^{N} w_{i,j,t-1} R_{j,t}^{y} + \varepsilon_{i,t}^{x} \tag{3}$$

where $w_{i,j,t-1}$ is the weight of local industry j in the index of country i, based on market values at $t-1$. Thus the pseudo mimicking portfolio of the French index consists of a weighted sum of all Euro-wide industry indices, where the weights are the market value weights of the French industries in the French country index. We perform the same type of pseudo style regressions taking industries as test assets. We use returns on full indices as benchmark portfolios as well as returns on indices excluding overlapping assets with the test portfolio. The coefficients of the pseudo regressions are observable at the beginning of each period, they are time-varying and they do not suffer from estimation error. By construction, portfolio and positivity constraints on the weights are always satisfied. The pseudo regression can therefore be interpreted as a style regression with time-varying and predetermined slope coefficients and we can interpret the pseudo regression's R^2 as a measure of the fraction of country return variance that is not captured by its industry replicating portfolio (and vice versa).

First, we compare the weighted average R^2s of the pseudo regressions to the results of the style analysis. The results for the full sample and the pre- and post-Euro periods are reported in Table 4. Panel A reports the results for the 'simple pseudo regressions' in which test and benchmark assets have components in common. Panel B reports the exclusive results, when the overlapping components have been removed from the benchmark portfolios. These results are directly comparable to the results reported in Table 3. Indeed, the patterns are very similar to those of the style analysis, but the average R^2s are a few percentage points lower. The main difference is that in the exclusive pseudo regressions for group one, country returns have better replicating abilities than industry returns in the pre-Euro period. However, the average R^2s are very close (the value-weighted average R^2 is 66% when countries benchmark assets and 64% when industries are benchmark assets, the equally weighted averages are 57% and 56% respectively). In contrast, the usual style analysis discussed in the previous section shows that for this group of countries, industry returns have superior mimicking abilities both before and after the introduction of the Euro. Unreported results show that rolling windows average R^2s of the pseudo regressions are very similar to those of the style analysis. These results confirm and reinforce our findings in the preceding section.

4.4 Other Robustness Checks

In addition to the pseudo regressions we conduct two further robustness checks. To be concise, we do not report the results but we briefly discuss them below.[8]

First, in periods of high market volatility, a portfolio of benchmark assets may explain a smaller fraction of the variance of the test asset returns, not because of lower correlations but because of a higher aggregate variance. This may affect the results of our style analysis. We therefore adjust the methodology to incorporate time-varying aggregate market volatility by using scaled returns. We divide the time $t+1$ return by the estimated conditional market volatility over the same period, denoted by σ_t. Now we can interpret the scaled returns $\sigma_t^{-1} R_{t+1}$ as the payoff of an actively managed portfolio when each period ${\sigma_t}^{-1}$ is invested in the assets that are included in the vector of returns R. We scale both country and industry returns. Therefore, as the returns on the right hand side and the left hand side of the style regressions are scaled by the same variable σ_t, which is always positive, the portfolio and nonnegativity constraints are still valid. Engle's ARCH test (Engle, 1982) shows that the Euro-wide market index indeed exhibits volatility clustering. We estimate this time-varying market volatility using a simple GARCH(1,1) specification (Bollerslev, 1986), which we estimate by maximum likelihood.[9] We find that our style regression results are nearly identical after controlling for time-varying market volatility. This suggests that the changes in the relative performance of industry and country-based mimicking portfolios cannot be accounted for by changes in aggregate market volatility.

A second possible concern is the impact of the internet bubble on our findings. At the end of

[8] All unreported results are available upon request.

[9] We also estimated two asymmetric models: EGARCH(1,1) and the GJR(1,1) model but we find that for both models the leverage parameter is insignificant. This suggests that asymmetry may not be present in our data.

the nineties, the world equity markets were affected by the dot.com mania. During 1999, the level of the Nasdaq composite index doubled. However, the internet and information technology bubble burst in the beginning of 2000 when on April 14^{th} - “Black Friday”- the Nasdaq index dropped to a level more than 34% below the peak on 10 March.[10] Using firm-level stock returns from 42 countries, Brooks and Del Negro (2004) suggest that the increasing importance of industry factors may be an artefact of the internet bubble, and show that controlling for the bubble accounts for most of the change in industry importance. However, their results also show that for Western Europe, industry effects are increasingly important with respect to country effects, with or without the technology sector. To distinguish the impact of the introduction of the Euro at the beginning of 1999 from this internet bubble, we perform all analyses excluding the telecommunications and technology sectors from the country and industry returns. In line with our previous results, we find that, when we exclude the two IT sectors, in Euro-zone equity markets country factors dominate in the pre-Euro period, while industry factors dominate during the post-Euro period. This reversal again appears to be mainly due to the countries with weaker pre-EMU economic linkages. For the remaining six countries, industry factors dominate during the entire sample period.

5 Discussion

Our results show that in the pre-Euro period the relative importance of country and industry effects is different for countries with tighter economic links with Germany and lower pre-Euro currency volatility than for countries with looser links and higher exchange rate volatility. After the launch of the common currency the pattern of dominance of industry over country effects is similar in the two groups of countries. These different patterns across countries and over time could be related to differences and changes in currency risk exposure and/or changes in financial market integration across countries and over time periods. This section further examines these questions. We first explicitly control for pre-Euro currency risk. Then, we examine the integration of the different countries in the Euro-zone and global equity markets.

[10] Source: ‘After the gold rush’, The Economist, April 20th 2000.

5.1 Currency Risk before the Adoption of the Euro

Before January 1999, Euro-zone equity returns are subject to currency risk within the EMU area. We use German Mark denominated returns, which are roughly equal to the local currency return on the foreign assets minus the change on the foreign currency/ German Mark exchange rate.[11] Hence, currency risk may affect the covariance structure of Euro-zone equity returns in the pre-Euro period when they are all expressed in one numeraire currency. Whereas the German Mark denominated return on a foreign country index only includes one currency component, the German Mark denominated return on a Euro-wide industry index includes a basket of different currency components. Consequently, when comparing country and industry effects in Euro-zone equity returns, pre-1999 currency risk may play a role. Moreover the impact of currency risk before 1999 and of the elimination of intra-EMU zone currency risk after 1999 on financial markets may differ across countries. In this section we examine to what extent the different results in the pre-Euro period between groups one and two is due to exchange rate changes.

We find that in the pre-Euro period, the cross-country correlations in group two are lower than in group one (0.51 versus 0.67, see Table 1 Panel C). The pre-Euro local currencies of the countries in group one are more tightly linked to the German Mark than those of the countries in group two. Hence, we would expect this currency component to be more important for the country returns in group two, which could explain (part of) the lower cross-country correlations in that group. Of course, the correlations could also be lower if country-specific risks play a more important role compared to Euro-wide or even global risks, which is the topic of investigation in the next section.

We explicitly control for currency risk in the pre-Euro period in two ways. First, we include exchange rate changes as additional explanatory variables in the style regressions. If exchange rate changes are an important component of country return variation that is not captured by Euro-wide industry returns, adding exchange rate changes as additional explanatory variables to the set of industry benchmark assets is likely to increase the style regressions' R^2s. When considering all eleven countries, we add exchange rate changes of all pre-Euro currencies with respect to the German Mark to both country and industry benchmark assets. When considering groups one

[11] For continuously compounded returns this holds exactly.

or two, we only include the respective subset of exchange rate variables. We perform the style regressions (simple and exclusive) for the pre-Euro period only.[12]

Table 5 Panel A reports the results. Comparing these results to Table 3, we see that all average R^2s indeed increase, as would be expected when adding more explanatory variables. Comparing groups one and two, we see that when replicating country returns with industry benchmark returns and exchange rate changes, the average R^2s increase substantially more for group two. For instance, for the simple style regressions, the value- and equally weighted average R^2s for group one increase by 1% and 3% respectively. For group two however, the value-weighted average R^2 increases by 4% and the equally weighted average R^2 increases by 11% (from 58% to 69%). The increases are even more dramatic for the exclusive regressions: 20% and 22% for the value- and equally weighted average R^2s. When taking country returns and exchange rate changes as benchmark assets to explain industry return variation, the R^2s do not nearly increase as much for either group. These results suggest that exchange rate changes are one important source of country return variation that is not captured entirely by Euro-wide industry returns, while country returns capture enough of the currency movements that adding currency to equity indices to mimic industry returns does not improve performance significantly. This plays a more important role for the countries for which exchange rate risk with respect to the denominator currency is more prevalent. However, the conclusions on the relative importance of country versus industry effects do not change: in the pre-Euro period country effects appear more important for the full set of countries as well as for group two, whereas industry effects dominate for group one. This suggests that while pre-1999 currency risk plays a role, it cannot fully explain the differences in results for groups one and two.

Our second approach to controlling for currency risk is by using fully hedged returns, i.e. we use returns based on local currency denominated indices. Even though the exchange rate component has been eliminated, these local currency returns can still be affected by local monetary policy and inflation. The results are presented in Table 5 Panel B. The style regressions R^2s are strikingly similar to those based on German Mark denominated returns, for all eleven countries, groups one

[12] In contrast to the equity benchmark assets, the exchange rate variables are not subject to nonnegativity or portfolio constraints. However, the results are very similar when imposing these constraints in the exchange rate variables.

and two, and for simple as well as exclusive style regressions. This again suggests that the difference in pre-Euro results for countries with different degrees of pre-Euro exchange rate volatilities and economic linkages cannot be fully explained by pre-Euro currency risk.

5.2 Market Integration

The extent to which national equity markets are integrated within the region or within the world affects their covariance structures. A consequence of more integrated markets is a decreasing exposure to country-specific factors and an increasing in exposure to Euro-wide or global factors. Hence, the increasing importance of Euro-wide industry effects could be related to a higher degree of market integration within the Euro-zone. Several papers document an increasing level of integration due to the EMU convergence process (e.g. Fratzscher, 2002; Hartmann et al. 2003; Baele et al., 2004, Hardouvelis et al., 2006; Cappiello et al., 2008). Bartram and Karolyi (2006) also report a decreasing exposure of Euro-zone equity returns to country factors due to the reduction of foreign exchange rate risk.

Hence, our finding that before 1999 industry effects dominate for group one countries while country effects are more important for group two countries might be related to differences in the degrees of market integration. Therefore, for all countries in our sample, we consider their integration within the Euro-zone market, as well as their integration within the global equity market. We perform the following regression for each country return

$$R^x_{i,t} = c_i + \beta_i R_{W,t} + \gamma_i R_{EMU,t} + \varepsilon_{i,t}, \tag{4}$$

where $R_{W,t}$ is the world market return, which we proxy for by the return on the US equity market to avoid overlap with the Euro-zone. $R_{EMU,t}$ is the return on the value-weighted Euro-zone market index, orthogonalized with respect to $R_{W,t}$. Similar to, amongst others, Bekaert and Harvey (1997), Baele et al. (2004) and Eiling and Gerard (2007), we measure integration of country i within the world market and within the Euro-zone market using the following two variance ratios:

$$Int\_world_i = \frac{\beta_i^2 \sigma_W^2}{\sigma_i^2} \tag{5}$$

$$Int\_EMU_i = \frac{\gamma_i^2 \sigma_{EMU}^2}{\sigma_i^2} \tag{6}$$

where $\sigma^2_W = Var(R_{W,t})$, $\sigma^2_{EMU} = Var(R_{EMU,t})$ and $\sigma^2_i = Var(R^x_{i,t})$. If a country is highly integrated within the world market, a large share of the country return variance should be explained by its exposure to the world factor. Similarly, if a country is highly integrated within the Euro-zone, a large share of its variance is due to its exposure to the Euro-wide market factor. Also,.we sum the two variance ratios to measure the total fraction of country variance that can be captured by global and Euro-zone market factors. We examine these integration measures for the pre- and post-Euro periods as well as for 60-month rolling windows.

Table 6 reports the sub sample period results. First, column two shows that in the pre-Euro period, the countries in group one are indeed on average more highly integrated within the Euro-zone market than the countries in group two. On average, the Euro-zone market factor can explain 40% of the country return variation for group one, and 27% for group two. These are value-weighted averages. Equally weighted averages show a similar picture: 32% versus 22%. However, not all individual countries in group one are more highly integrated than the countries in group two. For instance, the integration measure is 0.11 for Finland, which belongs to group one, while it is 0.28 for Italy which belongs to group two. The fourth column shows that on average, in the pre-Euro period, countries in group one were more highly integrated in the world market than countries in group two. These results imply that in the pre-Euro period country factors are relatively less important for group one than for group two. This is in line with our finding that for group one, Euro-wide industry effects dominate during this period, while for group two country effects are more important.

Next, we examine how our integration measures change over time. Columns three and five report the regional and global integration measures in the post-Euro period. Interestingly, we find that on average, the share of country variance explained by the Euro-zone market factor (orthogonalized with respect to the world factor) has decreased for group one, while for group two it has increased. As a result, in the post-Euro period integration within the Euro-zone market is on average higher for group two than for group one. Column five of the table shows that on average, in both groups countries have become more integrated within the world market. The world market integration measure is on average substantially higher for group one (57%) than for group two (40%). Equally weighted averages show similar patterns.

Figure 3 shows the integration measures for 60-month rolling windows. These are all based on value-weighted averages over individual countries. The equally weighted results are similar. First, Panel A reports the Euro-zone integration measures. The bold line represents the average over all group one countries, while the dotted line represents group two countries. The solid line is the average over all eleven countries. The picture confirms the results in Table 6: roughly in the first half of the windows, countries in group one are more integrated within the Euro-zone than countries of group two. The situation is reversed during the second half of the rolling windows. Panel B shows the world market integration measures. Note that for both groups one and two the world market integration measures trend upward, except for the last few windows. Throughout, countries in group one are on average more highly integrated in the world market. In the last few windows, world market integration decreases for both groups, while European market integration increases. This could be related to the subprime mortgage crisis that started in the US in 2007. Finally, we examine the total share of country return variance due to both Euro-wide and global factors, i.e. we add the two integration measures. The remainder of the total variance is country-specific. Panel C shows the results. Indeed, we find that in all windows, the share of total variance that is country-specific is greater for group two than for group one. In other words, on average, countries in group one are more highly integrated within the Euro-zone and global equity markets. However, countries in group two are rapidly becoming more integrated. Whereas in the early 1990s about 50% of their country return variance was due to world and Euro-zone factors, in recent years this has increased to over 70%.

In conclusion, we find that in the pre-Euro period, countries with lower exchange rate volatilities and tighter economic linkages with Germany before the EMU are on average more highly integrated within the Euro-zone market and the world market than countries with looser economic links and more volatile pre-Euro currencies. This implies that for the latter group of countries, country-specific risks are relatively more important. These results are consistent with our finding that for the first group, industry effects dominate country effects as in the early 1990s, whereas for the second group this happens only around the start of the new millennium. This section emphasizes the tight link between the country-industry debate and financial market integration.[13]

6 Conclusion

The debate about the relative importance of country versus industry factors as determinants of international equity returns has been ongoing in the international finance literature for over 30 years. This paper focuses on the Euro-area between 1990 and 2008. Over the span of these 19 years, countries in the Euro-area underwent substantial changes. As part of the Economic and Monetary Union integration process, monetary policies and to some extent fiscal policies converged. Also, trade barriers were lowered and the introduction of the Euro in January 1999 effectively eliminated all intra Euro-zone currency risk. These developments are likely to have substantial implications for the structure of Euro-zone equity returns.

Using style analysis, we examine which share of country return variance can be captured by Euro-wide industry returns and vice versa. This is equivalent to assessing whether industry portfolios can replicate country returns and vice versa. If industry effects dominate, we expect industry portfolios to replicate country returns better than the other way around.

We find that in the pre-Euro period between February 1990 and December 1998, country effects dominate. However, after 1999 this reverses and we find that in the nine years after the introduction of the Euro industry effects are more important. When we distinguish between countries with high exchange rate volatility and weak(er) economic links with Germany and countries with less volatile currencies and strong(er) economic links with Germany pre-EMU, we find remarkably different results across the two groups. For the group with the strongest pre-Euro linkages (Germany, France, the Netherlands, Belgium, Austria and Finland), industry factors dominate throughout the sample period. In contrast, for the group with the weakest pre-Euro linkages (Italy, Spain, Portugal, Greece and Ireland) our results show that before the Euro country effects dominate, while industry effects become more important after 1999. These conclusions are robust for the TMT bubble and time-varying aggregate volatility.

While the elimination of intra Euro-zone currency risk in 1999 accounts for part of these pat-

[13] This link is also discussed by amongst others, Adjaoute and Danthine (2003a) and Campa and Fernandes (2006).

terns, it is not sufficient to fully explain the reported changes. Overall, the patterns in country and industry effects that we observe in Euro area equity returns are consistent with the effect of time-varying financial market integration. We examine the integration of the Euro-zone countries in both the Euro-zone regional market as well as the global market. We find that the markets for which industry effects dominate over the entire sample period have already been highly integrated within the world and European markets from the start of the sample period. While these countries experience a slight increase in their degree of overall financial integration over the sample period (i.e. in both the Euro-zone and world markets), the most salient feature is the increasing impact of global factors and the decreasing role of Euro-zone specific factors. On the other hand, the second group of countries started the sample period being mildly integrated within Euro-zone and world markets and experienced a substantial increase in integration with both the Euro-zone and global markets. Indeed, for more integrated equity markets, local country factors matter little both before and after 1999. The second group of countries is rapidly reaching a similar level of overall integration with the parallel decrease in the importance of local country factors.

As equity markets are becoming increasingly integrated within regions, perhaps the traditional country-industry debate may soon shift focus from countries to regions as the relevant geographic factors.

Appendix: Test for Differences in Style Regressions' R^2s

We evaluate the statistical significance of differences in replicating abilities of country and industry portfolios by performing Monte Carlo simulations for the style regressions' average R^2s.

We assume that the returns on the local industries are multivariate normally distributed. There are two issues that keep us from using the standard estimation techniques for the mean returns and the covariance matrix. First, not all local industries are available for the full sample period. Some local industries start later than February 1990 and others end before May 2008.[14] To make full use of the available data, we implement the maximum likelihood estimators of the mean vector and covariance matrix proposed by Stambaugh (1997). These estimators use all available data to estimate the moments of the returns distribution and exploit the fact that series with long histories provide additional information on the moments of shorter history series. The estimates of the means and covariances of shorter history return series are based on regressions of these shorter history local industry returns on all longer history local industries (for the period in which they are all available).[15]

Second, the number of observations is small relative to the number of local industries. In this case, the usual sample covariance matrix imposes too little structure and can be singular for short sample periods. Ledoit and Wolf (2003) propose a shrinkage technique to alleviate this problem. The estimate of the covariance matrix is a weighted average of the sample covariance matrix and a shrinkage target, for which a single index model is used. We follow Ledoit and Wolf (2003) and use the equally weighted Euro-wide market portfolio for this single index model. The weight of the shrinkage target (i.e. the shrinkage intensity) determines how much structure is imposed. The

[14] Out of 110 local industries, two are unavailable over the entire sample period. 81 local industries are available for the full sample, 24 become available at a later date and three start later and end earlier.

[15] Because some local industries have a very short history, the number of independent variables would exceed the number of observations in the regressions. We therefore only select the returns of the same country or the same industry as independent variables. Furthermore, Stambaugh assumes that all assets end at the same time T and survival probabilities are not taken into account. In our sample three local industries end earlier (they are 'dead' indices). As the ending dates are assumed to be deterministic and independent of the distributions, we apply the methodology for the different ending dates as well.

optimal shrinkage intensity depends on the correlation between the estimation error of the sample covariance matrix and the estimation error of the shrinkage target. The benefits of this approach increase as the correlation between the estimation error of the target and the sample estimate decreases and the shrinkage intensity increases. Also, a positive semidefinite covariance matrix is guaranteed.

We use our estimates of the first and second moments of the returns on all local industries to generate simulated returns for on the local industries. We derive the empirical distribution of the style regressions' R^2s and test the significance of the difference in R^2. As starting values of the market values ($MV_{i,j,t}$) of the local industries we use the actual value of these indices observed on the start date of our sample period. We then simulate the returns on the local industry indices for all T months. When a certain index is unavailable at time t, it is also unavailable at time t in the simulated time series. We construct the value-weighted country and Euro-wide industry indices from these simulated local industry returns and market values and perform simple and exclusive style analyses using the returns on the simulated country and industry indices. Also, from the full set of simulated returns on all local industries, we select the local industry returns and market values for the countries that are in group one and in group two and we construct country and industry returns for these two groups as well. We use the same algorithms to construct country and industry indices and to run the style regressions in the simulation as we do in the actual estimation. The only deterministic parameters that enter the simulations are T, K, N, the starting values of $MV_{i,j,t}$, the starting and ending dates of the local industry indices and the parameters of the normal distribution. Each simulation results in a value of the average R^2 taking countries as benchmarks and a value of the average R^2 taking industries as benchmarks for the full set of eleven countries, as well as for the countries in groups one and two. We perform 10,000 simulations and test the significance of the difference in mimicking abilities by considering the difference in average R^2s. We allow for changing volatilities and covariances over time by estimating the mean returns and the covariance matrix for the pre-Euro, the post-Euro and the full sample periods separately.

References

[1] Adjaouté, Kpate., Jean-Pierre Danthine, 2001, EMU and portfolio diversification opportunities, CEPR discussion paper No. 2962.

[2] ———, 2003a, Equity returns and integration: Is Europe changing?, *Oxford Review of Economic Policy* 20, 555-570.

[3] ———, 2003b, European financial integration and equity returns: A theory-based assessment, FAME Research Paper No. 84.

[4] Baca, Sean P., Brian L. Garbe, Richard A. Weiss, 2000, The rise of sector effects in major equity markets, *Financial Analysts Journal*, September/ October, 35-40.

[5] Baele, Lieven, Annalisa Ferrando, Peter Hördahl, Elizaveta Krylova, and Cyril Monnet, 2004, Measuring European financial integration, *Oxford Review of Economic Policy* 20, 509-530.

[6] Baele, Lieven, Koen Inghelbrecht, 2005, Structural versus temporary drivers of country and industry risk, *Journal of Empirical Finance*, Forthcoming.

[7] Bartram, Sohnke M., Andrew Karolyi, 2006, The impact of the introduction of the Euro on foreign exchange rate risk exposures, *Journal of Empirical Finance,* 13, 519-549.

[8] Bekaert, Geert, Campbell Harvey, 1997, Emerging equity market volatility, *Journal of Financial Economics* 43, 29-77.

[9] Bekaert, Geert, Robert J. Hodrick, and Xiaoyan Zhang, 2008, International stock return comovements, *Journal of Finance,* Forthcoming.

[10] Bollerslev, Tim, 1986, Generalized autoregressive conditional heteroskedasticity, *Journal of Econometrics* 31, 307-327.

[11] Brooks, Robin, Marco del Negro, 2004, The rise in comovement across national stock markets: Market integration or IT bubble?, *Journal of Empirical Finance*, 649-680.

[12] Dumas, B. and B. Solnik, 1995, The world price of foreign exchange risk, *Journal of Finance* 50, 445-479.

[13] Campa, José Manuel, and Nuno Fernandes, 2006, Sources of gains form international portfolio diversification, *Journal of Empirical Finance* 13, 417-443.

[14] Cappiello, Lorenzo, Marco Lo Duca, and Angela Maddaloni, 2008, Country and industry equity risk premia in the Euro area: An intertemporal approach, Working paper European Central Bank.

[15] Carrieri, Francesca, Vihang Errunza, Sergei Sarkissian, 2004a, Industry risk and market integration, *Management Science* 50, 207-221.

[16] ———, 2004b, The dynamics of geographic versus sectoral diversification: Is there a link to the real economy?", Unpublished working paper, McGill University.

[17] Cavaglia, Stefano, Christopher Brightman, and Michael Aked, 2000, The increasing importance of industry factors, *Financial Analyst Journal* 56, 41-54.

[18] De Santis, Giorgio, Bruno Gerard, 1997, International asset pricing and portfolio diversification with time-varying risk, *Journal of Finance* 52, 1881-1912.

[19] ———, 1998, How big is the premium for currency risk?, *Journal of Financial Economics* 49, 375-412.

[20] Eiling, Esther, and Bruno Gerard, 2007, Dispersion, equity returns correlations and market integration, Unpublished working paper, University of Toronto and Norwegian School of Management.

[21] Ehling, Paul, Sofia B. Ramos, 2006, Geographic versus industry diversification: Constraints matter, *Journal of Empirical Finance* 13, 396-416.

[22] Engle, Robert F., 1982, Autoregressive conditional heteroskedasticity with estimates of the variance of United Kingdom inflation, *Econometrica* Vol. 50 No. 4, 987-1008.

[23] Ferreira, Miguel. A., Miguel Angelo Ferreira, 2006, The importance of industry and country effects in the EMU equity markets, *European Financial Management* 12, 341-373.

[24] Ferreira, Miguel A., Paulo M. Gama, 2005, Have world, country and industry risks changed over time? An investigation of the developed stock markets volatility, *Journal of Financial and Quantitative Analysis* 40, 195-222.

[25] Fratzscher, Marcel, 2002, Financial market integration in Europe: On the effects of EMU on stock markets, *International Journal of Finance and Economics* 7, 165-193.

[26] Griffin, John M. and Andrew Karolyi, 1998, Another look at the role of the industrial structure of markets for international diversification strategies, *Journal of Financial Economics* 50, 351-373.

[27] Grinold, Richard, Andrew Rudd, and Dan Stefek, 1989, Global factors: Fact or fiction? *Journal of Portfolio Management* 16, 79-88.

[28] Hardouvelis, Gikas A., Dimitrios Malliaropulos, and Richard Priestley, 2006, EMU and European stock market integration, *Journal of Business* 79, 365-392.

[29] Hartmann, Philipp, Angela Maddaloni, and Simone Manganelli, 2003, The Euro-area financial system: Structure, integration, and policy initiatives, *Oxford Review of Economic Policy* 19, 180-213.

[30] Heston, Steven L., K. Geert Rouwenhorst, 1994, Does industrial structure explain the benefits of international diversification?, *Journal of Financial Economics* 36, 3-27.

[31] Isakov, Dusan, Frederic Sonney, 2004, Are practitioners right? On the relative importance of industrial factors in international stock returns, *Swiss Journal of Economics and Statistics* 140.

[32] Ledoit, Olivier, Michael Wolf, 2003, Improved estimation of the covariance matrix of stock returns with an application to portfolio selection, *Journal of Empirical Finance* 10, 603-621.

[33] Lessard, Donald R., 1974, World, national and industry factors in equity returns, *Journal of Finance* 29, 379-91.

[34] Levy, Haim, Marshall Sarnat, 1970, International diversification of investment portfolios, *American Economic Review* 60, 668-675.

[35] Lustig, H. N, and A. Verdelhan, 2007, The cross-section of foreign currency risk premia and consumption growth risk, *American Economic Review* 97, 89-117.

[36] Moerman, Gerard A., 2008, Diversification in euro area stock markets: Country versus industry, *Journal of International Money and Finance* 27, 1122-1134.

[37] Ng, Angela, 2000, Volatility spillover effects from Japan and the U.S. to the Pacific-Basin, *Journal of International Money and Finance* 19, 207-233.

[38] Roll, Richard, 1992, Industrial structure and the comparative behavior of international stock market indices, *Journal of Finance* 47, 3-42.

[39] Rouwenhorst, K. Geert, 1999, European equity markets and the EMU, *Financial Analysts Journal*, May/ June, 57-64.

[40] Sharpe, William F., 1988, Determining a fund's effective asset mix, *Investment Management Review* December 1988, 59-69.

[41] ———, 1992, Asset allocation: Management style and performance measurement, *Journal of Portfolio Management* 18, 7-19.

[42] Solnik, Bruno, 1974, Why not diversify internationally rather than domestically?, *Financial Analysts Journal* 30, 48-54, reprinted in *Financial Analysts Journal* 51, 1995, 89-94.

[43] Stambaugh, Robert F., 1997, Analyzing investments whose histories differ in length, *Journal of Financial Economics* 45, 285-331.

Table 1: Summary Statistics of Euro-Zone Country and Euro-wide Industry Portfolio Returns

The table reports summary statistics of the monthly returns on EMU country and Euro-wide industry equity indices. Panel A concerns country returns for the eleven countries that adopted the Euro in January 1999 (excluding Luxembourg, including Greece). The countries are subdivided into two groups, based on the pre-EMU economic linkages with Germany. The panel reports variables indicative of these linkages: the cumulative depreciation of the pre-Euro currencies with respect to the German Mark ("cum.depr."), the volatility of monthly local currency/ German Mark exchange rate changes ("std.curr."), and the correlation between the changes in their local currencies/ British Pound exchange rate and the German Mark/ British Pound exchange rate ("corr(dem)"), all measured between Jan 72 and Jan 90. The last column gives the average (% p.a.) interest rate differential with respect to the German one-month interbank offered rate over the May 94 - Dec 98 period ("int.diff."). Group one includes the six countries with the lowest cumulative depreciation, currency volatility, and interest rate differential and generally the highest correlation with the DEM. Panel B concerns Euro-wide industry index returns for Oil and Gas ("OilGas"), Basic Materials ("BasicMat"), Industrials ("Indus"), Consumer Goods ("ConsGds"), Healthcare ("Healthc"), Consumer Services ("ConsServ"), Telecommunications ("Telcom"), Utilities ("Utils"), Technology ("Techno"), Financials ("Finan"). The means and standard deviations are given as percentages per month. corr(ctr) and corr(ind) are the averages of the correlations of the index return with each of the country indices and with each of the industry indices. Panel A only reports the correlations with the country and industry indices within groups one and two, while Panel B reports the correlations based on all Euro-zone countries and the Euro-wide industry returns. The columns 'weight' give the average weights of industries and countries in the Euro-wide market portfolio. The rows "average" report the averages over all countries (in group one and two) or all industries. Furthermore, Panels A and B report Wald tests of the null hypotheses that all mean returns are zero and that all mean returns are equal (p-values in parentheses). The sample period extends from February 1990 to May 2008 (220 observations). Panel C reports summary statistics (averaged over all countries or industries) for the pre-Euro (Feb 90 - Dec 98) and the post-Euro (Jan 99 - May 08) periods.

Panel A: Returns on Country Indices

	mean (%)	std. (%)	corr(ctr)	corr(ind)	weight (%)	cum.depr.	std.curr. (% p.a.)	corr(dem)	int.diff. (% p.a.)
Group 1:									
Belgium	0.86	4.40	0.65	0.64	3.92	0.53	3.33	0.95	0.13
Germany	0.77	5.41	0.73	0.75	26.33	NA	NA	NA	NA
Finland	1.44	9.31	0.51	0.51	2.98	0.88	7.16	0.71	0.25
France	0.95	5.25	0.72	0.74	25.29	1.15	5.42	0.85	0.64
Netherl.	1.01	4.70	0.73	0.73	14.45	0.14	2.57	0.97	-0.15
Austria	0.73	5.14	0.54	0.52	1.42	-0.03	2.65	0.97	-0.05
average	0.96	5.70	0.65	0.65	12.40	0.53	4.23	0.89	0.16
H_0: All country means are zero									(0.032)
H_0: All country means are equal									(0.667)
Group 2:									
Greece	1.55	10.15	0.42	0.42	1.23	9.09	9.67	0.57	10.97
Ireland	0.95	5.48	0.52	0.55	1.53	2.17	7.12	0.74	1.88
Italy	0.70	6.85	0.53	0.75	12.62	3.13	8.49	0.67	3.97
Portugal	0.60	5.03	0.54	0.53	1.13	9.60	9.14	0.62	3.67
Spain	1.08	5.98	0.61	0.71	9.09	2.20	9.84	0.55	2.96
average	0.98	6.70	0.53	0.59	5.12	5.24	8.86	0.63	4.69
H_0: All country means are zero									(0.073)
H_0: All country means are equal									(0.340)

Panel B: Returns on Euro-Zone Industry Indices					
	mean (%)	std. (%)	corr(ctr)	corr(ind)	weight (%)
OilGas	1.25	5.07	0.50	0.53	8.37
BasicMat	1.09	5.22	0.69	0.72	9.22
Indus	0.87	5.75	0.71	0.76	11.26
ConsGds	0.71	6.12	0.67	0.71	6.75
Healthc	0.90	3.92	0.58	0.61	8.50
ConsServ	0.74	5.24	0.70	0.73	7.67
Telcm	1.10	7.42	0.57	0.57	7.43
Utils	1.15	4.07	0.57	0.57	6.02
Techno	1.33	8.93	0.61	0.63	4.87
Finan	0.80	5.38	0.72	0.72	29.91
average	0.99	5.71	0.63	0.65	
H_0: All industry means are zero					(0.000)
H_0: All industry means are equal					(0.243)

Panel C: Summary Statistics Sub Sample Periods				
	average over all ctr or ind			
	mean (%)	std. (%)	c(ctry)	c(ind)
Group one Countries				
Pre-Euro	1.17	5.79	0.67	0.69
Post-Euro	0.76	5.57	0.64	0.62
Group two Countries				
Pre-Euro	1.41	7.90	0.51	0.62
Post-Euro	0.57	5.26	0.56	0.56
Euro-Zone Industries				
Pre-Euro	1.31	5.44	0.67	0.75
Post-Euro	0.69	5.90	0.61	0.58

Table 2: Style Analysis for Euro-Zone Countries and Industries

The table reports the benchmark portfolios style regression coefficients and the regression R^2s. The coefficients of each style regression are constrained to be positive and to sum to one. Panel A reports the style of countries in terms of industry benchmarks while Panel B reports the style of industries in terms of country benchmarks. The columns 'Smpl.' report the coefficients of the simple style analysis, while the columns 'Excl.' report the coefficients of the exclusive style analysis where the overlapping components with the test assets have been removed from the benchmark assets. The last rows of both panels give the Spearman rank correlation for the association between the style regression coefficients estimated with or without overlapping components in the benchmark assets. *, **, and *** denote significance at the 10, 5 and 1% levels respectively. We consider the eleven Euro-zone countries and ten Euro-wide industries.

Panel A: Country Styles in Terms of Industry Benchmarks												
	Belgium		Germany		Finland		France		Greece		Ireland	
	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.
interc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
OilGas	0.00	0.00	0.00	0.07	0.11	0.21	0.07	0.11	0.00	0.00	0.09	0.12
BasicM	0.14	0.15	0.11	0.08	0.05	0.08	0.04	0.06	0.09	0.02	0.06	0.03
Indus	0.00	0.00	0.44	0.18	0.00	0.00	0.21	0.24	0.00	0.00	0.00	0.00
ConsG	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.26	0.36	0.04	0.06
Healthc	0.36	0.43	0.00	0.04	0.00	0.00	0.24	0.13	0.00	0.00	0.16	0.10
ConsS	0.01	0.05	0.05	0.28	0.00	0.00	0.13	0.05	0.06	0.10	0.22	0.23
Telcm	0.00	0.00	0.07	0.00	0.07	0.42	0.05	0.16	0.06	0.04	0.00	0.00
Utils	0.20	0.10	0.03	0.06	0.08	0.00	0.00	0.00	0.21	0.29	0.21	0.25
Techno	0.00	0.00	0.03	0.09	0.69	0.20	0.13	0.01	0.02	0.04	0.00	0.01
Finan	0.29	0.27	0.27	0.20	0.00	0.09	0.09	0.24	0.29	0.16	0.22	0.21
R^2	74%	70%	91%	79%	62%	46%	90%	81%	25%	24%	56%	55%
rankcorr.	0.99***		0.50		0.66**		0.50		0.87***		0.94***	

Panel A (continued)										
	Italy		Netherlands		Austria		Portugal		Spain	
	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.
interc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OilGas	0.09	0.10	0.21	0.09	0.07	0.07	0.00	0.00	0.00	0.04
BasicM	0.00	0.05	0.11	0.24	0.47	0.45	0.00	0.00	0.00	0.00
Indus	0.00	0.02	0.00	0.02	0.00	0.00	0.04	0.06	0.00	0.00
ConsG	0.24	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.15
Healthc	0.00	0.00	0.10	0.14	0.15	0.18	0.33	0.36	0.00	0.11
ConsS	0.00	0.41	0.23	0.15	0.00	0.00	0.27	0.28	0.12	0.33
Telcm	0.32	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.22	0.14
Utils	0.00	0.15	0.00	0.04	0.21	0.20	0.14	0.11	0.33	0.01
Techno	0.00	0.12	0.05	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Finan	0.35	0.10	0.29	0.25	0.09	0.10	0.10	0.08	0.25	0.21
R^2	67%	51%	87%	80%	51%	48%	45%	44%	74%	64%
rankcorr.	-0.43		0.90***		0.81***		0.95***		0.45	

Panel B: Industry Styles in Terms of Country Benchmarks										
	OilGas		BasicMat		Indus		ConsGds		Healthc	
	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.
intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Belgium	0.00	0.24	0.08	0.07	0.00	0.00	0.02	0.03	0.46	0.51
Germany	0.00	0.03	0.20	0.16	0.57	0.50	0.36	0.19	0.00	0.00
Finland	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
France	0.02	0.06	0.17	0.18	0.36	0.39	0.22	0.19	0.21	0.06
Greece	0.00	0.00	0.02	0.03	0.00	0.00	0.04	0.04	0.00	0.00
Ireland	0.05	0.17	0.02	0.00	0.00	0.01	0.06	0.05	0.03	0.05
Italy	0.07	0.06	0.04	0.06	0.07	0.08	0.21	0.19	0.00	0.00
Netherl.	0.64	0.14	0.23	0.26	0.00	0.00	0.05	0.18	0.11	0.07
Austria	0.22	0.26	0.22	0.24	0.00	0.01	0.05	0.08	0.11	0.14
Portugal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16
Spain	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.00	0.00
R^2	48%	34%	82%	79%	91%	88%	77%	73%	59%	53%
rankcorr.	0.49		0.96^{***}		0.86^{***}		0.86^{***}		0.89^{***}	

Panel B (continued)										
	ConsServ		Telcm		Utils		Techno		Finan	
	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.	Smpl.	Excl.
intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Belgium	0.00	0.00	0.00	0.00	0.41	0.23	0.00	0.00	0.19	0.15
Germany	0.31	0.38	0.25	0.11	0.00	0.00	0.18	0.30	0.30	0.22
Finland	0.01	0.02	0.16	0.21	0.00	0.00	0.43	0.19	0.00	0.01
France	0.26	0.18	0.04	0.24	0.00	0.00	0.39	0.43	0.05	0.23
Greece	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.03
Ireland	0.04	0.04	0.00	0.00	0.05	0.17	0.00	0.00	0.01	0.02
Italy	0.10	0.09	0.26	0.21	0.02	0.05	0.00	0.08	0.14	0.09
Netherl.	0.11	0.08	0.00	0.00	0.01	0.12	0.00	0.00	0.21	0.15
Austria	0.00	0.00	0.00	0.00	0.15	0.19	0.00	0.00	0.02	0.08
Portugal	0.06	0.08	0.02	0.01	0.05	0.07	0.00	0.00	0.00	0.00
Spain	0.10	0.13	0.29	0.21	0.31	0.16	0.00	0.00	0.06	0.02
R^2	85%	83%	65%	55%	51%	37%	75%	59%	88%	75%
rankcorr.	0.95^{***}		0.77^{***}		0.90^{***}		0.80^{***}		0.81^{***}	

Table 3: Overview Results Style Regressions

The table presents the results of the style analysis for the full sample period, as well as for the pre-Euro period (February 1990 - December 1998) and post-Euro period (January 1999 - May 2008). The style regressions are performed for the complete set of 11 Euro-zone countries and for the subsets of countries in group one (Belgium, Germany, Finland, France, Netherlands, Austria) and group two (Greece, Ireland, Italy, Portugal and Spain). In the style regressions for groups one and two, the industry portfolios contain only components from the six or five countries in that group. In style regressions for all eleven countries, the Euro-wide industry returns are used. The table reports the equally (EW) and value weighted (VW) average R^2s of the style regressions. The value weights are determined by the weights of the test assets in the value-weighted index of all countries under consideration (i.e. the Euro-wide index, or the value-weighted indices of the group one or group two countries). Panel A reports the results of the simple style analysis where the test assets and benchmark assets have some components in common. Panel B reports the results of the "exclusive" style regressions where these overlapping components have been removed from the benchmark assets. For instance, if France is the test asset, the industry benchmark returns all exclude their French components. Due to lack of data availability, we can only compute the exclusive industry indices for group two as of August 1991. Therefore, in Panel B, the sample period for groups one and two starts in August 1991. 'Ctr styles in terms of ind bench' reports the average R^2 of the style regression where industry benchmark assets replicate the style of country indices. 'Ind styles in terms of ctr bench' shows the results of the country benchmark assets replicating industry styles. The table also reports p-values of the null hypothesis that the difference in average R^2s taking countries and industries as test assets equals zero. We calculate these p-values by simulating the distribution of the difference in average R^2s. We estimate different distributions for the two sub sample periods.

Panel A: Simple Style Analysis						
	VW average R^2			EW average R^2		
	Full sample	Pre-Eur	Post-Eur	Full sample	Pre-Eur	Post-Eur
All 11 countries						
Ctr styles in terms of ind bench	0.82	0.80	0.88	0.66	0.64	0.73
Ind styles in terms of ctr bench	0.76	0.84	0.74	0.72	0.80	0.70
p-value	(0.004)	(0.646)	(0.000)	(0.015)	(0.000)	(0.404)
Group one						
Ctr styles in terms of ind bench	0.89	0.88	0.93	0.76	0.75	0.81
Ind styles in terms of ctr bench	0.72	0.80	0.70	0.65	0.71	0.64
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Group two						
Ctr styles in terms of ind bench	0.82	0.85	0.85	0.59	0.58	0.69
Ind styles in terms of ctr bench	0.77	0.87	0.64	0.68	0.81	0.52
p-value	(0.024)	(0.074)	(0.000)	(0.852)	(0.083)	(0.000)

Panel B: Exclusive Style Analysis						
	VW average R^2			EW average R^2		
	Full sample	Pre-Eur	Post-Eur	Full sample	Pre-Eur	Post-Eur
All 11 countries						
Ctr styles in terms of ind bench	0.72	0.66	0.83	0.58	0.56	0.68
Ind styles in terms of ctr bench	0.67	0.77	0.64	0.64	0.74	0.61
p-value	(0.021)	(0.188)	(0.000)	(0.444)	(0.000)	(0.020)
Group one						
Ctr styles in terms of ind bench	0.79	0.73	0.87	0.67	0.65	0.73
Ind styles in terms of ctr bench	0.61	0.70	0.59	0.54	0.61	0.55
p-value	(0.000)	(0.003)	(0.000)	(0.000)	(0.006)	(0.000)
Group two						
Ctr styles in terms of ind bench	0.46	0.45	0.61	0.36	0.32	0.52
Ind styles in terms of ctr bench	0.63	0.77	0.47	0.58	0.75	0.41
p-value	(0.061)	(0.053)	(0.002)	(0.003)	(0.001)	(0.003)

Table 4: Results Pseudo Style Regressions

This table reports the results of the pseudo style regressions. When considering all 11 Euro-zone countries, we use the weights of each country component in a Euro-wide industry portfolio and the weights of each industry in country portfolio as time-varying and observable regression coefficients. When considering the countries in groups one or two, we use only the industry returns from those countries and calculate the weights correspondingly. These pseudo replicating portfolios represent true trading strategies and are not subject to estimation error. Panel A reports the results of the "simple" pseudo regressions in which the test and benchmark assets have some components in common. Panel B reports the results of the "exclusive" pseudo style regressions, in which the overlapping components have been removed from the benchmark assets. Due to lack of data availability, we can only compute the exclusive industry indices for group two as of August 1991. Therefore, in Panel B, the sample period for both groups one and two starts in August 1991. The table shows the equally (EW) and value weighted (VW) averages of the pseudo regressions' R^2s, where the value weights are determined by the weights of the test assets in the value-weighted index of all countries under consideration (i.e. the Euro-wide index, or the value-weighted indices of the group one and group two countries). The analysis is done for the full sample period, as well as for the pre-Euro period (February 1990 - December 1998) and post-Euro period (January 1999 - May 2008).

Panel A: Simple Pseudo Regressions

	VW average R^2			EW average R^2		
	Full sample	Pre-Eur	Post-Eur	Full sample	Pre-Eur	Post-Eur
All 11 countries						
Ctr styles in terms of ind bench	0.81	0.78	0.86	0.63	0.61	0.66
Ind styles in terms of ctr bench	0.73	0.83	0.61	0.68	0.79	0.54
Group one						
Ctr styles in terms of ind bench	0.89	0.86	0.92	0.75	0.73	0.75
Ind styles in terms of ctr bench	0.68	0.79	0.58	0.61	0.70	0.51
Group two						
Ctr styles in terms of ind bench	0.81	0.80	0.83	0.56	0.50	0.65
Ind styles in terms of ctr bench	0.77	0.87	0.60	0.69	0.82	0.49

Panel B: Exclusive Pseudo Regressions

	VW average R^2			EW average R^2		
	Full sample	Pre-Eur	Post-Eur	Full sample	Pre-Eur	Post-Eur
All 11 countries						
Ctr styles in terms of ind bench	0.69	0.60	0.79	0.54	0.50	0.59
Ind styles in terms of ctr bench	0.60	0.75	0.45	0.55	0.71	0.38
Group one						
Ctr styles in terms of ind bench	0.77	0.64	0.85	0.62	0.56	0.64
Ind styles in terms of ctr bench	0.52	0.66	0.42	0.45	0.57	0.35
Group two						
Ctr styles in terms of ind bench	0.38	0.26	0.57	0.26	0.10	0.45
Ind styles in terms of ctr bench	0.61	0.76	0.40	0.56	0.75	0.33

Table 5: The Role of Currency Risk Before the Introduction of the Euro

This table investigates the role of currency risk within the Euro-zone for our pre-Euro style regression results. Panel A reports the style regression results in which local pre-Euro currencies/ German Mark exchange rate changes are included as additional independent variables. We perform these analysis for all eleven countries, as well as for the six countries in group one and the five countries in group two. The style regressions only include the currencies of the countries under consideration. The exchange rate variables are not subject to the nonnegativity and portfolio constraints, while country and industry benchmark assets are. Panel B reports the style regression results based on fully hedged returns, i.e. country and industry returns in local pre-Euro currencies. Both panels report the style regressions' equally (EW) and value (VW) weighted average R^2s, where the value weights are the average weights of the test assets in the value-weighted index of all countries under consideration. We consider only the pre-Euro sample period that runs from February 1990 to December 1998. Both panels report results of simple style regressions and exclusive style regressions, in which overlapping components between test and benchmark assets have been removed. Due to lack of data availability, we can only compute the exclusive industry indices for group two as of August 1991. Therefore, in the exclusive regressions, the sample period for both groups one and two starts in August 1991.

Panel A: Style Regressions incl. Currency Benchmark Assets, Pre-Euro Period

	Simple Style		Exclusive Style	
All 11 countries	VW avg R^2	EW avg R^2	VW avg R^2	EW avg R^2
Ctr styles in terms of ind bench	0.85	0.71	0.75	0.66
Ind styles in terms of ctr bench	0.87	0.84	0.82	0.80
Group one				
Ctr styles in terms of ind bench	0.89	0.78	0.77	0.71
Ind styles in terms of ctr bench	0.82	0.75	0.75	0.68
Group two				
Ctr styles in terms of ind bench	0.89	0.69	0.65	0.54
Ind styles in terms of ctr bench	0.88	0.84	0.80	0.79

Panel B: Style Regressions using Fully Hedged Returns, Pre-Euro Period

	Simple Style		Exclusive Style	
	VW avg R^2	EW avg R^2	VW avg R^2	EW avg R^2
All 11 countries				
Ctr styles in terms of ind bench	0.81	0.64	0.68	0.57
Ind styles in terms of ctr bench	0.83	0.79	0.76	0.72
Group one				
Ctr styles in terms of ind bench	0.88	0.75	0.74	0.66
Ind styles in terms of ctr bench	0.79	0.71	0.70	0.60
Group two				
Ctr styles in terms of ind bench	0.85	0.60	0.49	0.35
Ind styles in terms of ctr bench	0.84	0.78	0.72	0.70

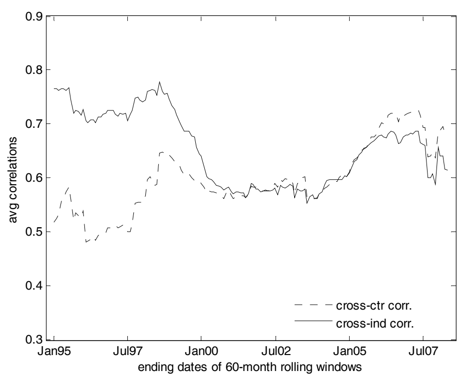
Table 6: Financial Market Integration

This table reports measures for the integration of the Euro-zone countries within the Euro-zone market and within the world market. We regress country returns on a constant, the world market return (proxied by the US market return), and the Euro-zone market return that is orthogonal to the world market return. Euro-zone market integration is measured as the fraction of the country return variance that is due to the (orthogonalized) Euro-zone market return. World market integration is measured as the fraction of total country variance that is due to the US index return. The last two columns report the sum of these two integration measures which equals the total fraction of country return variance that is due to both world market and Euro-zone market factors. We calculate these measures for the pre- and post-Euro periods separately. The table also reports the equally and value-weighted averages of the individual country R^2s, where the value weights are the average weights of the countries in the value-weighted index of all country returns of group one or group two.

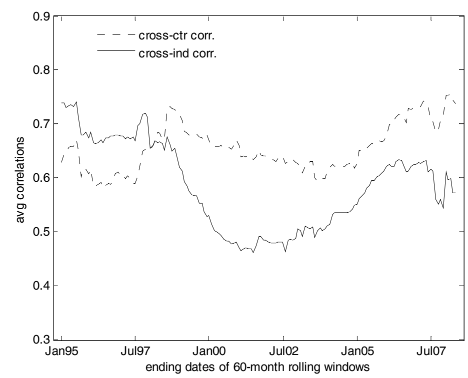
	Euro-zone Integration		World mkt Integration		Total Integration	
	Pre-Eur	Post-Eur	Pre-Eur	Post-Eur	Pre-Eur	Post-Eur
Group one						
Belgium	0.28	0.28	0.45	0.25	0.73	0.53
Germany	0.48	0.33	0.36	0.61	0.84	0.94
Finland	0.11	0.10	0.34	0.42	0.44	0.52
France	0.43	0.33	0.40	0.63	0.83	0.96
Netherlands	0.29	0.29	0.54	0.58	0.83	0.87
Austria	0.36	0.10	0.20	0.20	0.56	0.30
VW average	0.40	0.30	0.41	0.57	0.82	0.88
EW average	0.32	0.24	0.38	0.45	0.71	0.69
Group two						
Greece	0.11	0.22	0.08	0.15	0.19	0.37
Ireland	0.14	0.06	0.48	0.43	0.62	0.49
Italy	0.28	0.43	0.27	0.40	0.55	0.83
Portugal	0.25	0.32	0.21	0.21	0.46	0.53
Spain	0.29	0.28	0.38	0.47	0.67	0.75
VW average	0.27	0.34	0.31	0.40	0.59	0.74
EW average	0.22	0.26	0.28	0.34	0.50	0.60

Figure 1: Rolling Window Cross-Country and Cross-Industry Correlations

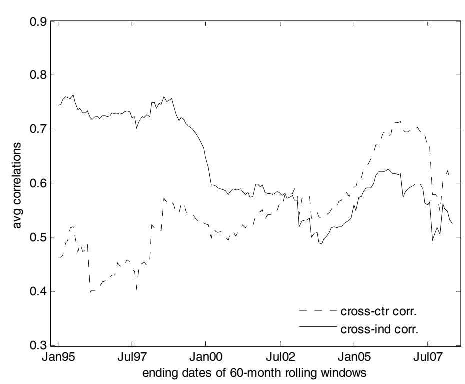
This figure plots equally weighted average cross-country and cross-industry correlations for 60-month rolling windows. Panel A reports the results for all 11 Euro-zone countries. Panel B concerns the countries in group one (Belgium, Germany, Finland, France, Netherlands, Austria) and Panel C concerns the countries in group two (Greece, Ireland, Italy, Portugal and Spain). Industry returns are composed only of stocks from the respective groups of countries.



Panel A: All 11 Euro-zone countries



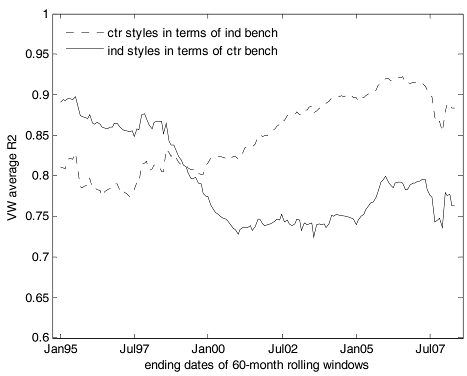
Panel B: Group one



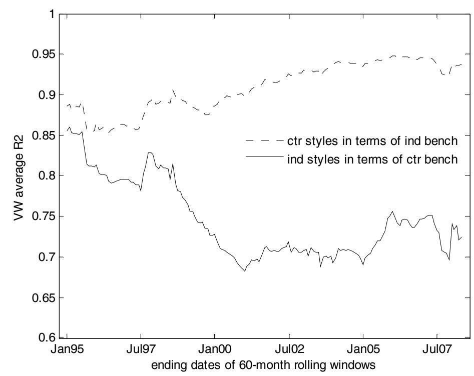
Panel C: Group two

Figure 2: Rolling Window Style Analysis

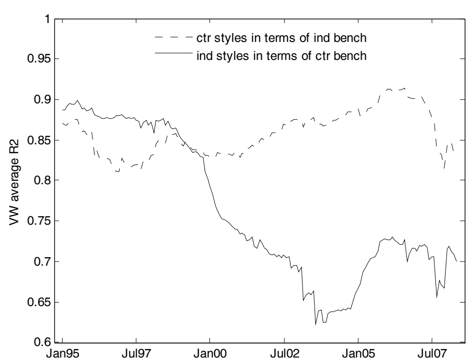
The figure shows the weighted average R^2s of 60-month rolling window simple style regressions. Panel A reports the results for all 11 Euro-zone countries. Panel B reports the results for the six countries in group one (Belgium, Germany, Finland, France, Netherlands, Austria) and Panel C concerns the five countries in group two (Greece, Ireland, Italy, Portugal and Spain). In these latter two panels, the industry returns are composed only of stocks from the respective groups of countries. We calculate a weighted average of the style regressions' R^2s using the average weight of the test assets in the value-weighted index of all eleven countries, the countries in group one, or the countries in group two respectively, in the 60-month window.



Panel A: All 11 Euro-zone countries



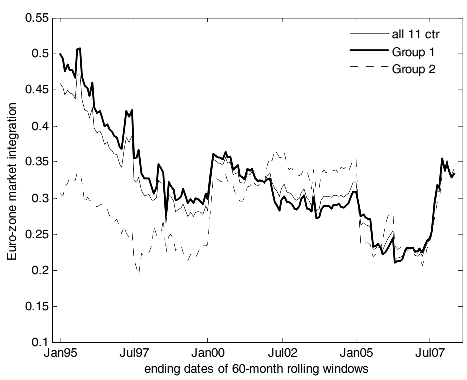
Panel B: Group one



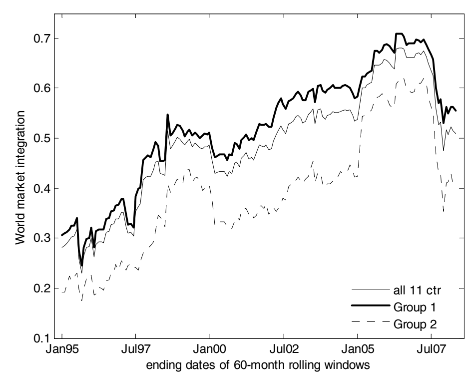
Panel C: Group two

Figure 3: Time-varying Integration Within the Euro-Zone and World Markets

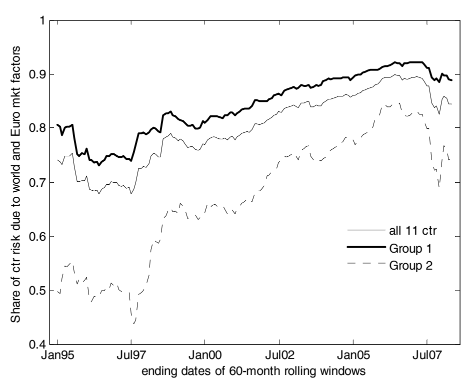
This figure reports Euro-zone and world market integration measures for 60-month rolling windows. We consider all 11 Euro-zone countries (the solid lines) as well as the six countries in group one (the bold lines) and the five countries in group two (the dotted lines). In each 60-month window, we regress country returns on a constant, the world market return (proxied by the US market return), and the Euro-zone market return that is orthogonal to the world market return. Euro-zone market integration is measured as the fraction of the country return variance that is captured by the (orthogonalized) Euro-zone market index. World market integration is measured as the fraction of total country variance that is captured by the US index return. We compute a value-weighted average over all countries using the average weight (in the 60-month window) of the countries in the value-weighted index of all countries in that group. Panel A reports the measures for integration in the Euro-zone market, while Panel B reports the integration within the world market. Panel C reports the sum of Panels A and B: the fraction of the total country variance that is due to both the world and the Euro-wide market factors.



Panel A: Integration in Euro-zone market



Panel B: Integration in world market



Panel C: Total variance due to world and Euro mkt