



Rapport de recherche

2003

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### How to cite

ADJAOUTE, Kpate, DANTHINE, Jean-Pierre, ISAKOV, Dusan. Portfolio Diversification in Europe. 2003

This publication URL: <https://archive-ouverte.unige.ch/unige:5792>

# **Portfolio Diversification in Europe<sup>\*</sup>**

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Current draft: April 2003

## Abstract:

Have the euro and accompanying measures of financial integration had a discernable impact on the degree of diversification of European investors? This is an empirical question that this paper tries to answer by exploring four alternative avenues. First we focus on the final outcome: If European investors are indeed better diversified, their consumption should be increasingly correlated. Second we check more directly what is known about the composition of Europeans' portfolios. A third perspective focuses on the evolution of returns and prices. If indeed European investors are attempting to exploit new arbitrage opportunities opened up by the euro and European financial integration, then it is likely that these behavioral changes will be matched by significant changes in returns or in the nature of the return generating process. Finally, we explore the possibility that the answer to our question may be better revealed by examining the changes that have taken place in the investment process itself.

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<sup>\*</sup>Paper prepared for the DG EcFin workshop "Who will own Europe? The internationalization of asset ownership in the EU today and in the future", Brussels, February 27-28, 2003. We thank the participants to the workshop and especially our discussant, S. Berrigan, for their comments. This report builds on and extends Adjaouté and Danthine (2003). Danthine and Isakov's research is carried out within the National Centre of Competence in Research "Financial Valuation and Risk Management." (NCCR FINRISK). The NCCR FINRISK is a research programme supported by the Swiss National Science Foundation.

## 1. Introduction

Are Europeans better diversified than 5 or 10 years ago? This is the question we focus on in the present report. The importance of this question is obvious in the face of converging evidence that Europeans have been insufficiently diversified in the past – across asset classes and on an international basis - and that this situation has potentially important welfare consequences. But the home bias in investments also has a bearing on corporate ownership and industry structure. It means that, even for publicly traded companies, ownership remains confined to national borders and that, as a consequence, industrial diversification pays. At the extreme opposite, in a world of perfectly diversified portfolios, corporate ownership would simply mirror the relative importance of the international sources of savings. An increase in international diversification thus has necessary implications for the question posed in this conference: who owns Europe?

It is not controversial to assert the existence of a long run trend away from bank savings and national government bond holdings toward equity ownership and, within equity holdings, toward more (internationally) diversified portfolios. This trend is evident, for example, in Massaro and Laakari (2002) who report the changes in European households portfolio holdings between 1996 and 2000 (see Tables 2 and 3, in particular). For the entire euro zone, the shares of “currency and deposits”, “securities other than shares” and “shares and other equity” went from 37%, 13% and 25%, to 29%, 8% and 37% respectively, with “insurance technical reserves” constituting the remainder.<sup>1</sup> Similarly, the BIS Study group on fixed income markets (2001) reports that “net purchase of equities by euro area households and corporations jumped to nearly 6% of GDP in the 1998-99 period from less than 2% a few years earlier. At the same time, deposit flows, traditionally the savings vehicle of choice in the euro area, halved to 2%. Euro area residents began in the mid-1990s to reduce their holding of debt issued by their own government and to diversify into other assets”. They also note that non-residents were net buyers of euro area government securities throughout the nineties with the result that non-residents’ holdings of euro area government debt rose to 30% of the outstanding stock in 1999 from 21% in 1995.

The question at hand is “has this trend been accelerated in a discernible manner by the most recent evolution in the euro-area, in particular the advent of the euro and accompanying

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<sup>1</sup> Of course the high stock valuations of 2000 make it hard to distinguish behavioral changes from pure valuation changes.

measures of financial integration”)? That the euro and measures of financial integration are no small matters for this issue is suggested by the general argument that they constitute decreases in existing obstacles to international investing within Europe. Even a small decrease in the cost of transacting internationally may be significant. This can be inferred from observations made on stock market participation.<sup>2</sup> If even small costs are sufficient to keep investors out of the stock market, presumably because the marginal investor wants to take only limited equity positions, a fortiori, small impediments are likely to suffice to prevent investors from optimally diversifying abroad.<sup>3</sup> In addition an important fraction of Europeans’ investments is intermediated by institutions – pension funds and insurance companies – that were restricted to investing but a small fraction of their wealth in foreign currencies. These currency matching rules were automatically lifted with the advent of the euro.

There is an alternative view, however, asserting that the main obstacles to international transaction within the euro area had been eliminated before the 1990’s and that currency risk was only a minor factor for portfolio investors. De Santis, Gérard and Hillion (1999) for example had predicted that the disappearance of currency risk would have only a limited impact on portfolio investors. They based their view on the observation that while EMU countries’ currency risk was a significant risk factor for portfolio investors in the 1990’s and while investors were indeed compensated for their exposure to this source of risk, its importance had declined in the course of the decade. In addition they estimated that non-EMU currency risk (in particular associated with the dollar) was quantitatively much larger. While their position can be understood as saying that the pricing of European equities, at unchanged fundamentals, would not be significantly altered by the arrival of the euro, it remains that the euro and accompanying factors might signify important changes in the fundamentals underlying European equities, with attendant consequences on investors’ behavior.

Be that as it may, the question at hand is ultimately an empirical one and we attempt at resolving it by exploring four alternative avenues. A first approach is to focus on the final outcome: If European investors are indeed better diversified, their consumption should be increasingly correlated. This is because improved risk sharing permit smoothing idiosyncratic fluctuations of national income and thus leads to increasingly similar consumption patterns.

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<sup>2</sup> See Guiso, Haliassos and Jappelli (2003) and references cited therein.

<sup>3</sup> Of course the same argument also suggests that small decreases in cost may matter only if the remaining obstacles themselves are small enough.

We review the evidence on this score in section 2. A second approach, at the opposite end of the logical spectrum, consists of simply checking the composition of Europeans' portfolios. This approach is not devoid of dangers and difficulties, however. First, data on individual portfolio holdings is hard to come by. We report, in Section 3, data on intermediated accounts, which may not tell us much about the final positions held by individuals if the changing circumstances lead to alterations in the relationships between individual investors and their intermediaries. Second, although this problem plagues our entire inquiry, the post-euro sample is at the same time very short and quite extraordinary. Market circumstances since the advent of the euro have been spectacular, on the upside until about mid-2000, on the downside ever since. One would not be surprised if, over the period under review, actual portfolio positions held by private and institutional investors, and changes in them, had been dominated by these circumstances, making it extremely difficult for observers to detect low frequency structural changes.

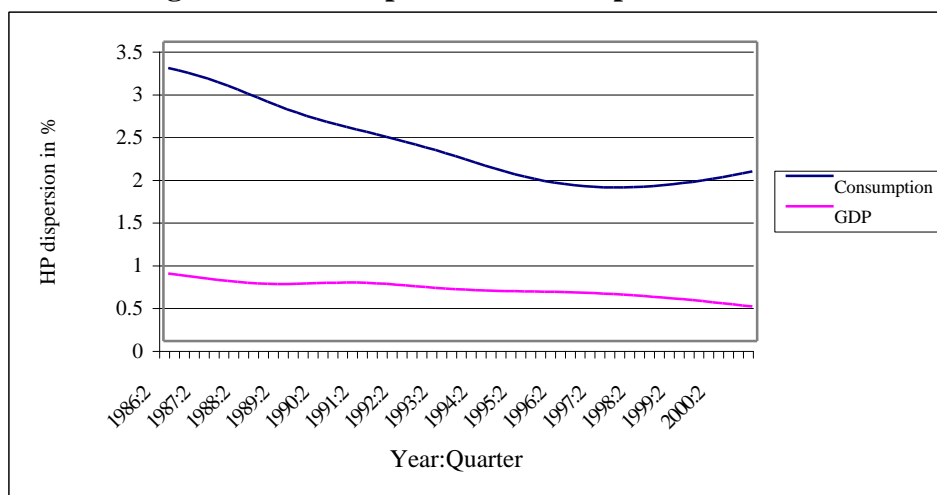
Still another perspective is proposed in Sections 4 and 5: Instead of focusing on quantities, we describe relevant elements in the evolution of returns and prices. The underlying logic is that if indeed European investors are attempting to exploit new arbitrage opportunities opened up by the euro and European financial integration, then it is likely that these behavioral changes will be matched by significant changes in returns or in the nature of the return generating process. We look at this hypothesis from a CAPM perspective, leading us to see equity returns as the sum of a risk-free rate and of an equity premium, in Section 4 and then from a multi-factor perspective in Section 5. Finally, it is possible that, rather than by focusing on the outcome of the investment process, the answer to our question may be better revealed by examining the changes in the process itself. We pursue this lead in Section 6. Section 7 draws conclusions from this investigation.

## **2. Consumption**

If indeed Europeans are increasingly diversified, their consumption patterns should become increasingly alike. In this section we check whether there is evidence of such a tendency. Note that by taking the viewpoint of aggregate consumption, we are implicitly assuming that, within each country at least, markets are sufficiently complete to permit the assumption that aggregate consumption adequately reflects individual consumption. If this extreme hypothesis is not valid, prudence is called for in concluding from the type of evidence reported here. Evidence on consumption correlations is provided by Adjaoaté and Danthine (2003) and

Flotho (2002) among others. Looking at bilateral consumption correlations of a large set of European countries with the EU average, Flotho (2002) does not find any tendency for correlations to increase. By contrast, Figure 1 indicates that the cross-sectional dispersion of country consumption growth rates exhibits a clear downward trend at least until 1996.<sup>4</sup> The equivalent statement is that consumption growth rates are increasingly correlated in the euro-area. At first sight, this evidence provides support to the hypothesis of increasing diversification. The case may be overstated, however, because a similar pattern can be found for the growth rates of GDP (also reported in Figure 1). The observations on consumption may thus simply be the mechanical consequence of the increased synchronization of output and income.

**Figure 1: Consumption & GDP dispersions: EMU**



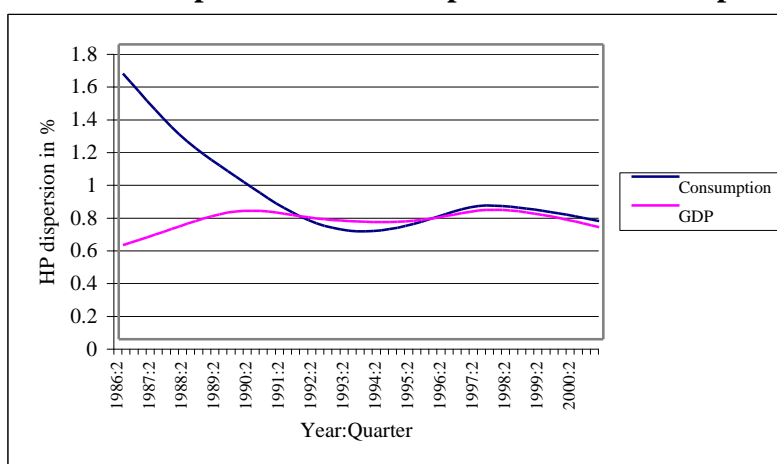
Source: Datastream

In addition, Figure 1 also shows that the dispersion of consumption growth is always significantly higher than the dispersion of output growth, indicating that the opposite pattern tends to prevail for correlations. (This result is in accord with those obtained by Flotho, 2002). This of course suggests that risk sharing opportunities are far from being fully exploited since

<sup>4</sup> We will be using repeatedly the concept of dispersions to support the results obtained with simple correlations. Cross sectional dispersions are meant to be the cross-sectional counterpart to correlations and to provide the same underlying information. Our problem stems from the highly changing nature of the relationships we are focusing on and on the limited size of the post-euro sample of observations. If returns are highly correlated, we expect that more often than not they will move together on the upside or on the downside. If they do, the instantaneous cross-sectional variance of these returns will be low. Conversely, lower correlations mean that returns often diverge, a fact translating into a high level of dispersion. Dispersions and correlations are thus inversely related. While correlations require a minimum sample length to be estimated with some precision, no such requirement is needed for dispersions, although the measure will be more imprecise if the number of returns entering in the variance measure is too small. Cross-sectional dispersions were first used in the context of equity returns by Solnik and Roulet (2000). As the dispersions are very noisy we typically smooth them with Hodrick- Prescott (HP) filters to get a better idea of the underlying trends.

optimal international risk sharing would imply the opposite inequality: consumption correlations exceeding income correlations. Complementary evidence is provided by Adam et al. (2002) who reject the hypothesis that consumption growth rates are unaffected by idiosyncratic changes in GDP growth rates as would be the case under perfect risk sharing among members of the euro area. At the opposite, working on the basis of GDP rather than consumption data, Kalemli-Ozcan, Sorensen and Yosha (2003) paint a rosier picture concluding that, for the first time in the latter part of the 1990s, non-negligible insurance through international capital income flows could be measured in Europe and noting that “in this respect Europe is beginning to converge towards the United States.”

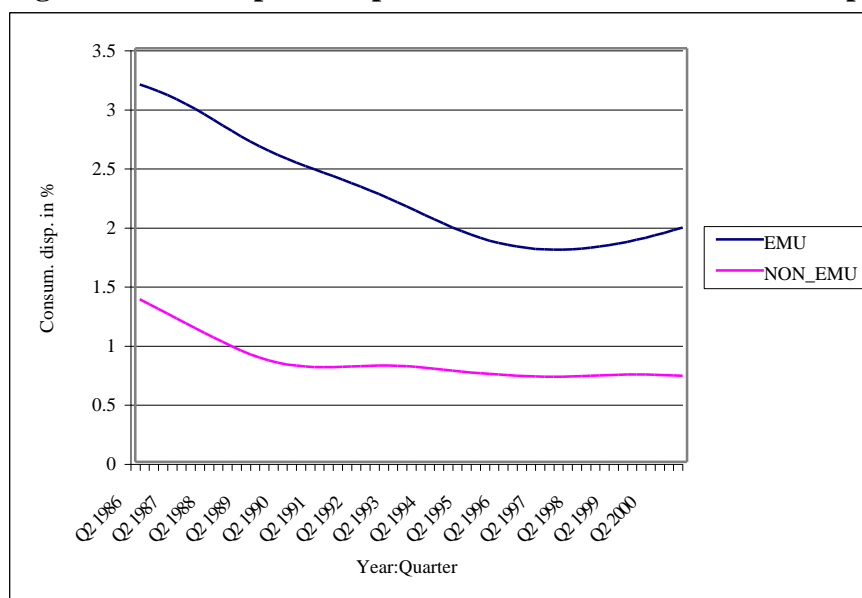
**Figure 2: Consumption and GDP dispersions - non Europe OECD**



Source: Datastream

Figure 2 offers a benchmark by providing the same type of evidence for the non-European members of the OECD. The decrease in consumption dispersion is even more spectacular with consumption and GDP dispersions being almost coincident since the early nineties. Finally Figure 3 compares the consumption dispersions of euro area countries and the other European countries, respectively. Overall these data are, quite surprisingly, evidence of a rather smaller degree of consumption synchronization inside the euro area than elsewhere in Europe or outside Europe. While this may be a reflection of differing macroeconomic realities and measurement problem could be an issue, it is nevertheless difficult to find in the data presented in this section any reassuring evidence on the degree of international risk sharing within the euro area.

**Figure 3: Consumption dispersions: EMU vs. non-EMU Europe**



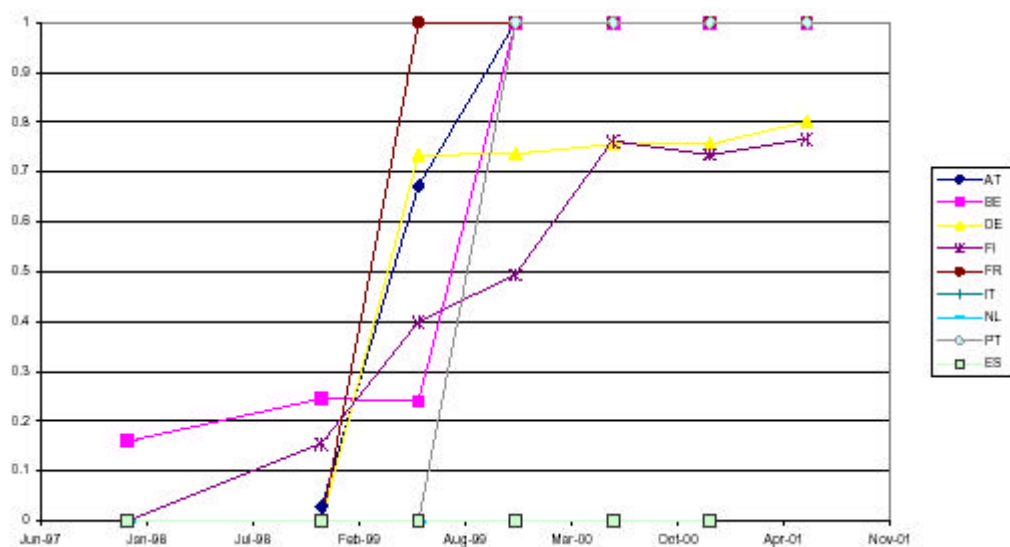
Source: Datastream

### 3. A look at portfolio composition

What direct evidence do we have that European investors are increasingly diversifying on an international basis? Figures 4 to 8 are excerpted from Adam et al. (2002). They provide some answers from the perspective of investment funds - money market, bond and equity - and of institutional investors pension funds and insurance companies. Note that the data reported stops in June 2001. The evidence is spectacular when it relates to money market and bond market funds. For these two categories, Figures 4 and 5 plot the percentage of funds invested in funds managed with a Europe-wide investment strategy (relative to the total assets under management in funds with either a domestic or an European focus). The internationalization of these two fund types is seen to have made very significant progress during the first months of 1999 (except for the case of Spanish bond funds). The evidence is less overwhelming when one turns to equity funds. Although from our perspective the main message of increasing international diversification is not contradicted (in most countries the trend is clearly upward), there are exceptions (Greece) or progress followed by retrenchment (France, Figure 6; Austria, Figure 7; Italy, Spain, Figure 8) besides the fact that the levels of internationalization are not always as high as one might expect.

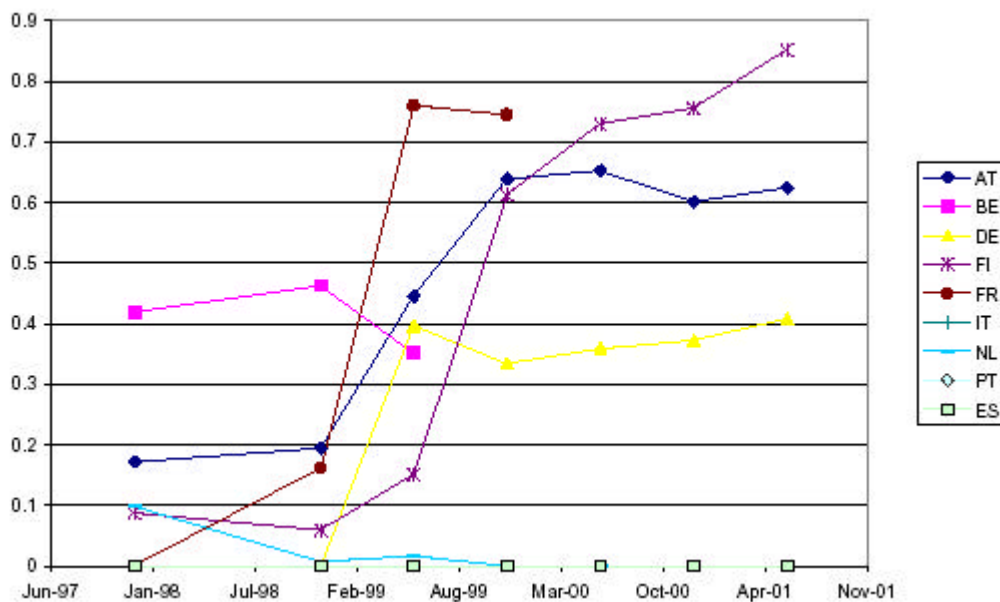


**Figure 4: Asset share of European-wide investing money market funds – Euro zone countries (December 1997 – June 2001)**



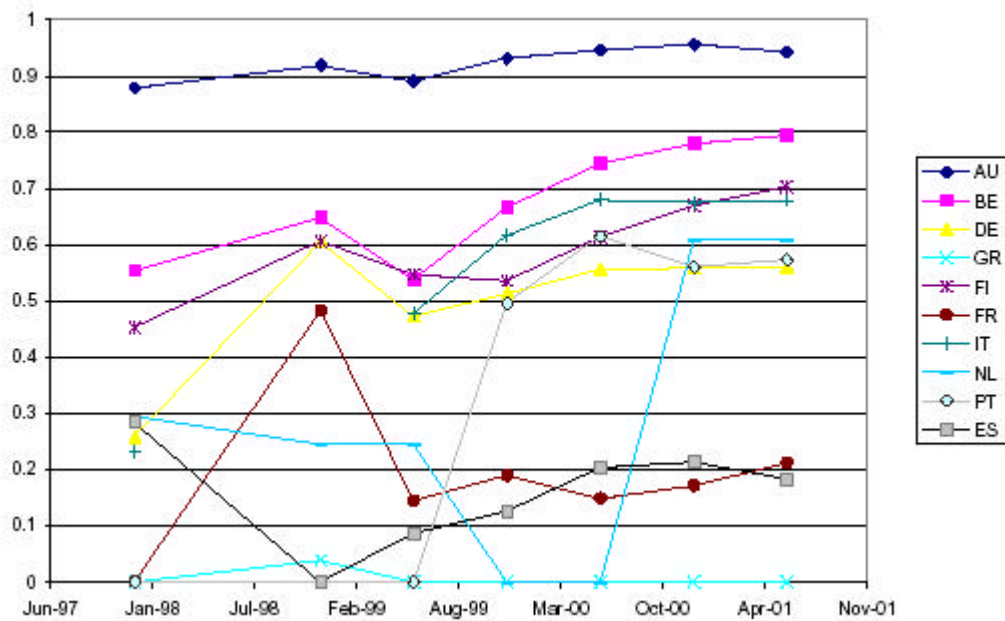
Source: Adam et al. (2002) – Data source: Federation Europeenne des Fonds et Societes d'Investissement (FEFSI)

**Figure 5: Asset share of European-wide investing bond funds – Euro zone countries (December 1997 – June 2001)**



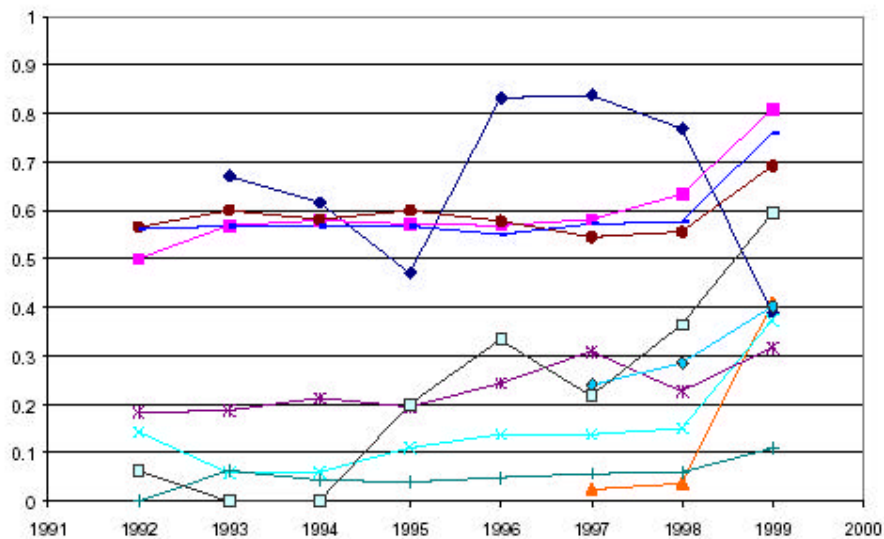
Source: Adam et al. (2002) – Data source: Federation Europeenne des Fonds et Societes d'Investissement (FEFSI)

**Figure 6: Asset share of European-wide investing equity funds – Euro zone countries  
(December 1997 – June 2001)**



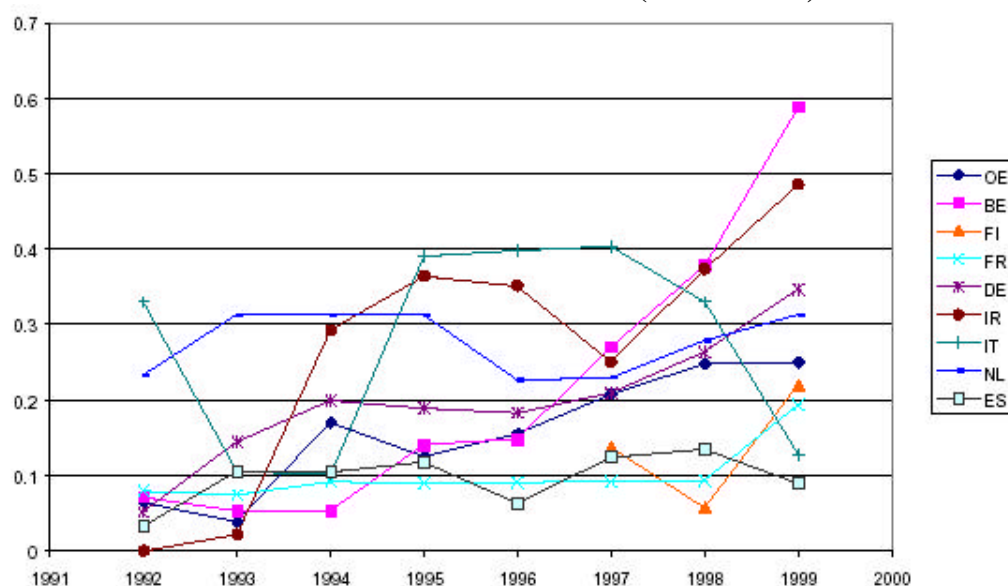
Source: Adam et al. (2002) – Data source: Federation Europeenne des Fonds et Societes d'Investissement (FEFSI)

**Figure 7: Pension funds: Foreign equities as a percentage of total equities invested – Euro zone countries (1992 – 1999)**



Source: Adam et al. (2002) – Data source: InterSec Research Corporation

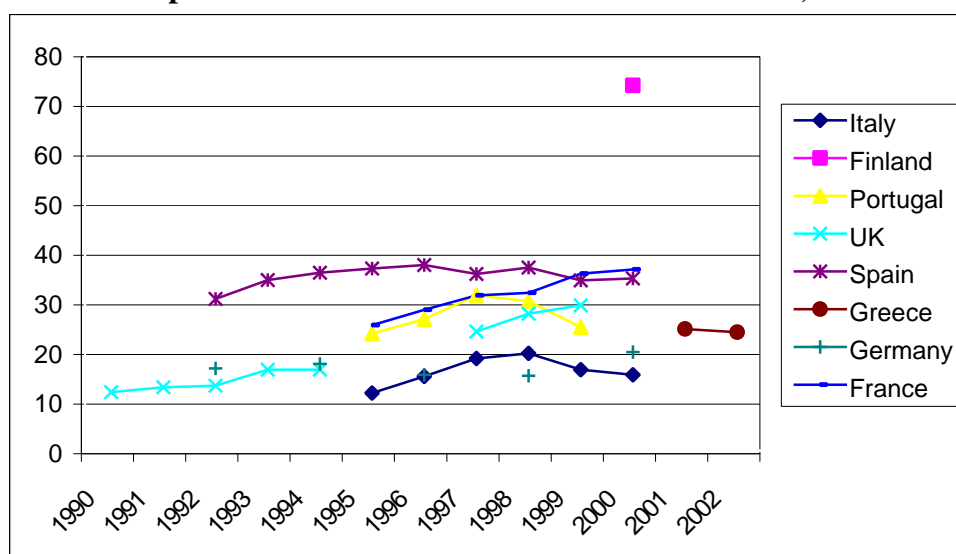
**Figure 8: Insurance companies – foreign equities as a percentage of total equities invested – Euro zone countries (1992 – 1999)**



Source: Adam et al. (2002) – Data source: InterSec Research Corporation

Additional evidence is provided by Galati and Tsatsaronis (2001). They make specific observations on international portfolio flows originating from Germany noting the significant acceleration in German investors' purchases of euro-area securities ahead of the introduction of the new currency (in 1998) and the intensification of these purchases in 1999 and 2000. The same source reports detailed aggregate portfolio data for Italian mutual funds showing the decreasing allocations to Italian bonds and equities and the rise in the allocations to euro area securities. The share of euro area bonds in the overall bond portfolio increased from 8% in 1995 to 23% at the end of 2000. They also report that while the share of euro area equities has followed a largely parallel path after 1998, Italian investors have looked outside the euro area for the primary source of diversification of their equity portfolios. Investments in industrialized economies outside the single currency area have filled up the room freed by a declining equity allocation and accounted for nearly half of the equity portfolio of these funds at the end of 2000. Finally some additional information gathered from the 2002 report of the FESE (see FESE 2002) is reported on Figure 9. It displays the shares of national equity markets held by non-residents. In some sense, this graph is a direct answer to the question of this conference "Who owns Europe"? It indicates a rather stable situation with a slight upward trend in the degree of foreign ownership, in particular in the cases of the UK and France.

**Figure 9: Proportion of equity shares of a country held by non-resident investors (in percent - individual and institutional investors)**



Source: Share ownership structure in Europe 2002, Federation of European Securities Exchanges

Now this evidence mostly relates to institutional investors. We are not surprised on this front to see some effect of the relaxation of currency matching rules. In the end, however, what we are interested in is the net positions of individual investors and on this ground we have very little direct observation. It is conceivable that the latter are not undergoing changes proportional to those described at the institutional level. This would be the result of offsetting changes made by individuals in their choices among investment funds. We believe this is unlikely. However, the scarcity of data on individual portfolio holdings permits neither to rule out this possibility, nor to affirm the hypothesis that the recorded changes at the institutional level are of no material consequences for the degree of diversification of individual European investors.

#### 4. The CAPM view

In this section and the next we look for evidence suggesting that changes in the behavior of European investors and of investors investing in European markets have led to changes in the pricing of European assets. We first specifically focus on the return on short term (risk free) government bonds and on the equity premium paid stockholders, thus paralleling the standard decomposition of equity return into a risk free rate and an equity premium.

#### *4.1. The recorded changes in the government bond markets of the euro area.*

In this section we summarize the evidence gathered by Adjaouté and Danthine (2003) (from now on AD) for the government bond markets of the euro area and complement this evidence with observation that can be made on rates paid on euro-currency deposits. We gauge whether the recent evolution of these markets is in line with what would be expected if European investors were increasingly thinking in terms of a single government bond market and investing accordingly. This line of reasoning obviously has no direct implications for corporate ownership. It, however, provides useful indications on the diversification process while also permitting us to talk meaningfully about the equity premium in the next subsection.

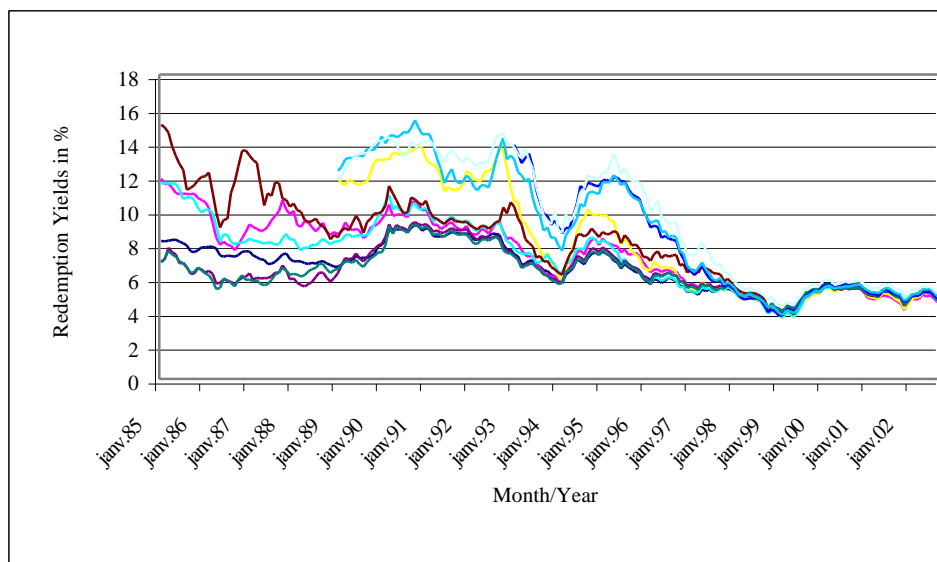
The main observation here is that when the home bias dominates and national fixed income markets are segmented, the prices and returns of the corresponding securities are disconnected. The demand and supply of savings are matched country by country and the risk appetite largely depends on local circumstances. Since pricing differences are not arbitrated away - there is no way to trade on the basis of relative capital abundance and relative willingness to take risk -, local capital market conditions determine the interest rates on the national risk-free asset. Thus an increase in international investing should be characterized by a convergence of interest rate levels as well as an increasing similarity in the time-series properties of the returns on the closest proxy to the risk-free asset.

While even under segmentation one does not necessarily expect interest rate correlations to be zero because contagion effects cannot be excluded – an Enron could have effects on the appraisal of the risk of financial assets in the neighboring country even in the absence of capital mobility -, one clearly anticipates correlations between risk-free bonds to increase with integration. One further expects that the return on the single risk free asset of a larger economic area will be less volatile than the risk-free rates of the constituent elements of this large entity under segmentation. This is because the large area risk-free rate should be less sensitive to idiosyncratic local market conditions than under segmentation. In other words, the specific local conditions should offset one another via the usual diversification mechanism.

AD provide evidence in line with this description. Government bond yields of the euro area have undergone an impressive process of convergence in levels (Figure 10) and they display an increasing degree of correlation. On the latter point, Figure 11 reports that dispersions have fallen by more than 90% from an average of 2.28 in the pre-euro period to an average of 0.16

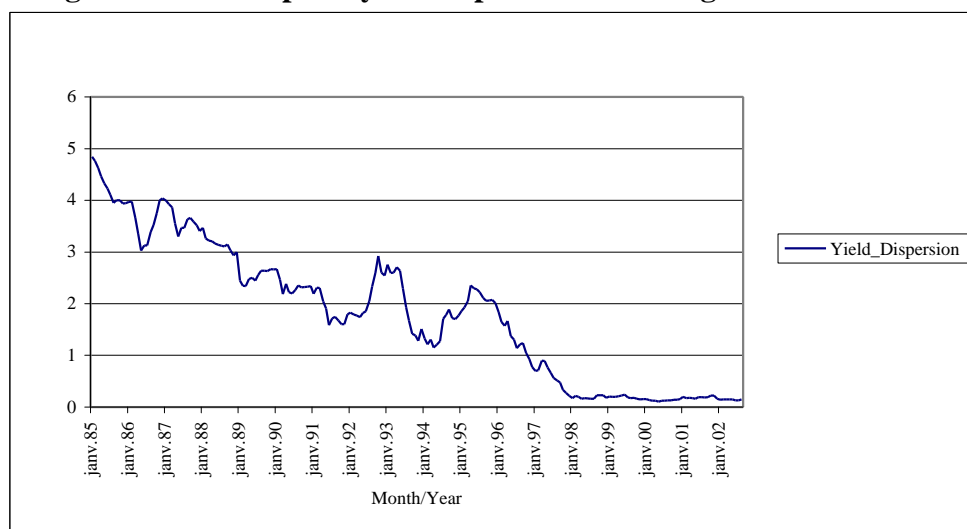
since the euro. From January 1999 onwards, the various government bond yields in the euro-area have exhibited a closely similar behavior as theoretically expected.

**Figure 10: Convergence of EMU government bond redemption yields**



Source: Datastream. The redemption yield used for each country represents the average yield on benchmark bonds within maturity sectors. That is, within each maturity sector, sample bonds are selected based on their tradability and interest to international investors and a weighted average redemption yield is computed on all selected bonds across the maturity spectrum.

**Figure 11: Redemption yield dispersion of EMU government bonds**



Source: Datastream - See Figure 10 for definition

Finally, Table 1 shows that in conformity with theory, interest rates in Europe have become less volatile. The change in volatility is valid and statistically significant for each and every country in the sample, a striking result suggesting indeed that the euro-area bond markets respond to a smaller extent to idiosyncratic local circumstances and that inter-market

arbitrages tend to distribute across the whole area, and thus stabilize, the effects of sudden local changes in supply and demand conditions.

**Table 1: Volatility of Government bond redemption yields**

	Pre Euro	Post Euro	Var. Ratio Stat	P-values
Austria	1.211	0.481	6.780	0
France	1.797	0.474	2.994	0
Finland	3.094	0.517	1.206	0
Belgium	1.809	0.535	3.759	0
Netherlands	1.241	0.414	4.786	0
Ireland	2.224	0.456	1.807	0
Germany	1.162	0.409	5.318	0
Portugal	2.842	0.507	1.366	0
Spain	3.117	0.492	1.070	0
Italy	2.944	0.433	0.929	0

The pre euro period goes from January 1985 to December 1998, and the post euro period from January 1999 to August 2002.

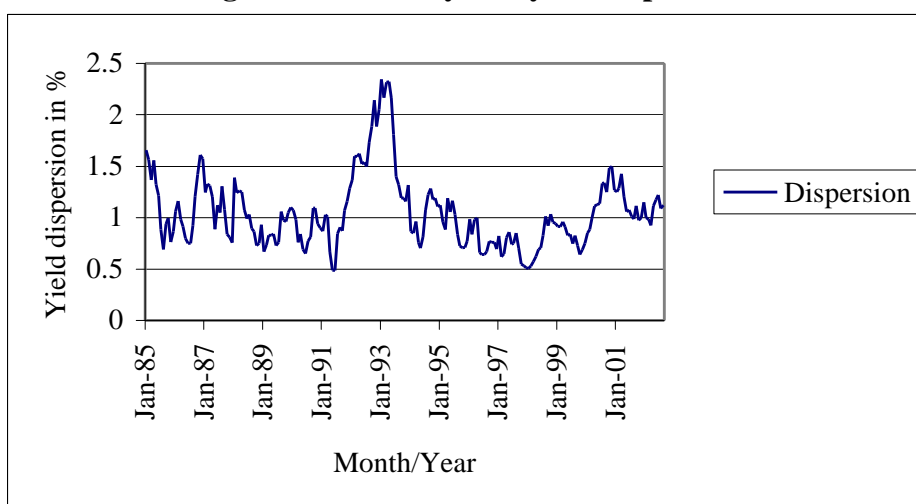
At first sight, this range of evidence provides spectacular support to the notion that the behavior of European investors has changed materially. AD however observe that these results could be the almost mechanical outcome of the convergence of inflation rates in the euro area without any change in investors' behavior. And they indeed present some evidence leading them to conclude that most of the convergence in nominal yields is in fact attributable to the convergence of inflation rates. Specifically they compute ex-post real yields by deducting observed inflation rates from the nominal redemption yields to show (i) that the result of lower volatilities is confirmed, but (ii) that the result of decreasing dispersion is not: no obvious time pattern is discernable contrary to what was the case for the dispersion of nominal yields. The corresponding results are displayed in Table 2 and Figure 12.

Now these results can be viewed in both ways. On the one hand they do suggest that the convergence of yields may well be a macroeconomic phenomenon with little implication for the way Europeans attempt to diversify. On the other hand, the evidence on real returns implies that the convergence of nominal yields has gone further than the convergence of inflation. And this is rather indicative of a financial phenomenon going beyond the needs of investors acting in semi-segmented markets.

**Table 2: Volatility of real yields**

	Pre euro	Post euro
Austria	0.911	0.741
France	0.952	0.492
Belgium	1.316	0.569
Netherlands	1.229	1.103
Ireland	1.669	1.445
Germany	1.217	0.735
Portugal	2.025	1.029
Spain	1.689	0.478
Italy	1.599	0.400

Source: Datastream

**Figure 12: Monthly real yield dispersion**

Source: Datastream

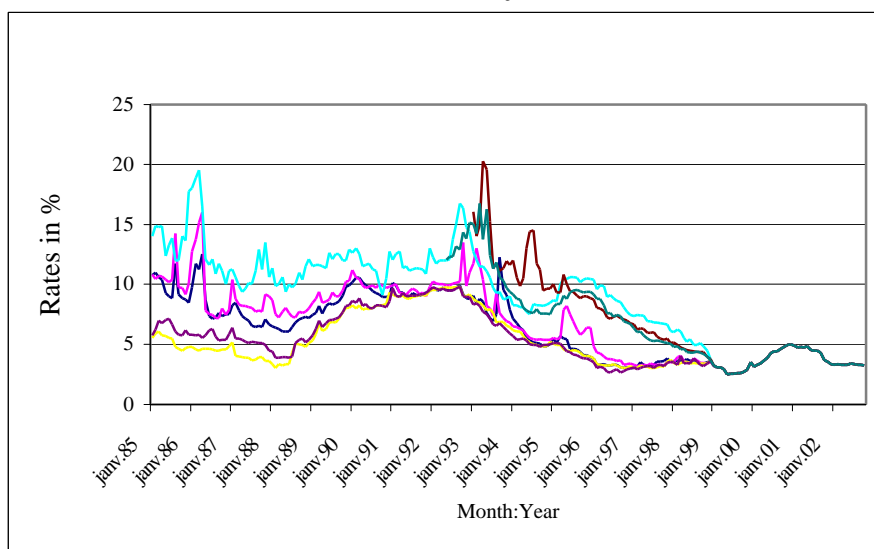
As to the decrease in yield volatility, be they nominal or real, again this result may be due to macroeconomic phenomena, monetary policy in particular, or indeed to an increase in the intensity with which investors arbitrage away idiosyncratic influences on national debt markets. To check whether the hypothesis of an internationalization of the outlook of European investors has some element of truth we take a look at the one-month euro-currency market. Indeed this is an interbank market that has been characterized by a strong international and integrated outlook since its inception. One would not expect the introduction of the euro to have significantly decreased the volatility of the rates paid on this market.

Figure 13 displays the evolution of euro-currency interest rates for EMU countries from January 1985 to June 2002. Figure 14 does the same for real (deflated) euro-currency rates. And Figure 15 displays the dispersion of real Eurocurrency rates. Finally Table 3 reports the



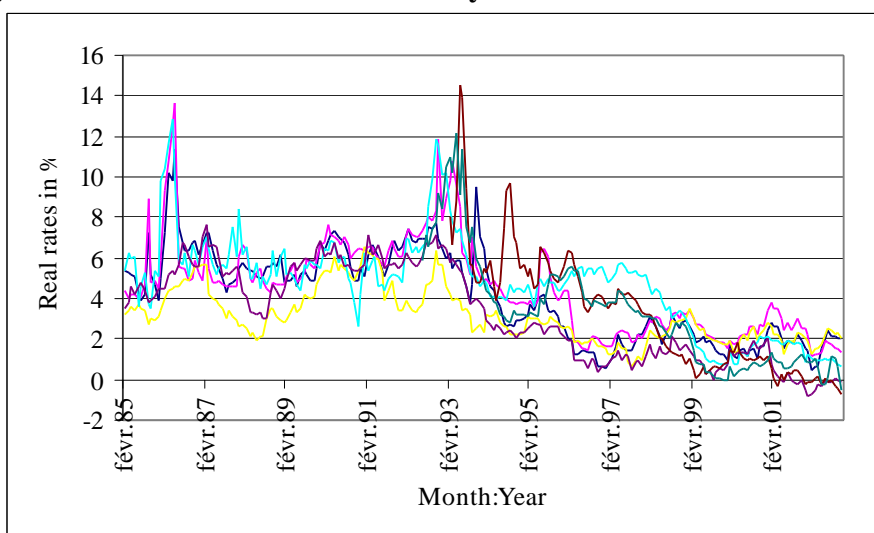
volatility data for the same series. At all these levels of observation, the outcome appears similar to what was obtained for the yields on government bonds. This lends support to the view that the recorded evolution is indeed more likely to be the product of macroeconomic and monetary events than the consequence of a change in the investment behavior of European investors.

**Figure 13 : Nominal 1-month Eurocurrency interest rates for EMU countries**



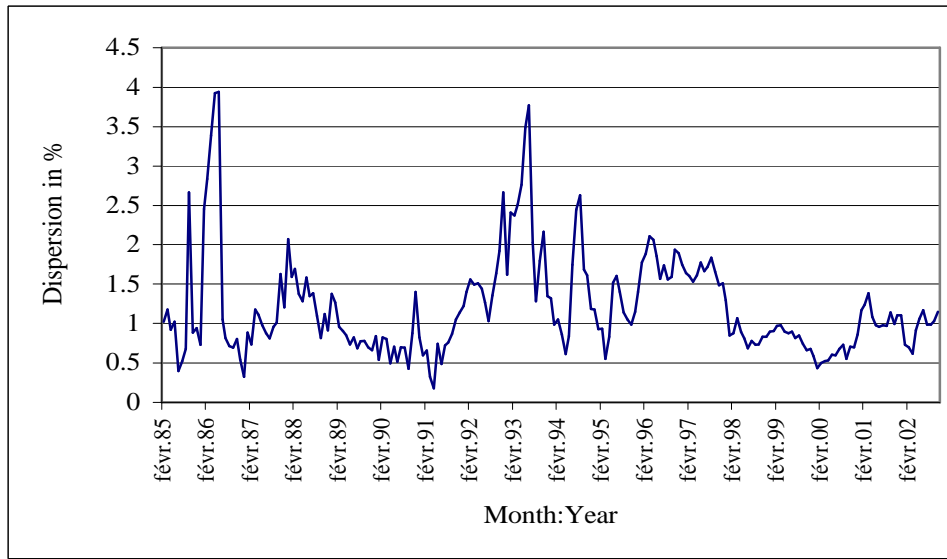
Source: Datastream

**Figure 14: Real 1-month eurocurrency interest rates for EMU countries**



Source: Datastream

**Figure 15: Dispersion of real eurocurrency interest rates - EMU countries**



Source: Datastream

**Table 3: Volatility of euro-currency rates**

	Nominal		Real	
	Pre-euro	Post euro	Pre-euro	Post-euro
Belgium	2.526	0.769	2.072	0.543
France	2.800	0.769	2.187	0.664
Germany	2.176	0.769	1.318	0.457
Italy	2.798	0.769	1.698	0.497
Netherlands	2.114	0.769	2.012	0.763
Portugal	3.617	0.769	2.510	0.568
Spain	3.194	0.769	2.305	0.484

Source: Datastream

#### 4.2. Equity Risk Premia

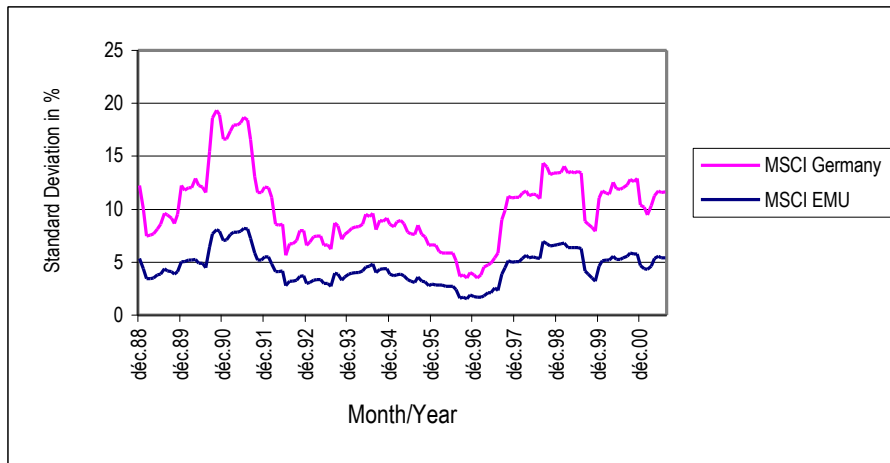
We now turn to an examination of the excess returns on equity viewed as indicative of equity premia. The CAPM suggests that, *ceteris paribus*, a more international outlook among investors of the euro area, that is a lower home bias, would be expected to decrease the equity premium. This can be demonstrated using a simple reasoning of Stulz (1999). Assume a simple situation where all individuals display constant relative risk aversion. The price per unit of risk is constant and identical in initially segmented markets or in the whole integrated area. Let us denote it by  $P$ . In the case of full segmentation, local investors hold undiversified portfolios (from the viewpoint of the global economy). Their reference market portfolio is limited to national firms. The appropriate measure of risk for the local country portfolio then

is its standard deviation. That is, under segmentation the risk premium on a given security  $i$  will be  $\sigma_i^2 P$ , where  $\sigma_i^2$  is the variance and  $\sigma_i$  is the standard deviation of the returns on asset  $i$ . In a single financial market, investors hold internationally diversified portfolios. The proper measure of risk for the local country portfolio is not its standard deviation but its beta with the world portfolio. The same asset in an integrated market will therefore yield a risk premium of  $\beta_i P = \rho_i \sigma_i \sigma_m P$  where  $\beta_i$  is the beta of country  $i$  market portfolio with respect to the world portfolio.  $\beta_i$  is a function of its covariance with the market portfolio which can also be written in terms of the correlation coefficient between the market portfolio and the return on asset  $i$ ,  $\rho_i$ . From this little exercise one obtains that if the following condition is satisfied

$$\frac{\sigma_i}{\sigma_m} > \rho_i$$

and thus in particular if  $\sigma_i > \sigma_m$ , then the risk premium in an integrated market will necessarily be smaller than in segmented markets. But as shown by AD this inequality is satisfied for every country of the euro area. Figure 16 makes the point in the case of Germany.

**Figure 16: 12 month trailing standard deviation**



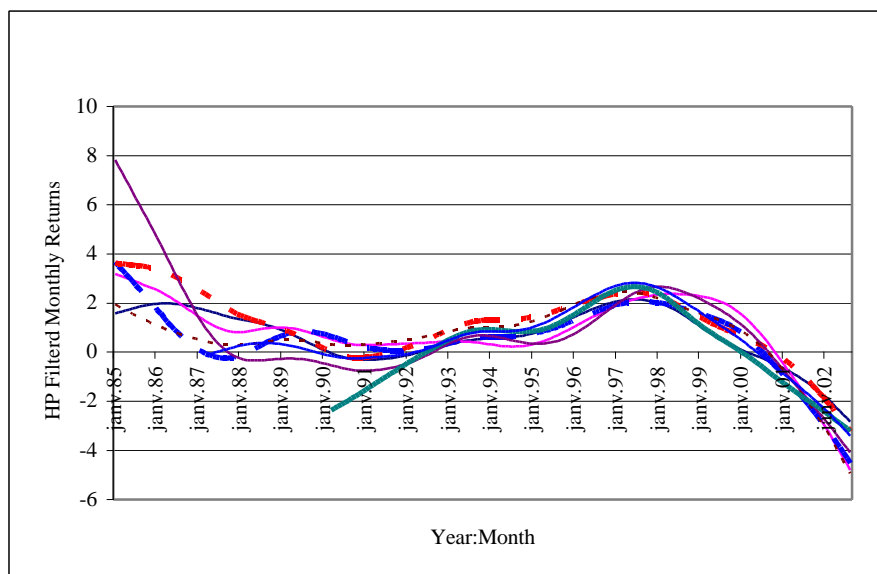
Data and methodology: Monthly MSCI price index series (inclusive of dividends) for each of the countries and the EMU area - December 1987 to July 2001. The first 12 monthly returns are used to compute the first standard deviation, and the window is moved each time by dropping one observation and adding a new one to obtain a time series of 152 standard deviations.

Let us now turn to the direct evidence of equity premia. We compute the excess returns as the monthly total return on national equity indices over the 1-month euro-currency return for the corresponding country. Figures 17 and 18 display the HP filtered equity returns and equity

excess returns respectively for the EMU-countries. Two observations stand out. First there is a clear convergence in both returns and excess returns up to the mid-nineties, a little-known fact that we find striking, but the evolution is less clear thereafter. Second the strong market conditions of the end of the nineties and the beginning of the new century are clearly discernible and the question of whether they have an overriding influence on the observations cannot be avoided. We then proceed to measure the dispersion of equity excess returns. The HP filtered series is presented in Figure 19. We find it particularly remarkable. It indeed suggests that the convergence of excess returns is being pursued with a dispersion level falling below the 2.5% mark at the end of 2002 for the first time since the beginning of our sample (1985). Here is some evidence in favor of the hypothesis that Europeans (and non resident investors in the euro area) are increasingly seizing up the opportunities offered by the euro and financial integration. Of course this is not the only possible explanation for the observed phenomenon. For one thing, ex-post excess returns may be a poor measure of the equity premium – a problem that is especially acute when they fall into negative territory as they have toward the end of our sample. Moreover, measured excess returns appear to be very volatile, implying that we would need a longer observation period before being able to rule out special circumstances. Finally, another possible explanation is that the fundamentals underlying the priced assets are getting increasingly similar. The complementary data on total returns presented in the next section, to the extent that it is not fully congruent, constitutes *prima facie* evidence against the latter explanation.

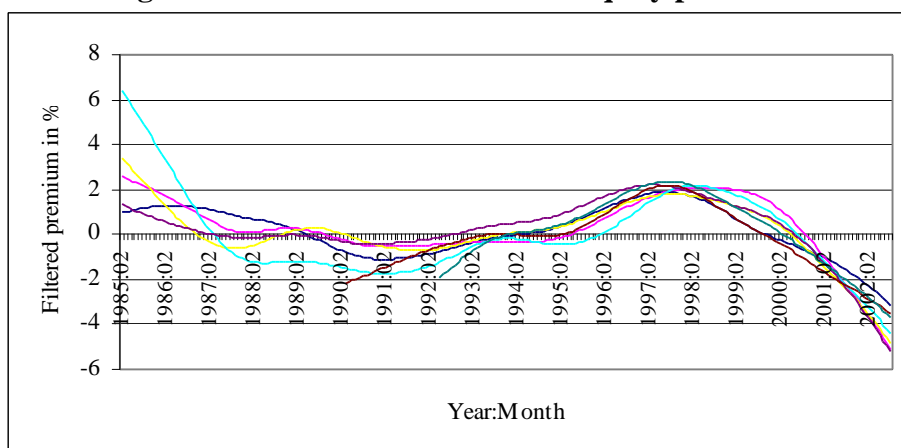
We note that, in accord with the evidence provided in Figure 19, Hardouvelis et al. (2001) find that, within EU sectors, the cost of equity capital has fallen by between 0.5% and 3% in the 1990s and that there is evidence of convergence in the cost of capital for similar sectors across countries (stocks in the same sector tend to have same cost across countries). Convergence across different sectors, however, appears to be slow.

**Figure 17: EMU countries filtered equity returns**



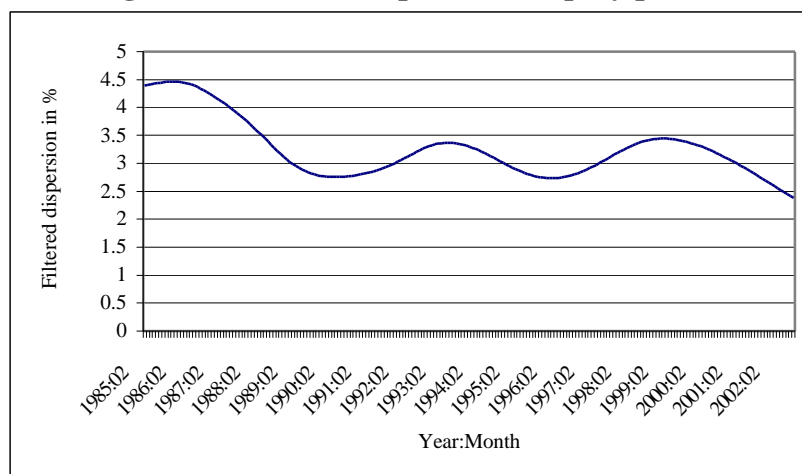
Source: Own calculations - Return data from Datastream

**Figure 18: EMU countries filtered equity premiums**



Source: Datastream

**Figure 19: Filtered dispersion of equity premia**



Source: Datastream

## 5. The multi-factor approach

### 5.1 Heston-Rouwenhorst

We now consider the possibility that equity returns are impacted by several (orthogonally defined) factors: sectors, countries, global (euro area/world).<sup>5</sup> We start with a version of this hypothesis initiated by Heston and Rouwenhorst (1994, HR from now on) in which the return generating process can be described as

$$R_{it} = \alpha_t + \gamma_{kt} + \delta_{jt} + \varepsilon_{it} ,$$

where  $\alpha_t$  is the global component,  $\gamma_{kt}$  is the country factor,  $\delta_{jt}$  is the industry factor and  $\varepsilon_{it}$  is the idiosyncratic return. A large number of papers have investigated the issue of the relative importance of country and industry factors by first estimating this dummy variable model. In a second stage, the relative influence of both factors is determined by comparing either the relative variances, or the mean average deviations (MAD) of country/industry effects. Until recently, the literature was nearly unanimous in finding that country factors dominated industry factors. This finding was robust across different datasets. Let us mention the papers by Beckers, Connor and Curds (1996), Griffin and Karolyi (1998) and Rouwenhorst (1999). Rouwenhorst (1999), for instance, analyzes the returns of all 952 European stocks included in the MSCI indexes of 12 European countries. His data set ends in August 1998. With an eye on the potential impact of economic and monetary integration on the results of the variance decomposition, he concludes that the superiority of country effects has been effective at least since 1982 and that it has continued during the 1993-98 period “despite the convergence of interest rates and the harmonization of fiscal and monetary policies following the Maastricht Treaty.”

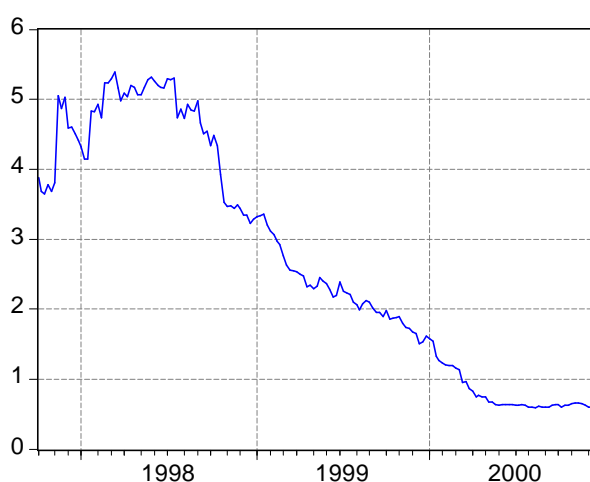
The unanimity, however, appears to have broken down recently and papers using very recent datasets have detected an increase in the global industry effects. Arnold (2001) prolongs the study of Rouwenhorst (1999), using data up to 1999, and finds that, in the year following the introduction of the euro, industry factors have dominated country factors. Baca, Garbe and Weiss (2000) find that both industry and country effects have converged while Cavaglia, Brightman and Aked (2000) also document that industry factors have weighted heavier than country factors since 1997. On the contrary, Isakov and Sonney (2003) confirm the dominance of the country effects for the period 1997-2000 with a sample including 20

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<sup>5</sup> Kuo and Satchell (2001) and Hamelink, Harasty and Hillion (2001) assume that returns are impacted by yet another factor, namely style.

developed countries, but they detect a shift in the last part of their sample. As shown in figure 20, allowing for time variations in the decomposition, they confirm that industry factors are growing in importance and that they have explained a larger fraction of the variance of returns after March 2000.

**Figure 20: Evolution over time of the relative country/industry influences**



Source: Isakov and Sonney (2003) This graph represents the evolution of the ratio of the variance of the country effects to the industry effects. Variances have been estimated over 36-weeks intervals.

### *5.2 Country and sector indices approach*

The results obtained with the HR approach are not always convergent, however. Thus Galati and Tsatsaronis (2001) arrive at slightly different conclusions. They look at the companies in the FTSE Eurotop300 completing their assessment with a time series analysis of the weighted factor averages. They find that industry factors have become more important than country factors for the first time a few months prior to the formal arrival of the euro. Contrary to most other researchers, however, they also find that the superiority of the country factors was insignificant after the beginning of 1996 and even as early as 1992. These results are in sharp contrast with those of Rouwenhorst (1999), among others. A possible reconciliation arises from observing that Galati and Tsatsaronis concentrate their analysis on very large capitalizations. Such stocks have been found to be less sensitive to country factors than smaller cap stocks by Isakov and Sonney (2003) for example. It remains, however, that the results obtained with the HR approach appear to be quite sensitive to the data used, the definition of sectors, and the period of analysis. Table 4 in Isakov and Sonney (2003), for example, shows that the ratio of the fraction of return variances explained by country and

industries varies in a ratio of 2 to 11.5! Moreover, the HR methodology suffers from other drawbacks that call for completing it with the use of alternative approaches.

The first problem associated with the HR approach is that it imposes the restriction that a firm belongs to a country and an industry and that it cannot be sensitive to other countries/industries. This implies that in a setup where the asset manager is constrained to elect between a country or a sector dimension, whenever the fraction of the total variance explained by country factors becomes smaller than the fraction of variance explained by industry factors, the first step of an optimal asset allocation should be done at the level of sector or industry indices (and conversely). However, Adjaouté and Danthine (2003) show that if the assumption of factor orthogonality does not hold then the optimal first step in the asset allocation in fact depends on the sensitivities to the different factors.

The assumption that factors are orthogonal is highly disputable in the face of the trend toward multinational firms and the reality that many firms have outputs or inputs connected with multiple industries. This difficulty is evident in the task of Industry Classification Standard providers as highlighted in MSCI-S&P joint GICS (Global Industry Classification Standard) publications. The classification of companies into given sectors proves increasingly difficult with many business segments contributing to the turnover or the operating income, the criteria used to typify companies. Assigning a country to a company has become equally tricky with the country of origin or the country where the company is actually headquartered having often very little to do with the geographical areas that effectively influence the business of the company.

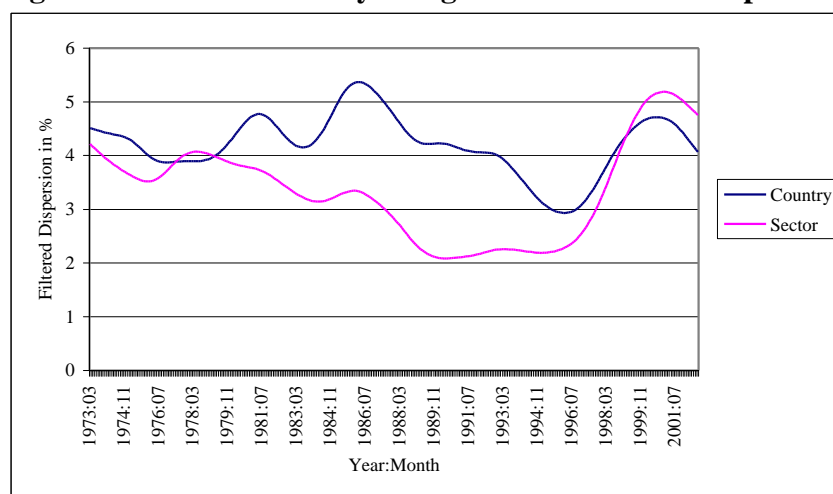
This view receives further support from the observation that if the restricted HR model were true, the covariance of stock returns would show non-zero terms only for stocks in the same sector or belonging to the same country. This is far from being the case. We illustrate this point with the correlation matrix that we use in the next section and which corresponds to a higher level of disaggregation (we identify 77 country-sectors within EMU, the unit being a sector in a country). This matrix include 2,926 ( $77*76/2$ ) independent correlations, out of which only 41 (68) are less than 0.1 in absolute value during the first (second) part of the sample!



A second problem associated with the HR approach is that it assumes that all stocks from the same country/industry have the same sensitivity to the country/industry factors. This assumption is clearly inconsistent with the most basic asset pricing model. A recent paper by Brooks and Del Negro (2002b) provides clear evidence against this assumption. These authors argue that there are reasons to believe that the exposure to a country factor may vary across firms in the same country, as some are more international than others. They go on to test this hypothesis and to unambiguously reject the constraints that the coefficients to own country factors are all unity.

For this variety of reasons, it is of interest to complete the data analysis with an alternative methodology consistent with an unrestricted model simply stating that a security can be subjected to multiple sources of uncertainty owing to its multinational character (more than one country) and/or because it is a conglomerate operating in more than one sector (or, more generally, because its performance depends on the price of inputs originating in other industries than its own). Here we analyze the cross-sectional dispersion of country returns and global sector returns, respectively. The global correlation/dispersion is particularly useful in that it can be generated as a time series for the available frequency of return data. It reports on instantaneous relations involving no time averaging and thus allows for a more thorough investigation of the evolution of the diversification opportunities in the EMU zone. The time series of raw country return and global sector return dispersions are highly time-varying while also following some cycles. The more interesting cyclical pattern appears clearly if one filters the series to extract their slowly moving components. The result is displayed in Figure 21 where the two series are shown together.

**Figure 21: Filtered country and global EMU sector dispersions**



Source: Datastream

This analysis is revealing. Both country and sector dispersions have displayed a downward trend until the fall of 1996, an evolution that Adjaouté and Danthine (2001b) credit for the widespread view that correlations among country indices were increasing in Europe due to European integration and that indeed diversification opportunities were being hampered. But these dispersions have trended upward since reaching their most recent peaks around the end of 2000. By then the dispersion levels were at an all-time high for sectors and had almost matched their highest point of the mid-1980's for country indices. Thus, in contradiction to the often expressed view, the post-euro period has been very favorable for diversification within the euro-area whether on a geographical or on a sectoral basis.

Viewed from this angle, the superiority of a country-based asset allocation was clear for most of the period (in conformity with Rouwenhorst, 1999). But there appears to be a reversal in this ranking taking place in early 1999.<sup>6</sup> This reversal can be associated with the reversal of the variance inequality in the HR context uncovered by different authors. This result is also consistent with the finding that the euro-area business cycles have become more synchronized, so that the orthogonal portions of the euro-area country factors are showing increasingly smaller variances. Yet, the variability of the relationships and the fact that reversals have occurred in the past (this was the case from around 1977 to 1979) suggest that caution must be exercised before definitively linking this reversal to permanent structural changes. This is also the case because the difference between the two series is small by historical standards. In the end, the convergent results obtained by the two approaches followed in this subsection, HR and global dispersions, comforts us in the assessment that indeed industry effects have been the dominant determinant of returns in the most recent time period.

### *5.3 Is it European specific and does it relate to fundamentals or to integration?*

At this stage one may wonder whether the growing importance of sectors relative to countries is specific to the euro area, thus being plausibly associated with greater economic and financial integration, and whether it is likely to be permanent. Alternatively one may speculate that it could be a more universal phenomenon and/or that the recent stock market bubble could have played a role in this observation.

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<sup>6</sup> The exact dating of the reversal is likely to depend on the specific filtering or data-smoothing method.

Brooks and Del Negro (2002a) provide interesting evidence in these regards. First they observe that the correlation of the US equity market with other developed equity markets has moved from a low level of 0.4 in the 1980s to almost 0.9 in the late-90s. They argue that this may be due to a decline in home bias, so that the marginal investor in the German stocks is not necessarily German, and as a result country-specific investor sentiment now plays a minor role. Alternatively, the general rise in co-movement of equity markets may be the manifestation of firms becoming more diversified internationally, and therefore increasingly exposed to the global business cycle, causing stock markets to move together more. Finally, there is the possibility that the rise in co-movement of stock markets is a temporary phenomenon associated with the recent stock market boom and bust.

Brooks and Del Negro use a sample of companies representing three geographic regions, in MSCI's terminology, Americas, Far East and Europe. They estimate the standard dummy variables HR model and use MADs of country and sector factors to assess the relative importance of each shock. The empirical evidence for the whole sample seems to suggest that industry factors have outgrown country factors in the late 90s, in conformity with what we reported for the euro-area. However, when US stocks and companies in the telecommunication, media, biotechnology and information technology (TMBT) are excluded from the sample, the evidence of industry factors dominating country factors disappears. The absence of evidence beyond TMBT sectors and the US is interpreted by the authors as an indication that the recent dominance of industry effects over country effects is a temporary phenomena associated with the stock market bubble. At the regional level, however, they report that the European evidence is not affected by the removal of TMBT sectors. Isakov and Sonney (2003) provide a converging assessment. Even when TMBT sectors are excluded from the sample, the recent superiority of sectors holds true in Europe.

To summarize, in general the estimation of the relative importance of countries and sectors is sensitive to the inclusion or exclusion of specific countries (the US in particular) or sectors (TMBT). The fact that the evidence is more robust in the case of the euro-area supports the hypothesis that something more fundamental is at work in that region. It remains to be seen, however, whether this more fundamental evolution is indicative of a movement toward better portfolio diversification or whether it is the result of macroeconomic changes associated with monetary unification and/or economic integration.

## **6. Can the multi-factor perspective rationalize the shift in asset allocation paradigm?**

The lack of data on the outcome of individual investors' investment decision (Section 3) makes it of interest to discuss the process by which individuals allocate their assets. Indeed, many observers would argue that it is at this level that the major change in the European equity scene has been registered. The large majority of investors intermediate their portfolio investments through commercial banks or independent asset managers. The most common practice among portfolio managers is to follow a top-down approach to asset selection. Traditionally, the first step of the top-down approach consisted in deciding on a country allocation grid, effectively placing first priority on an adequate geographical diversification of portfolios. The second step consisted in selecting the best securities in accord with this allocation, that is, within each national market to the extent permitted by the grid. This practice has often been placed in the context of the discussion of our last section on the relative importance of country vs. industry or sector factors in explaining the cross-section of international returns. The standard position arguing that country factors were dominant supported the geographical slant of the top-down approach. Everywhere, the argument is now made that the country orientation of the top-down approach should give way, within the euro-area at least, to an industry or sector orientation. According to this view, the first step of the portfolio optimization should be undertaken at the industry level. For many observers, this shift in the asset allocation paradigm is the hallmark of the euro for the asset management industry.

The change in asset allocation strategy is not a minor change. It is viewed as implying that the teams of analysts, until now organized along country line, are to be reorganized along industry lines. This in turn is meant to imply that the sought-after competencies become the ability to analyze the prospects of an industry and of specific firms within that industry as opposed to the prospects of a country, in particular its macroeconomic outlook. Because it is not a minor change it is legitimate for us to ask whether we can make sense of this change and whether it has implications for the subject of our inquiry, portfolio diversification in Europe.

To place the change in asset allocation paradigm in perspective, we follow AD in disaggregating the data one step further. This is because, while the factor analysis has a tendency to rationalize asset allocation strategies in terms of country or industry indices, it is not clear that one can understand either strategies relative to the alternative of proceeding to a full optimization across both countries and sectors. To illustrate, why limit oneself to 10

country indices or 10 global sector indices when one could equally well use the full 10x10 matrix of what we will label “country-sector” indices?

In fact, not all sectors are available in all countries, or only for a very short time period. We thus use a sample of 77 country-sectors. Table 4 collects the evidence on the 77x77 correlation matrix, pre- and post-convergence. The displayed summary statistics are interesting because they do not support the view that country-sector correlations have moved in either direction: the average pre-convergence correlation is 0.407, compared to 0.406 during the convergence period. We take this to mean that what is at work is not operative at company levels but is something affecting the appropriateness (for diversification purposes) of the specific portfolio weights characterizing either country or sector indices.

**Table 4: Country- sector index correlation stats**

	Pre convergence	Convergence
Minimum	-0.112	-0.064
Maximum	0.910	0.842
Average	0.407	0.406
Median	0.400	0.409

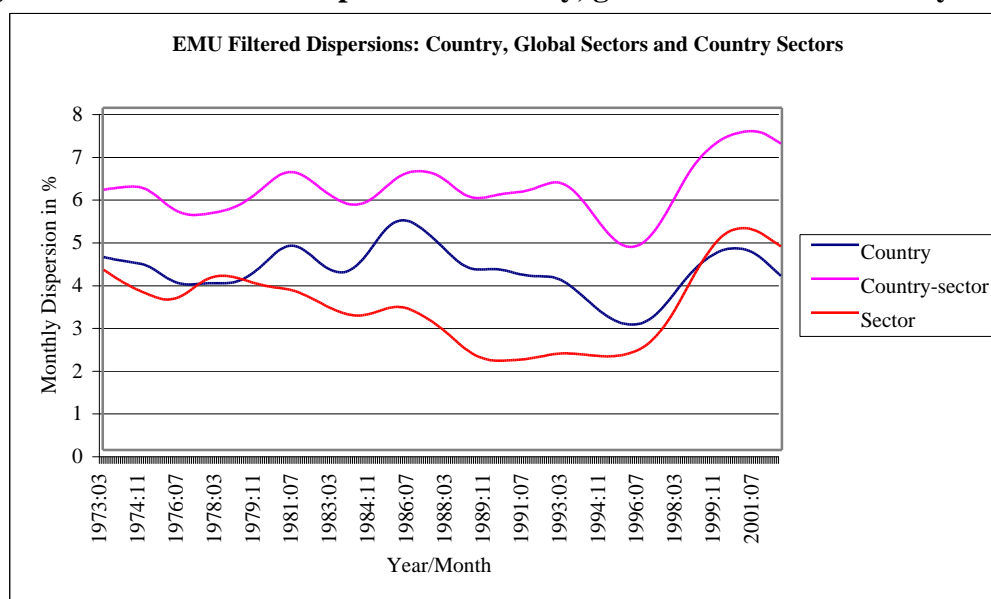
Source: Datastream

To further check the time-series properties of the country-sector indices, we next turn to the dispersion measures again meant to reflect instantaneous correlations. Figure 22 superposes on the series of Figure 21 the filtered dispersion for the country-sectors indices. The result is illuminating. First, country-sector indices display the same sort of cycles as observed for the country or the sector indices. Second, at the disaggregated level of country-sectors, the most recent period is confirmed as a favorable period for diversification opportunities. Finally, and most importantly, it clearly appears that the diversification possibilities are always better at the country-sector level than at either more aggregated level: Country-sector portfolios have consistently been *less* correlated than country portfolios or global sector portfolios and the advent of the single currency had no impact on this reality.

Now this is a puzzling result that may shed some light on the industry. Indeed the lesson of Figure 22 is that if easily available diversification opportunities were appropriately exploited the euro should not have been a significant event for the industry. Put differently, while the structural changes presented in Section 5 are of interest to the outside observers as they may

tell us something on the changes in return structures following the euro or other measures of financial integration, they should not have led to any changes in paradigm. It was best to take asset allocation decisions at the country-sector level before the euro, it remains so after the euro.

**Figure 22: EMU filtered dispersions: country, global sectors and country-sectors**



Source: Datastream

One may try to understand these observations in terms of cost. Thus confronted with this evidence, AD argue that a two-step allocation is costlier than a one-step strategy. Small players could possibly afford only one step. The findings of the previous section suggest that the changes that have taken place imply the one step should now be industry. That is, the marginal diversification gain of adding an extra layer of optimization is smaller when the first step is industry and the extra-layer is country than when the first step is country and the extra-layer is industry. But this reasoning is far from fully convincing. While the costs in question may possibly be understood when placed in the larger context of the costs of doing active portfolio management in a multi-industry international setting, they are hard to rationalize in the context of passive strategies.

Another possible reaction is that the discussion has been circumscribed to the matrix of return variances and covariances, that is, to a measure of diversification opportunities. In practice one is equally interested in expected returns and there is always the possibility that a shortfall in diversification possibilities is compensated by gains in the expected returns front. But AD show that it is not the case. This can be understood from the fact that the set of ex-post returns attainable with country or sector indices is also attainable with country-sector indices.

Effectively they show that the Sharpe ratios of both tangent and minimum variance portfolios were much larger when optimizing at the level of the country-sectors rather than under either of the more aggregated approaches.

Our second question is whether the change in the asset allocation paradigm is a good or bad thing for diversification. Given our lack of understanding of the motivation for the change, this question is effectively unanswerable. One may argue that the new sectoral approach to asset allocation is a strong antidote to the home bias. This is because global sector indices are by definition impervious to national considerations and the reliance on these indices at the first stage of the asset allocation process will automatically force investors towards a more international outlook. But one could as well argue that, on the contrary, once the optimal sector allocation has been defined, it will be natural for investors to try to fill in the grid with home stocks belonging to the required industries, something that will be possible in a majority of cases. Of course, doing so systematically would lead to going further away from an optimal geographical diversification. In addition, the process may very well be further complicated if sector/industry indices are geographically concentrated.

All in all, there are clear indications that the step-by-step top-down asset allocation process commonly adopted forgoes major diversification gains and there is no guarantee that the current paradigm change will affect this reality. We cannot dispell our suspicion that the evidence displayed in this section in fact constitutes an indictment of current asset allocation practices. With recent events serving as a reminder that equity markets and their practitioners are not immune from fads and herding behavior, one may wonder whether the most common asset allocation practices and the observed recent changes in these practices are not another manifestation of similar tendencies.

## **7. Conclusion: on the state of portfolio diversification in Europe**

Where do we stand in regard to the question raised in this paper? Are we ready to conclude that the average European investor is now better diversified than in the recent past? We have indeed accumulated some modest evidence of favorable changes. This evidence relates mostly to the behavior of institutional investors who almost certainly have, to some extent, seized the opportunities opened by the disappearance of relevant currency matching restrictions within the euro-area. We have also proposed new, although fragile, evidence suggesting that the equity risk premia, across European stock markets, are converging. This accords with ex-ante reasoning on the effect of European integration and with complementary evidence that the cost of capital has decreased in Europe. There is also robust evidence that the structure of equity returns has changed, in Europe specifically. In particular the country factors now

appear to be dominated by the factors associated with industry or sector and this finding is more robust – across data bases and methodologies – than it is elsewhere. This latter result may, however, be simply the result of macroeconomic and monetary integration and at this stage we cannot make strong inferences on the degree of portfolio diversification from these observations.

On the negative side, the relationships between national consumption patterns within the euro area do not reveal as strong a degree of international risk sharing as one would expect from an area that is economically and financially integrated. In fact they compare unfavorably with similar observations made in other regions of the world. Furthermore we have not been able to dispel the suspicion that the most popular asset allocation process among European practitioners is seriously flawed. In particular, our data does not permit rationalizing the observed change in the asset allocation paradigm often identified as the trademark impact of the euro on the industry.

At the end of this inquiry on the status of portfolio diversification in Europe, we are clearly standing in front of a glass that is half full, or half empty! Unfortunately we have to conclude in the absence of “smoking gun” revealing without ambiguity that decisive progress is being made. But some advances are registered nevertheless. While leaving the reader free to choose his or her own appreciation of the uncovered reality, we cannot conceal our bewilderment at finding ourselves in the incapacity of justifying the most important change associated with the euro by practitioners. This leaves us with the suspicion that Europeans continue to be seriously undiversified.



## References

- Adam, K., T. Jappelli, A. Menichini, M. Padula and M. Pagano (2002), *Study to analyze, compare and apply alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union*, Commission of the European Communities, Internal Market Directorate General
- Adjaouté, K. and J.P. Danthine (2001a), "EMU and portfolio diversification opportunities", FAME Research paper No. 31
- Adjaouté, K. and J.P. Danthine (2001b), "Portfolio diversification: Alive and well in Euroland", FAME Research Paper No. 32
- Adjaouté, K. and J.P. Danthine (2003), "European Financial Integration and Equity Returns: A Theory-Based Assessment", Paper prepared for the Second European Central Banking Conference, October 24-25 2002, to appear in "The Transformation of the European Financial System", ,
- Arnold, I. (2001), "Country and industry effects in Euroland's equity markets", in J. Choi and J. Wrase, eds. *European Monetary Union and Capital Markets*, (Elsevier), volume 2, 137-155.
- Baca S. P., Garbe B. L. and R. A. Weiss, 2000, "The rise of sector effects in major equity markets," *Financial Analysts Journal* 56, October, 34-40.
- Beckers S., Connor G. and R. Curds, 1996, "National versus global influences on equity returns," *Financial Analysts Journal* 52, 31-39.
- BIS Study group on fixed income markets (2001), "The Changing Shape of Fixed Income Markets", BIS Working Papers No 104, September
- Brooks R. and M. Del Negro (2002a), "The rise in comovement across National Stock markets: Market Integration or Global Bubble", IMF Working Paper, September 2002
- Brooks R. and M. Del Negro (2002b), "International Diversification Strategies", IMF Working Paper, November 2002
- Cavaglia S., Brightman C, and M. Aked (2000), "The increasing importance of industry factors," *Financial Analysts Journal* 56, 41-54.
- De Santis, G., B. Gerard, and P.Hillion (1999), « The European single currency and world equity markets », in P. Hillion et al. (eds), *European Capital Markets with a Single Currency*, Oxford University Press
- Federation of European Securities Exchanges (FESE) (2002), "Share Ownership Structure in Europe", Economic and Statistics Subcommittee, mimeo.
- Flotho, T. D. (2002), "A Note on Consumption Correlations and European Financial Integration", Nota di Lavoro 115.2002, Fondazione Eni Enrico Mattei, December

Galati, G. and K. Tsatsaronis (2001), "The impact of the euro on Europe's financial markets", BIS Monetary and Economic Department, working paper No. 100

Gerard, B, P. Hillion and F. de Roon (2002), "International portfolio diversification: industry, country and currency effects revisited", working paper

Griffin J. M. and A. G. Karolyi (1998), "Another look at the role of the industrial structure of markets for international diversification strategies," *Journal of Financial Economics* 50, 351-373.

Guiso L., Haliassos M. and T. Jappelli (2003), "Household Stockholding in Europe: Where Do We Stand and Where Do We Go?", Forthcoming *Economic Policy*

Hamelink F., Harasty H. and P. Hillion (2001), Country sector or style: What matters most when constructing global equity portfolios, FAME Research Paper no 35.

Hardouvelis G., Malliaropulos D. and R. Priestley (2001), "The impact of globalization on the equity cost of capital", Working Paper, Banque de France

Heston, S. and K. Rouwenhorst (1994), "Does industrial structure explain the benefits of industrial diversification?", *Journal of Financial Economics*, vol. 36, no. 1, 3-27

Isakov D. and F. Sonney (2003), "Are practitioners right? On the relative importance of industrial factors in international stock returns," Working paper, HEC-University of Geneva no 2003.04 and FAME Research Paper no 72.

Kalemi-Ozcan S., B.E. Sorensen, and O. Yosha, "Asymmetric shocks in a monetary union: updated evidence and policy implications for Europe," presented in the workshop "Who should own Europe?", Brussels, February 2003

Kuo W. and S. E. Satchell (2001), "Global equity styles and industry effects: the preeminence of value relative to size", *Journal of International Financial Markets, Institutions and Money* 11, 1-28.

Massaro R. and E. Laakari (2002), "The European and euro-zone financial structure – Rapid changes in recent years", Eurostat -Statistics in Focus, Economy and Finance, 18/2002

Rouwenhorst, K.G. (1999), "European equity markets and the EMU", *Financial Analysts Journal* 57-64

Solnik, B. and J. Roulet, (2000), "Dispersion as cross-sectional correlation", *Financial Analysts Journal*, January/February 54-61.

Stulz, R. (1999), "Globalization of Equity Markets and the Cost of Capital", *Journal of Applied Corporate Finance*, Fall (1999), 8-25.