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## **Abstract**

We provide a quantitative analysis of the impact of the euro on European financial integration. We consider both volume- and price-based indicators. In general, we find evidence that common membership of the euro area strengthens bilateral financial linkages. However, we emphasize that EMU has only been one innovation driving European financial integration in recent years, with global factors also increasingly important.

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## 1. Introduction

The goal of this paper is to provide a quantitative review of the impact of European Monetary Union (EMU) on international financial integration. The degree of financial market integration can be measured along several different dimensions and there is no widespread agreement about a single correct measure (Adam et al. 2001, Baele et al. 2004). *De jure* measures of financial market integration rely on the dating of financial market liberalisations initiated by policymakers. The effects of such liberalisation episodes are typically examined using event-study methodologies. *De facto* measures focus instead on the outcomes of such liberalisations. In so far as the impact of policy decisions will develop into outcomes gradually over time, it is likely that *de jure* and *de facto* measures will provide different views about the extent of financial market integration. Moreover, *de facto* measures rely either on quantities, be it stocks or flows of equity, debt or foreign direct investment, or on asset prices or returns. Finally, some studies make use of conditional asset pricing models and assess the relative importance of regional and local risk factors in explaining expected returns (Bekaert and Harvey, 1995; Hardouvelis et al., 2006): a greater degree of market integration results when expected returns are increasingly explained by regional risk factors and less by local risk factors.

In this paper, we consider both volume-based indicators of financial integration and the evidence from asset prices. We find that both approaches generally provide clear evidence that the launch of the euro has led to a remarkable degree of financial integration among the member countries. However, we also argue that a parallel trend has been a contemporaneous increase in financial globalization – financial linkages among all countries (inside and outside the euro area) have been growing rapidly in recent years – and that EMU has not been the only force shaping financial integration in recent years.

The structure of the rest of the paper is as follows. First, we examine volume-based indicators of financial integration in section 2 before turning to an analysis of asset returns in section 3. The international financial role of the euro is discussed in section 4, while some conclusions are offered in section 5.

## 2. Volume-Based Indicators of Financial Integration

In this section, we first discuss the impact of the euro on the volume of asset trade in debt and equity securities markets. Next, we examine its impact on the banking sector. Finally, we briefly review the evidence concerning the effect of EMU on foreign direct investment.

### 2.1 Securities Markets

In this subsection, we first consider the money and bond markets before turning to equity markets<sup>1</sup>. EMU has naturally led to a very high degree of integration of the money and bond markets, as a result of the unification of the monetary environment. By combining

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<sup>1</sup> The line of argument in this subsection draws on Lane (2006a).

the individual markets of the member countries, a much larger and more liquid market has been created. In turn, this has prompted a significant increase in bond issuance by the corporate sector – a market segment that historically had lagged far behind the United States. For instance, figure 1 shows that a trend break in the volume of corporate bond issuance is clearly linked to the formation of EMU.

One way to capture the scale of integration of the euro area bond market is to examine bilateral patterns in cross-border bond holdings – are EMU members more likely to hold each other's bonds than is the case for other country pairs? To address this question, Lane (2006b) examines the bond portfolio allocations of a sample of investor countries that includes 11 EMU member countries and 11 other high-income countries from outside the euro area vis-a-vis over 90 destination countries<sup>2</sup>. By contrasting the behavior of members and similar non-members, it is possible to investigate whether a country pair where both are members of the euro area has a different investment pattern than other country pairs. The general specification employed in that study is given by

$$(1) \quad \log(BOND_{ij}) = \phi_i + \phi_j + \beta EURO_{ij} + \rho Z_{ij} + \varepsilon_{ij}, \quad i = \{HIGH - INC\}$$

where the dependent variable is the level of source country  $j$ 's bond or equity holdings in destination country  $i$  and the pair-wise dummy  $EURO_{ij}$  takes the value 1 if both the source and destination countries are members of the euro area and zero otherwise. The other explanatory variables include the level of bilateral imports, bilateral exchange rate volatility, an EU membership dummy, a border dummy, bilateral distance, colonial and common language dummies, the bilateral correlation in growth rates, a tax treaty dummy and a dummy for common origin of legal institutions. The regression results estimated by Lane (2006a) indicate that common membership of the euro area raises bilateral bond holdings by about 100 percent in a levels specification and by (85,125) percent in a first-differences specification. In addition, employing a similar specification, Lane and Milesi-Ferretti (2005) find that common membership of the euro area raises bilateral portfolio equity holdings by 62 percent.

However, it is not clear that the increase in intra-EMU financial holdings provides much diversification against country-specific shocks. First, the abolition of national currencies means that the country component in bond returns has largely been eliminated. Second, as is discussed further in section 3, national stock market indices do not necessarily provide much exposure to national risk factors, since the global and sectoral components in returns have increased in relative importance.

Lane and Milesi-Ferretti (2006) and Lane (2006a) emphasise that the scale of global asset trade has also increased rapidly in recent years. To the extent that member countries hold different global portfolios, this may actually serve to reduce the internal coherence of the

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<sup>2</sup> These are the US, UK, Denmark, Sweden, Switzerland, Norway, Japan, Canada, Iceland, Australia and New Zealand. These countries are advanced economies that are structurally similar to the EMU member countries and as such form a natural comparator group. Luxembourg is excluded as a source country due to its special status as an offshore centre.

euro area, since it implies asymmetric exposures to external financial shocks. Indeed, this was cited by HM Treasury (2003) as an important barrier to the United Kingdom's participation in EMU, in view of the particularly strong financial linkages between the United Kingdom and the United States.

## **2.2 The Banking Sector**

At a qualitative level, the introduction of a single currency should contribute to further cross-border banking integration among the participating countries. The elimination of currency risk fosters greater transparency and should lead to more competition. More integrated markets should allow banks to exploit economies of scale and to develop more diversified activities, thereby enhancing the stability of the financial system. There is also mounting evidence showing that financial integration brings about a more efficient allocation of capital and enhances economic growth.

Clearly, other factors will also contribute to the evolution of cross-border banking integration. The liberalisation of international capital movements and gradual deregulation in the European banking industry should facilitate the cross-border provision of financial services and should lead banks to hold a significant proportion of their assets outside their own jurisdiction. Technological innovation not only reduces the costs of the banking industry, such as the collection and the processing of financial information, but also allows banks to expand the number of services that they provide. Moreover, technological innovation lowers the effect of other types of impediments to cross-border banking integration such as geographical distance. Overall, the combination of free capital movements, a single currency and technological innovation should lead to greater European banking integration<sup>3</sup>.

Walkner and Raes (2005) distinguish between three forms of cross-border banking integration, namely organic growth through the creation of foreign branches and subsidiaries, consolidation through mergers and acquisitions, and the cross-border provision of banking services. We consider each aspect of banking integration in turn, providing some evidence about the degree of integration and discussing the remaining obstacles that prevent further integration.

### **Foreign Branches and Subsidiaries**

Walkner and Raes (2005) argue that foreign branches should be more widespread than subsidiaries. Current EU legislation facilitates organic growth through the creation of a foreign branch that is subject to the home country supervision. In contrast, the establishment of subsidiaries involves supervision in each of the host countries and would therefore appear to be less practical and more costly. Yet, European Central Bank (2005b) shows that around half of the foreign presence in EU countries consists of

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<sup>3</sup> These forces also operate on the integration of European (and global) capital markets. For instance, the Euronext platform now combines the stock exchanges in Amsterdam, Brussels, Paris and Lisbon, while there have been multiple attempts to seek a merger between the London Stock Exchange and other major exchanges in Germany and the United States.

subsidiaries. Overall, the market share of foreign branches and subsidiaries accounts for around 25 percent of the total EU-25 assets.

Walkner and Raes (2005) list several reasons behind the apparently disproportionate share of subsidiaries in the overall market share of foreign branches and subsidiaries. In particular, the creation of foreign branches requires extensive knowledge of the local market in so far as the relationship between banks and potential customers is typically characterised by asymmetric information. Borrowers typically know more about their own creditworthiness than banks do. Consequently, long-term relationships remain crucial since they provide banks with a track record of their customers. The creation of a foreign branch must overcome the lack of knowledge about local market conditions, as well as the generally weak incentives for customers to break a long-term relationship with their banks.

### **Mergers and Acquisitions**

Mergers and acquisitions should develop as banks exploit economies of scale and they should contribute to the consolidation of European banking industry. They also represent a possible solution to the problems inherent in establishing foreign branches. European Central Bank (2005a) shows that the number of credit institutions in the euro area has actually declined from 9500 in 1995 to 6400 in 2004. This one-third reduction can be interpreted as evidence that the European banking industry is going through a process of consolidation. However, Walkner and Raes (2005) and the European Central Bank (2005a) show that more than three-quarters of mergers and acquisitions are conducted at the national level, and not across borders. Even though it appears that consolidations within countries have been slowing down, while consolidations across countries have increased, it remains true that consolidations involving only domestic credit institutions represent a large proportion of all mergers and acquisitions.

This evidence has raised questions about the likely welfare impact of mergers and acquisitions. Consolidation at the national level would mean greater concentration, possibly leading to less competition and preventing consumers from reaping the benefits of further consolidation. Walkner and Raes (2005) provide estimates of concentration indices and show that competition has actually decreased in most countries, except for the three Scandinavian countries. In this sense, further cross-border banking integration is more likely to bring benefits for consumers than within-border consolidation.

Several studies have identified remaining impediments to further cross-border banking integration. Local regulations still differ despite successive efforts at harmonising legislation across the European Union. Cultural differences in banking practice imply different work practices, different management procedures, different technological solutions and possibly different languages. As a result, the integration of two financial institutions requires overcoming significant obstacles. Taxation remains a national prerogative and different national tax systems create costs and uncertainty for cross-border financial institutions. Finally, and importantly, some governments have resisted cross-border mergers and acquisitions in the name of strategic grounds. Recent examples

involve various sectors of the economy, in particular the energy sector and the banking sector. The French government blocked a bid made by Enel, the leading Italian energy company, on Suez, a French competitor, by forcing the state-owned Gaz de France and Suez to merge, thereby marking the birth of yet another national champion. The Spanish government has recently expressed discontent after E.ON, a German energy company, made a bid for the Spanish leading energy firm Endesa. The Governor of the Bank of Italy was forced to resign after blocking bids by a Spanish bank and a Dutch for two Italian banks.

These examples suggest that protectionism is returning at the forefront of the industrial policy agenda. Special public control rights allow states to intervene directly into the economy. The strategy appears to consist of encouraging consolidation at the new national level in order to reach a critical mass which then allows to conduct foreign acquisitions, or mergers in which the national firm is a leader. It must be noted that this strategy is not universally adopted in so far as some major countries such as the United Kingdom have not resisted mergers and acquisitions. Understanding the reasons behind the different views about mergers and acquisitions is beyond the scope of this paper. Yet, it means that removing legal obstacles will not fully achieve cross-border banking integration since some countries pursue their own interests at the expense of the development of a truly integrated banking industry.

### **Cross-Border Provision of Financial Services**

The international expansion of banking activity may also arise from the cross-border provision of financial services. European Central Bank (2005b) shows that cross-border holdings of interbank loans and securities amounts to around 45% of total holdings in the euro area. Therefore, it seems that banking integration is relatively high at the wholesale level (Cabral et al., 2002). However, integration remains very low at the retail level and shows no sign of a change since the introduction of the single currency. Another indication of the small degree of integration in retail banking is the high difference in fees charged for cross-border financial transactions and those charged for domestic transactions.

The weak integration at the retail level partly reflects the nature of banking relationships at that level. Banks have traditionally developed at the local level to overcome the problem of asymmetric information inherent in the banking activity. In this respect, selling financial services abroad remains difficult in so far as banks do not have strong knowledge of local markets. Again, asymmetric information would suggest that mergers and acquisitions are the easiest way to overcome the asymmetric information problem. Another obstacle to the cross-border provision of financial services is that European contract law diverges across member states, so that banks must establish different contracts in each member state. This legal problem means that banks cannot apply the same model to all countries equally, and that cross-border transactions entail significant costs due to the multiplication of contracts and procedures. Moreover, the absence of a unified private law at the European level creates problems in other areas. For example, the nature and the extent of the protection of consumers remains heterogeneous across



countries. Such divergences in rules imply that banks cannot offer identical products everywhere in the EU, and that they cannot fully exploit economies of scale.

### **Banking Integration and Financial Supervision**

At a general level, a greater degree of cross-border banking integration will have significant macroeconomic effects. Notwithstanding the higher degree of concentration at the national level, further cross-border integration is likely to raise competition and to deliver the usual benefits to consumers. However, further integration also means a greater potential for systemic turbulence in so far as banks are increasingly interdependent. This is especially true at the wholesale level, which is relatively integrated. The possibility of systemic effects raises new challenges for financial supervision, in particular in the light of the current home and host arrangements.

Gonzalez-Paramo (2006) focuses on banking supervision and crisis management. On the first issue, sharing information about cross-border institutions should involve all relevant parties, both during tranquil times and episodes of turbulence. Greater coordination of supervisory measures will arise from the Capital Requirements Directive, which aims to strengthen and clarify supervisory relationships between home and host countries. On the second issue, coordination is even more difficult in so far as banking crises not only involve financial supervisors, but also central banks and finance ministries. Timely information sharing is a necessary condition for a prompt reaction to systemic developments. Financial market turbulence can be severely contagious when emerging turbulence is not contained rapidly and in a coordinated manner. Stress testing exercises and further cooperation through Memorandums of Understanding have enhanced coordination among all relevant parties.

### **Summary**

In this subsection, we have emphasised that many real and policy barriers remain that prevent the full integration of the banking sector. While banks in the euro area are linked together through the wholesale money markets, it is policy decisions at the EU level that are most important for European banking integration. Indeed, some of the most important cross-border mergers and acquisitions in Europe have involved non-members of the euro area (e.g. the formation of Nordea in Scandinavia, the entry of Spanish banks into the UK banking sector). The supervisory and regulatory challenges at the levels of the euro area and the broader European Union are significant, in view of the variable geometry of the current policy regimes.

### **2.3 Foreign Direct Investment**

In principle, it is ambiguous whether EMU should raise or lower FDI flows between member countries – the increase in trade permitted by a reduction in trade costs may be a substitute or a complement for direct investment. However, the evidence is that the net impact has been positive: De Sousa and Lochard (2005) estimate that the euro has raised intra-EMU FDI flows by 62 percent and FDI stock positions by 17 percent. Along

another dimension, Barr et al. (2003) find suggestive evidence that EMU has tilted direct investment flows away from those EU countries that did not join EMU and towards the member countries, such that that intra-European exchange rate stability offered by the euro area is proving to be attractive for export-platform multinational activity.

### **3. Evidence from Asset Pricing**

This section focuses on stock market return correlations and examines whether the adoption of the euro has affected the pattern of correlations across countries and over time. The introduction of the euro should affect stock market return correlations for several reasons. First, the existence of a single currency means that currency risk disappears completely among the participating countries. Consequently, the barriers to cross-border investment arising from the costs of hedging currency risk are fully eliminated. Second, the common monetary policy inherent in the single currency and the convergence of long-term interest rates arising from the convergence of inflation expectations have brought about almost perfectly correlated real risk-free rates (Cappiello, Engle and Sheppard, 2003). Almost identical risk-free rates will in turn mean a more homogeneous valuation of stocks across the participating countries. Third, the process of monetary integration induces closer real convergence in the form of enhanced trade integration and greater business cycle synchronisation. Consequently, it is likely that expectations of real dividends will become more synchronised across countries.

Taken together, these three reasons explain why asset return correlations should increase after the adoption of the euro, with important implications both for financial market participants and policymakers. Higher cross-country stock market correlations would mean that the traditional approach to portfolio diversification across countries is not the most appropriate one anymore. There is strong evidence that the relative importance of country effects has decreased, and there is some evidence that industry effects are now prevailing among EMU participating countries. We follow the flexible approach of Adjaoute and Danthine (2003, 2004) and provide the latest evidence on both types of effects. We find evidence that supports the prevalence of industry effects over country effects in the early period after the introduction of the single currency. Cross-sectional measures of dispersion are higher across industries than across countries. However, this shift appears to be only temporary since cross-sectional standard deviations converge in 2004. These results suggest that the common currency has contributed to an increase in intra-industry trade, thereby increasing return correlations across industries.

#### **3.1 Bond Spreads**

Table 1 shows that spreads on ten-year government bonds are minimal across the member countries. These low spreads underline the high degree of substitutability across these bonds, signalling the effective unification of the government debt market<sup>4</sup>.

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<sup>4</sup> The evidence does show that the spreads are positively related to the ratio of government debt to GDP – but the slope is quite flat. Indeed, there is a debate about whether risk in this market is under-priced, with

Similarly, the evidence from the corporate bond market is that spreads are determined by the sectoral and credit-risk attributes of issuers, with only a minor role for country factors (Baele et al 2004, Pagano and von Thadden 2004).

### 3.2 Evidence on Stock Market Return Correlations

This section presents evidence on the magnitude of stock market return correlations. We make use of Datastream stock market indices expressed in U.S. dollars and obtain returns through log differentiation. The time period ranges from April 1988 to December 2005 and data are retrieved at the weekly frequency, unless otherwise noted. Daily data remain problematic because of non-synchronous trading hours. Monthly data may not provide enough information to the extent that the computation of correlations requires a significant amount of data.

#### Preliminary Evidence

Figure 2 shows correlation coefficients between the returns of individual countries and the return on an EMU index, both before the creation of the euro and afterwards. The sample consists of ten EMU countries (Luxembourg and Portugal are excluded) and four European non-EMU countries (the United Kingdom, Sweden, Denmark and Switzerland), which should be seen as a control group. The return on the EMU index is computed as a weighted average of the returns of the ten EMU countries above, excluding the country with respect to which the correlation coefficient is calculated. Thus, the EMU return used to calculate the correlation with the return of country  $j$  is given by

$$(2) \quad r_{EMU,t} = \frac{1}{\sum_{k \neq j} w_{k,t}} \left[ \sum_{k \neq j} w_{k,t} r_{k,t} \right]$$

The weights for each country are obtained as the ratio of this country's market capitalisation to the total market capitalisation of the ten EMU countries. The hypothesis that the euro has brought closer stock market integration should translate into higher correlations between EMU participants' returns and the EMU return after the creation of the euro, and relatively stable correlations for European non-EMU countries across both sub-periods.

For most countries, correlation coefficients between the returns of individual EMU participants and the EMU return have increased after the introduction the euro<sup>5</sup>. These results could be interpreted as evidence that the euro has indeed led to a greater level of financial integration. However, a higher degree of financial market integration could also arise from a more general tendency towards free capital movements and financial liberalisation at the global level. Consequently, it remains crucial to consider other

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some market participants expecting that the ECB would bail out a government that faced repayment difficulties.

<sup>5</sup> Correlations have decreased for Belgium, Ireland and Austria.

European countries that do not belong to the euro area as a control group. Figure 2 shows that correlations between the returns of the United Kingdom, Sweden and Switzerland, and the EMU return have also increased after the introduction of the euro. This result casts doubt about the validity of the interpretation that the single currency is the cause of higher correlations for EMU participants.

This analysis can be extended by considering correlation coefficients of individual countries not only with an EMU return but also with the return on a world index. In such way, we hope to determine whether correlations of returns of European countries with a world return have also increased. Figure 3 presents correlations between the returns of individual countries and the same EMU return as above as well as the world return, for the same two sub-periods. Correlations with the return on the world index have increased for all countries since the introduction of the euro, except for Belgium, Ireland and Austria. Further evidence (not presented here) shows that Belgium and Ireland exhibit higher correlations with a U.S. return after the introduction of the euro. Finally, it should be noted that correlations with the world return are almost as high as those with the EMU return. Overall, we conclude that the interpretation that the creation of the single currency has increased raw correlations in returns between member countries is not supported by the data.

### **Time-Varying Correlations**

Two potential issues arise in the estimation of correlations across two sub-periods. First, we have arbitrarily chosen the first week of January 1999 as the turning point and we have then computed correlations for each country in two sub-periods. In fact, it is unclear whether the first week of January 1999 is the right turning point. For example, Fratzscher (2002) concludes that stock market integration has risen during the convergence period that preceded the introduction of the euro, that is starting around 1996. Second, many studies (e.g. Cappiello et al. 2006) have shown that correlations are time-varying, even at relatively high frequencies. As a result, the computation of mean correlations over several years may not provide an adequate characterisation of financial market integration in so far as mean statistics could hide significant time variation.

The time-varying nature of financial market integration is captured through rolling correlation coefficients, whereby the correlation coefficient is computed over a moving period of ninety weeks leading up to the date under consideration<sup>6</sup>. For instance, the correlation for the first week of January 1990 is calculated over the period from mid-April 1988 until the first week of January 1990 inclusive. Other studies focus on correlation coefficients centered around two windows corresponding to a number of weeks before the date under consideration, and the same number of weeks after that date. This alternative calculation remains problematic if significant events occur during the

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<sup>6</sup> Forbes and Rigobon (2002) and Cappiello et al. (2006) have noted that correlation coefficients may exhibit a bias in the presence of heteroscedastic stock market returns. Forbes and Rigobon (2002) propose a correction for the correlation coefficient that works only under certain conditions. Cappiello et al. (2006) make use of GARCH estimations to calculate conditional correlation coefficients. We have implemented the correction of Forbes and Rigobon (2002) and the main results remain unchanged.

latter window and capture a pattern of integration that does not yet exist at the date under consideration. One particular example in our context is the occurrence of the 1992/93 crisis of the Exchange Rate Mechanism. The latter approach would exhibit rising correlations in the summer of 1991 already when the crisis really started in the summer of 1992.

Figure 4 depicts correlation coefficients for four EMU countries and two European non-EMU countries. Correlations are clearly time-varying, as shown by Cappiello et al. (2006). In particular, Belgium exhibits high variability but it is as integrated as France and Germany by the end of the sample period. Clearly, computing means over long periods of time can be misleading! In general, all countries exhibit rising correlations in the period leading up to the 1992/93 ERM crisis, possibly as a result of the removal of controls on capital movements in the late eighties and the early nineties. Correlations have decreased in the aftermath of the crisis and remained somewhat lower until they started rising in a highly synchronous manner, except for Ireland. Interestingly, correlations have been rising since early 1997 for all countries, whether being a forthcoming EMU participant or not. Since the turn of the century, with the exception of Ireland that has seen higher correlations with the United States, correlations have been very high. Consequently, we would conclude that European financial markets are now very highly integrated. Yet, this does not seem to depend heavily on EMU participation.

Figure 5 provides the mean for each week of correlations for two groups of countries, respectively ten EMU countries and four European non-EMU countries. Financial market integration seems to be slightly higher among the group of EMU participants but this is the case throughout the whole sample period, not only after the introduction of the single currency. Again, this casts doubts about the hypothesis that the euro has led to greater financial integration. Another interesting pattern is the similarity of the time-varying pattern of correlation across the two groups. This observation suggests that correlations could be affected by a factor common to both EMU and non-EMU members, thereby hiding the effect of the introduction of the common currency.

### **Correlation Coefficients and Common Shocks**

Country-specific stock market returns, denoted as  $r_{it}$  can be decomposed into a time-varying common factor, denoted as  $D_t$ , and a time-varying idiosyncratic factor, denoted as  $\varepsilon_{it}$ . Hence,

$$(3) \quad r_{it} = \beta_i D_t + \varepsilon_{it}$$

Correlation coefficients could be high because the contribution of the common factor to explaining returns could be large relative to that of the idiosyncratic factor. Such common factors include not only international influences such as the level of oil prices, the level of international interest rates, global risk appetite or a drive towards more homogeneous monetary and fiscal policies, but also common European legislation or free capital movements among EU member states. The effect of the single currency could be hidden by common factors, that is factors common to EMU as well as non-EMU European

countries, and it may therefore be desirable to abstract from such factors to pin down the Euro effect more precisely<sup>7</sup>.

There are two equivalent ways in our simple framework to decompose returns into common and idiosyncratic effects. On the one hand, we could simply pool all country returns over time in a panel data framework, and estimate equation (3) using time dummies. The coefficient  $\beta_t$  would indicate the magnitude and the direction of the impact of the factor or each week. On the other hand, we could simply calculate the mean return across countries for each week. Indeed, this is precisely what the coefficient  $\beta_t$  is capturing in a panel regression. The identified common factor is then subtracted from the country-specific returns to obtain estimates of the idiosyncratic factor for each week. We also reconstruct our EMU returns focusing only on the idiosyncratic component. Correlation coefficients are obtained using the idiosyncratic component of each country's return and the EMU return based on idiosyncratic components.

Figure 6 depicts the mean for each week of correlations for each group of countries, namely EMU countries and non-EMU countries. It shows clearly that once we have extracted the component of returns common to both EMU and non-EMU countries, the former group exhibits significantly higher correlations than the latter group from the time of the introduction of the single currency onwards, *other common things equal*. Indeed, the disconnect between the correlations of the two groups starts at the beginning of 1998, a time when the group of countries that would eventually participate to the monetary union became known with almost complete certainty. Adjaoute et al. (2000) collect poll data on the expected participation to the monetary union and find that all future members were expected to join by a probability greater than 0.95 by January 1998.

Our conclusion is that stock market return correlations are a useful indicator to measure the degree of financial market integration. Yet, financial integration is affected by a wide variety of factors and isolating the euro effect remains a difficult task. Our approach is to abstract from common factors affecting the returns of all countries, including the non-EMU economies, and to compute time-varying correlation coefficients, so that we do not have to choose an arbitrary turning point. Our evidence shows a rapid, significant and persistent disconnect of correlations in early 1998. To the extent that the future members of the monetary union were more or less known at that time, it was logical that the effect of the common currency on financial markets could start at that time.

### 3.3 Implications for International Investors

The correlation coefficients between the returns of countries participating into the monetary union and an EMU return have increased over time. It remains unclear whether the euro is the main explanation or whether it contributed marginally. However, as a

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<sup>7</sup> Corsetti, Pericoli and Sbracia (2005) construct a single-factor model and derive a measure of financial market interdependence that allows for changes in the relative variance of common and idiosyncratic shocks, as well as changes in the country-specific factor loadings. We do not follow this approach in this paper for practical reasons. Again, our aim is to extract any information common to both EMU and non-EMU participating countries to focus narrowly on the idiosyncratic components of returns.

matter of fact, cross-country correlations have increased and this has important implications for international investors. The traditional approach to portfolio diversification has been to allocate wealth firstly across countries and secondly within each country. There is indeed widespread historical evidence that country factors dominate industry factors in explaining stock market returns (Heston and Rouwenhorst, 1994; Griffin and Karolyi, 1998; Rouwenhorst, 1999). Nevertheless, higher stock market return correlations across countries would imply lower benefits of portfolio diversification across countries and would mean that an investment strategy based on diversification across industries may become more appealing. Several studies have documented the fall in the dominance of country factors over time (e.g. Brooks and Del Negro, 2004) and some studies conclude that the introduction of the euro coincides with a greater dominance of industry factors (Brooks and Del Negro, 2002; Isakov and Sonney, 2004; Flavin, 2004). Isakov and Sonney (2004) emphasise that the shift in the relative importance of country and industry factors has led financial institutions to reorganise their research departments in terms of industries rather than countries.

Most studies use the methodology advanced by Heston and Rouwenhorst (1994) to determine the relative importance of country and industry effects. Stock market returns are regressed on a set of industry-specific and country-specific factors captured by dummy variables and their relative importance is assessed by calculating the relative variances of the estimated factors at each frequency of the data. However, this approach has been criticised for several drawbacks (Adjaoute and Danthine, 2003; Moerman, 2004). In particular, firms are restricted to belong to only one industry and also to only one country, thereby not depending on other industries and/or other countries. This feature remains largely inadequate in so far as economic activity is partly multinational and multisectoral. Moreover, the approach assumes that all assets from a given industry or country have the same sensitivity to that industry or country.

Adjaoute and Danthine (2003, 2004) rely on an alternative view about the respective role of industry effects and country effects. They calculate standard deviations of sectoral returns and country returns, respectively, for each month over a given time period. Although diversification benefits are typically related to correlations, Solnik and Roulet (2000) show that there is a direct and inverse relationship between correlations and cross-sectional measures of dispersion. Higher cross-sectional standard deviations should therefore correspond to lower correlations. This alternative measure to correlations is useful in so far as the relative importance of country and industry effects could exhibit significant time variation.

Monthly sectoral returns are computed for ten broad sectors, namely energy, materials, industrials, consumer discretionary goods, consumer staples goods, health care, financials, information technology, telecommunications, and utilities, and the data are retrieved from the MSCI's Global Industry Classification Standard. We also make use of MSCI's stock market indices to compute monthly country returns. The time period ranges from February 1995 until December 2005. Figure 7 shows cross-sectional standard deviations for both country returns and industry returns, as well as corresponding eighteen-month moving averages to identify the underlying trends. We have also

replicated this analysis using the Hodrick-Prescott filter and the results remain unaffected.

We confirm previous evidence (Brooks and Del Negro 2002; Isakov and Sonney 2004; Flavin 2004) that industry effects have become relatively more important than country effects during the convergence period and after the introduction of the euro. The cross-sectional standard deviation of industry returns becomes relatively higher around the second half of 1998. However, the change in the relative importance of country and industry effects appears to be only temporary since the cross-sectional standard deviations revert in the first half of 2004. The two dispersion measures are almost equal by the end of 2005.

Our evidence suggests that although the importance of country factors has decreased, it is also the case that industry factors become less significant. Further economic integration leads to higher cross-country return correlations, but also to higher cross-industry return correlations in the last part of our sample period. It is possible that the higher level of economic openness associated with the creation of the monetary union (see Baldwin, 2005, for a review) implies that broad economic sectors could be affected by global shocks to a greater extent. The temporary rise in the standard deviation of industry returns could also be due to the bubble in the information technology sector, bringing about higher dispersion of returns across industries. Overall, our results would suggest that portfolio diversification across industries only is unlikely to yield the highest benefits for international investors. To the extent that both country and industry effects become similar, an investment strategy that yields superior gains would be to diversify across both countries and industries (Adjaoute and Danthine 2004, Moerman 2004). This being said, it remains true that the traditional top-down approach to portfolio diversification has become inadequate for the purpose of international investment in Europe.

#### **4. The International Financial Role of the Euro**

After the US dollar, the euro is the world's second most important currency. Table 2 shows that the euro is heavily represented in global foreign exchange transactions, while Table 3 underlines the importance of the euro in international debt markets<sup>8</sup>. However, Table 4 also shows that the euro still takes only a small share of “external” transactions – only 6.2 percent of loans made by banks outside the euro area to borrowers outside the euro area are denominated in euro, while the euro accounts for only 8.4 percent of deposits in banks outside the euro area held by non-banks outside the euro area. Table 5 shows that one quarter of global reserves are denominated in euros: however, this share is far behind the dollar's dominant position. However, Dominguez (2006) emphasises that the euro has established a significant regional presence – it is highly important in the external financial transactions of the countries in Central and Eastern Europe and the Community of Independent States.

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<sup>8</sup> Table 3 also shows that euro-denominated bonds form only a trivial proportion of the portfolios of North American institutions.



It is well understood that network externalities and hysteresis effects mean that the dollar, as the leading currency, can command a disproportionate share in international transactions and global reserve holdings. However, by the same token, this situation can shift rapidly if a “tipping point” is reached that turns the euro into a truly global currency that can rival the dollar. The large current account deficit of the United States in recent years have raised the probability of this scenario, since holders of dollar assets face substantial depreciation risk to the extent that a dollar weakening is a necessary component of the adjustment process that the United States must undertake in order to engineer an improvement in its trade balance (Gourinchas and Rey 2005, Lane and Milesi-Ferretti 2005). For instance, Chinn and Frankel (2005) estimate that the euro could surpass the dollar as the leading reserve currency by 2022, if the euro area is enlarged to include the United Kingdom and dollar depreciation risk remains important.

More generally, growth in the international role of the euro will reflect the pace of development in the euro area's financial markets – the most important difference between the dollar and the euro is that dollar markets are much deeper and more liquid than the euro markets, which is an especially important criterion in the reserve allocation decisions of central banks. For instance, European Central Bank (2006) reports that the total dollar bond market is \$21.4 trillion, with the euro area's bond market less than half its size at \$10.3 trillion. Since it is still early days in the development of the European corporate bond market, the gap may be expected to narrow in the coming years – especially if the United Kingdom were to join the euro area.

Finally, another dimension of the international role of the euro is in the exchange rate regime choices made by other countries. Table 5 records that fifty countries attach some weight to the euro in their exchange rate targets. To the extent that greater bilateral nominal exchange rate stability vis-a-vis the euro promotes trade and financial linkages, this may carry additional benefits both for the member countries and the trackers. However, it also alters the monetary transmission mechanism, since the interest rate choices by the European Central Bank has a direct spillover effect on the tracking currencies (Honohan and Lane 1999), and may carry some risk to the extent that a tracking country experiences difficulty in maintaining its currency target.

## **5. Conclusions**

This paper has reviewed the impact of the euro on international financial integration. We have found considerable evidence that the euro has significantly reshaped the European financial system, especially with respect to the securities markets. This is evident both in the data on the volume and direction of asset trade and in regard to the patterns in asset return comovements. However, the real and policy barriers to integration in the retail and corporate banking sectors remain significant, even if the wholesale end of banking has been largely integrated. Finally, while the international financial role of the euro is significant, it does not yet closely rival the dollar in world financial markets.

The financial integration induced by EMU has had a significant macroeconomic impact. Dvorak (2005) finds that EMU has raised the investment rate by five percentage points.

As is highlighted by Lane (2006a), the unification of the debt market and the elimination of national currency and liquidity risk premia has allowed some peripheral countries to experience significant lending booms and run sizeable current account deficits. This relaxation of credit constraints helps lagging countries to accelerate the convergence process (Blanchard and Giavazzi 2002). However, an excessive lending boom may lead to over-valuation and attendant adjustment problems (Blanchard 2006). An unresolved issue for the euro area is how it would cope with a systemic problem in the banking sector, given the lack of a European-level financial supervisory authority and the uncertainty about the relative roles of the European Central Bank and national fiscal authorities in addressing distress in the banking system. The policy framework supporting financial integration remains incomplete.

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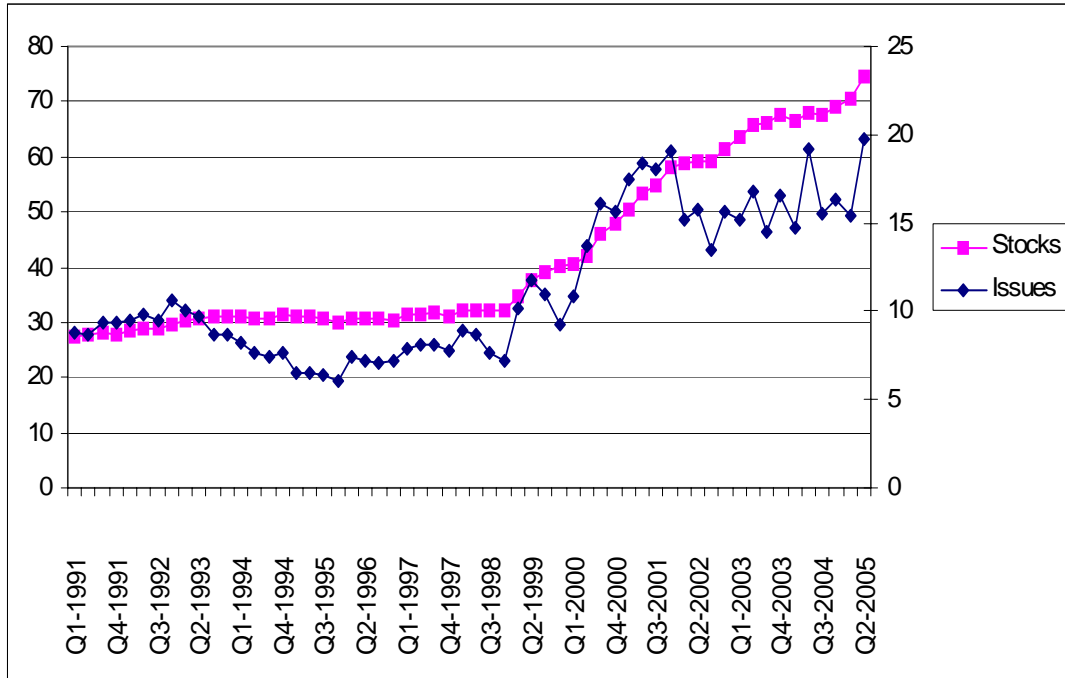


Figure 1: Euro area: securities issues (as a ratio to GDP).

Source: Lane (2006b), based on ECB data.

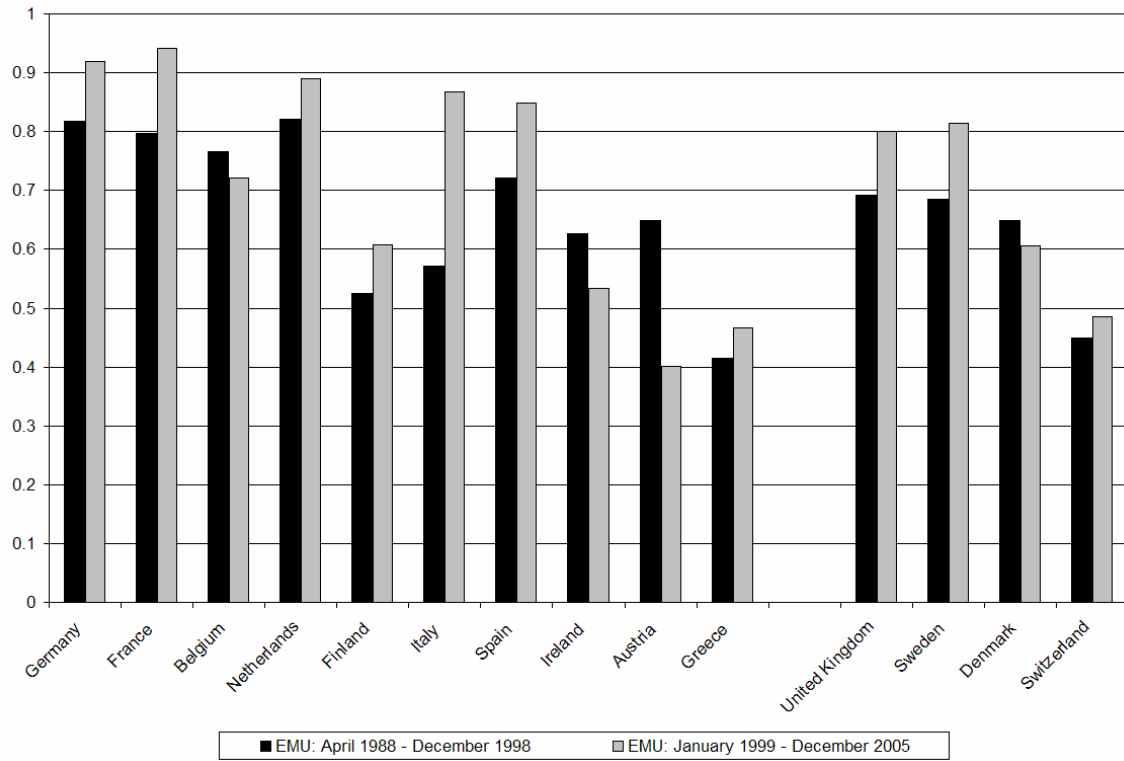


Figure 2: Return correlations to an EMU return for two sub-periods.



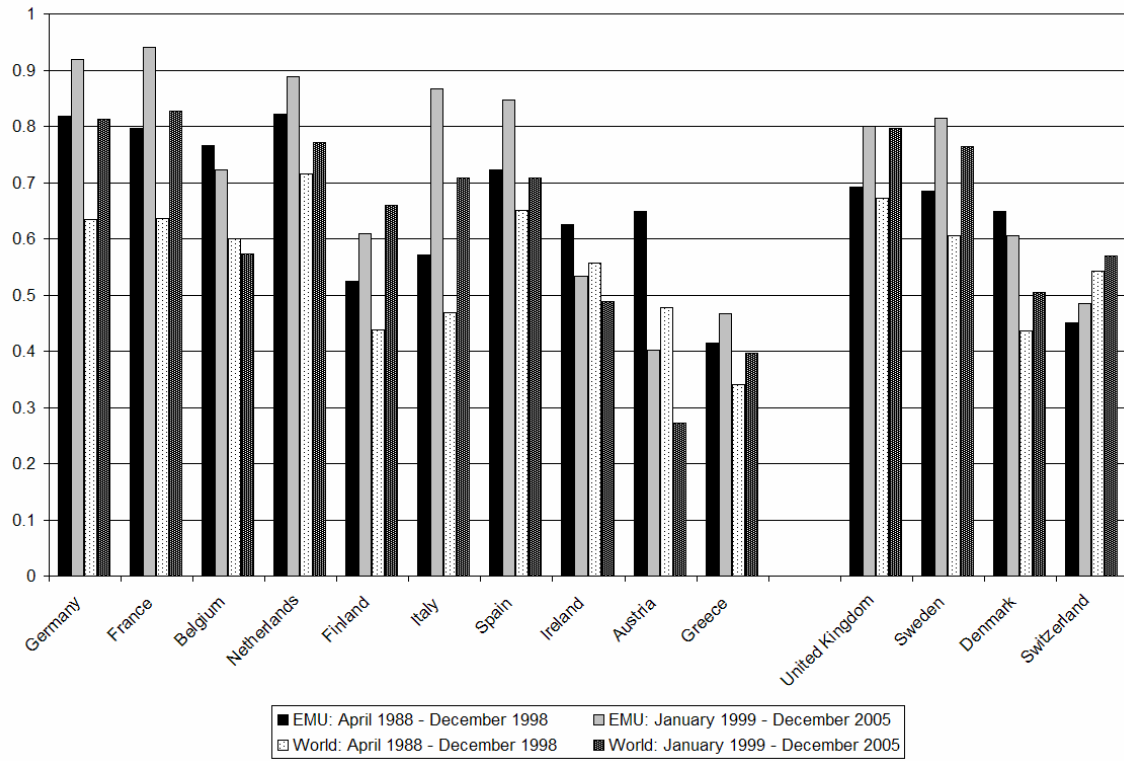


Figure 3: Return correlations to two returns for two sub-periods.

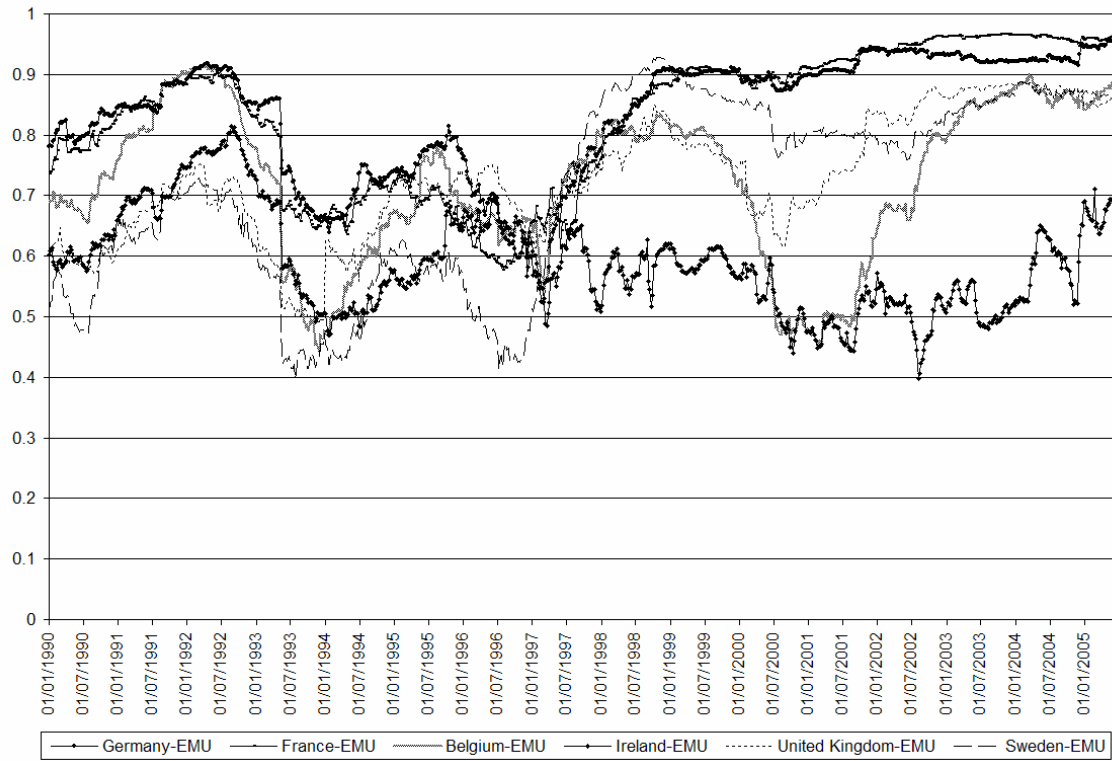


Figure 4: Time-varying correlations to an EMU return.

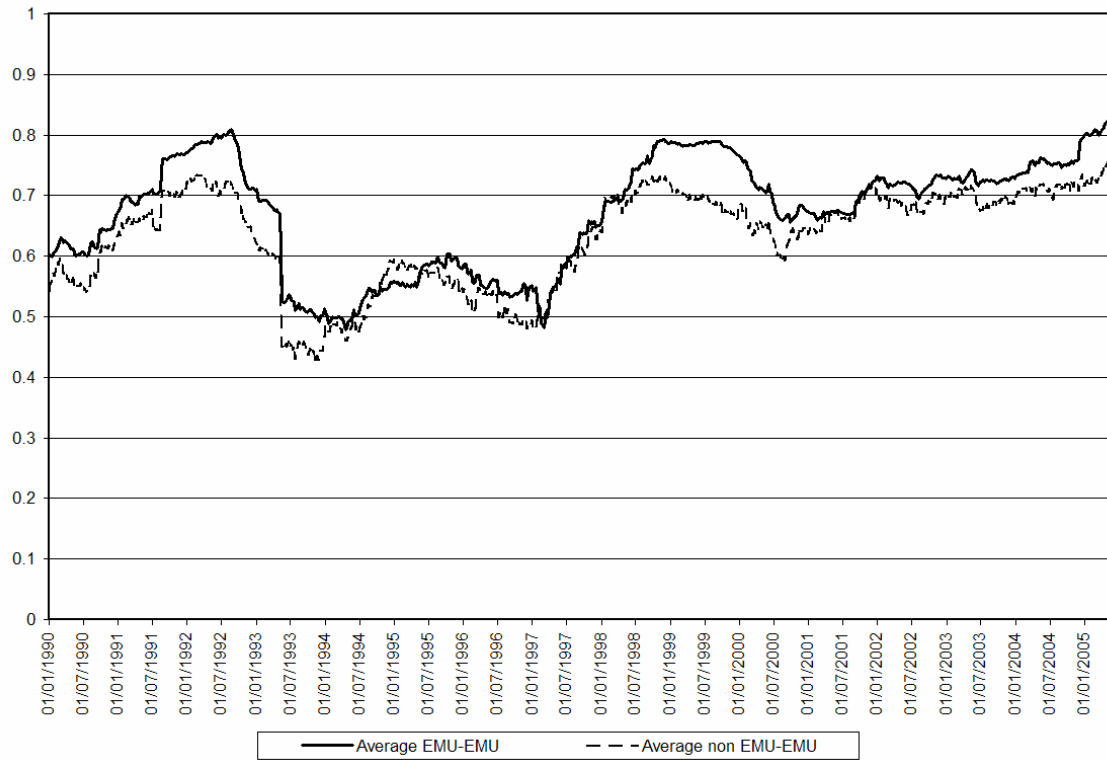


Figure 5: Means of time-varying correlations to an EMU return.

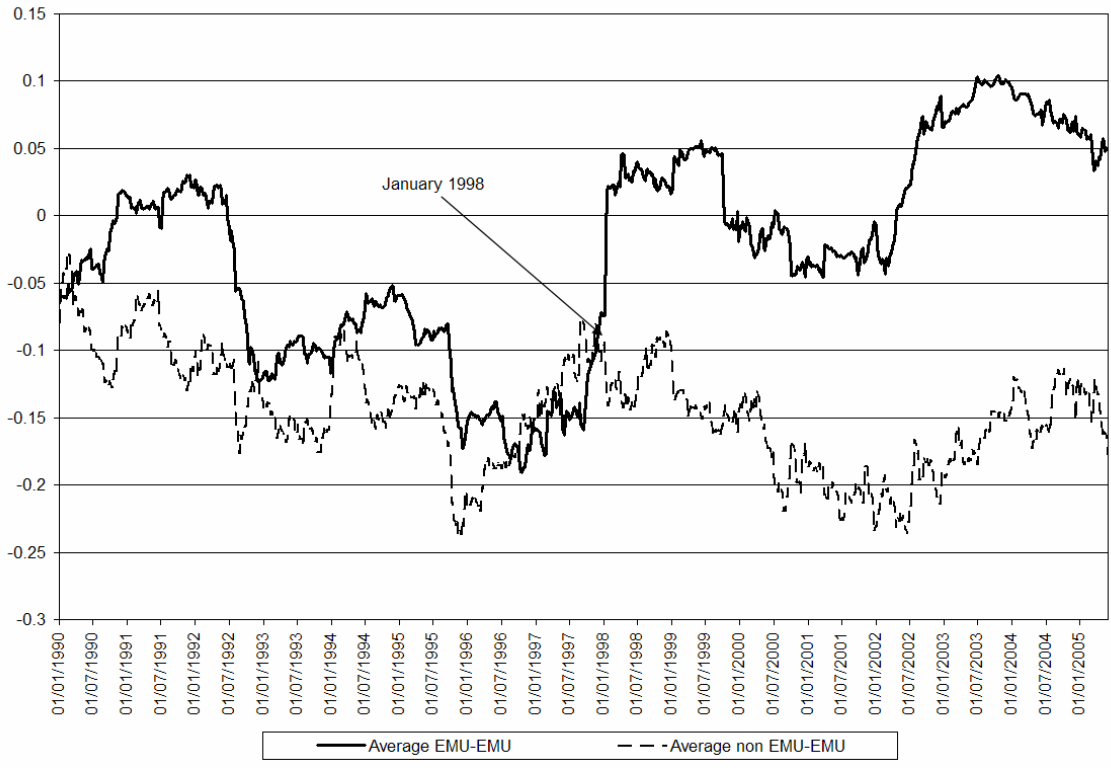


Figure 6: Means of time-varying correlations based on idiosyncratic components.

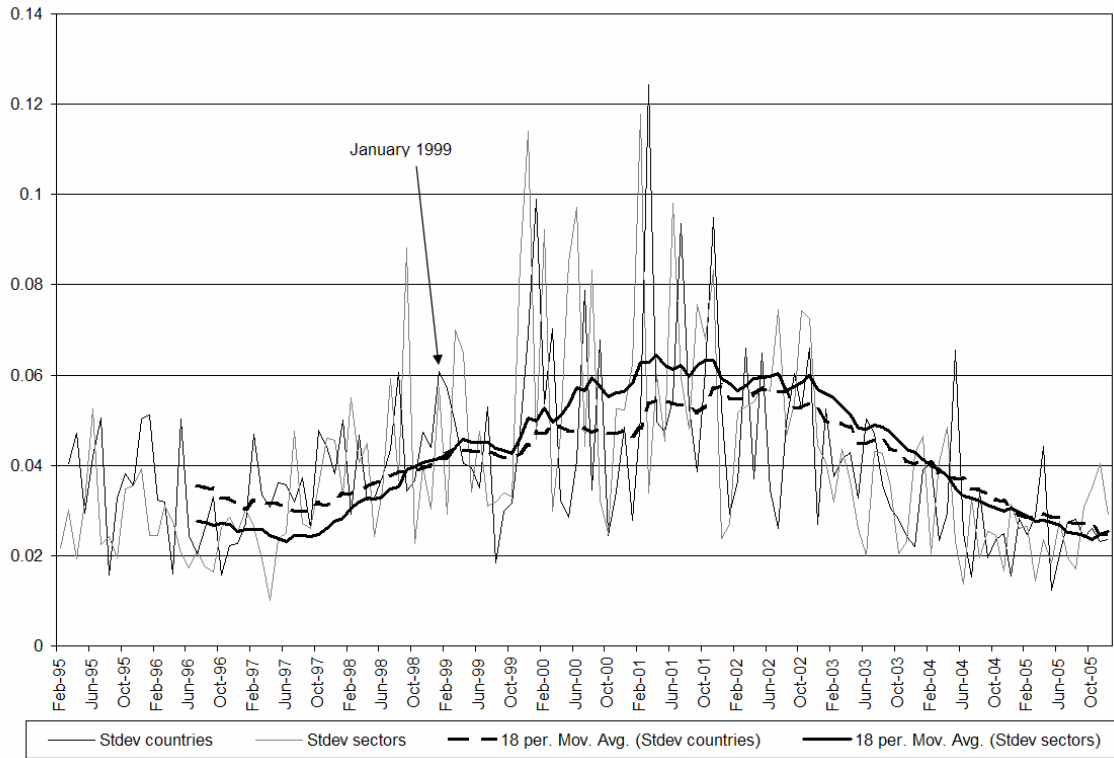


Figure 7: Cross-sectional dispersions for country and industry returns.

Table 1: Spreads on ten-year government bonds

<b>Country</b>	<b>Spread</b>
Austria	0.1
Belgium	1.8
Finland	-6.9
France	-0.5
Germany	0.0
Greece	20.1
Ireland	-1.8
Italy	20.0
Luxembourg	8.1
Netherlands	-6.2
Portugal	-0.8
Spain	0.3

Note: End of January 2006. Source: Authors' calculations based on data drawn from Global Financial Data.

Table 2: The Euro in foreign exchange markets

<b>Share of the euro in:</b>	
Total foreign exchange turnover	37.2%
Daily settlements	43.0%

Source: European Central Bank.

Table 3: The Euro in international debt markets

<b>Share of the euro in:</b>	
Stock of debt securities	27.30%
Broad stock of international debt securities	46.60%
Narrow stock of international debt securities	31.50%
Issues of international bonds and notes	34.90%
Issues of international money market instruments	37.10%
Bond portfolio	30%
Portfolios in the United States and Canada	0.70%
Portfolios in non-euro area Europe	26.20%

Source: European Central Bank.



Table 4: The Euro in international loan and deposit markets

<b>Share of the euro in:</b>	
Loans from euro area banks to external borrowers	37.4%
Loans from external banks to non-bank borrowers in the euro area	54.1%
Loans from external banks to external non-bank borrowers	6.2%
Deposits of external non-banks in banks in the euro area	50.6%
Deposits of euro area non-banks in external banks	51.5%
International deposits of external non-banks in external banks	8.4%

Note: External refers to entities outside the euro area. Source: European Central Bank.

Table 5: The Euro in third countries

Number of euro trackers	50
Share in global reserves	24.9%
Cumulative net external shipments of euro banknotes	55.0 billion
Total external stock of euro-denominated bank deposits	68.0 billion

Source: European Central Bank.



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