EMU and Portfolio Adjustment *

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Executive Summary

The advent of the euro is a significant event for portfolio managers, both within and outside the Monetary Union. The euro will affect portfolio decisions through a variety of channels. The emergence of a single currency marks the disappearance of explicit and psychological barriers to international investing. The set of investment opportunities qualifying as 'domestic' is expanding, while the need for diversification across currencies must now be met by an increased demand for assets which are not denominated in euros. The role of country risk among EMU countries is bound to decrease suggesting that portfolio shifts from the country to the sectoral level may occur. The disappearance of exchange rate uncertainty within the euro area also alters the demand for all types of securities issued within the zone, whether by private or by public institutions. The search for higher yield by investors, greater expertise in analysing credit risks by institutional investors, and reduced issuance by European governments should combine to spur growth in the European corporate bond market.

Aim of the Study

This study examines the principal factors influencing the portfolio reallocation process following the introduction of the euro. The analysis has two dimensions. The first lays out the changing structure of European securities markets since the euro's introduction. The objective is to place the advent of the single currency within the context of the frictions to cross-border investment remaining in the euro area. Many of these barriers, which are discussed in the context of the existing home bias, stem from differences in tax regime, legal framework and transaction settlement. At a more indirect level but of equal importance, the reality of underdeveloped markets (e.g. corporate bond markets) or of incomplete financial services (e.g. securities markets that are not fully integrated) also impinge on the ability to fully utilise the investment opportunities under the euro and represent an additional form of investment obstacle. This situation implies that the investor is required to make a sector specific investment (e.g. in telecommunications) in the case of the European corporate bond market or pay a liquidity premium due to the lack of integrated markets.

The second aspect of the analysis provides quantitative estimates of the impact of the euro on portfolio allocations. Three broad categories of possible portfolio allocation are considered: domestic versus non-domestic investment, debt versus equity investment, and public debt versus private debt investment. The home bias looms large here as well because it implies the existence of significant deviations between actual and optimal investment practices. While the cost to investing abroad within the euro area should now be lower with the advent of the euro, the other obstacles to cross-border investments we document cast doubt on the possibility of a full convergence between observed practices and theoretical prescriptions. It is nevertheless important to analyse the extent to which optimal allocations are modified by the advent of the single currency. Given the complexity of the task a (diversified) two-route strategy is pursued. The first route examines the evolving risk-return characteristics of European equity investments as economic and monetary integration has proceeded and their implications for international diversification within the euro area. The second considers the divide between equity and bonds in the broader international context and analyses the impact of the disappearance of currency risk in the euro area on these allocation choices.

Portfolio Allocation under a New Landscape

The greatest changes are predicted to take place in the European corporate bond market. The search for higher yields by investors, greater expertise in analysing credit risks by institutional investors, and reduced issuance by European governments are expected to spur growth in the European corporate bond market. In the first nine months of 1999, indeed, the European corporate bond market has outpaced the American and the British markets, which also enjoyed growth of over 35%. The average credit rating of European issuances has fallen, reflecting the increasing depth of the European market. All of this has occurred against the backdrop of weaker than anticipated economic growth in Europe and the Russian crisis, which has produced a flight to quality.

Although our analysis of the European corporate bond market is largely descriptive, several implications for portfolio management emerge. Despite enjoying strong growth in the euro market, corporate bonds grew unevenly among the European sectors and the EMU countries. Growth came primarily from large companies in the telecommunications sector. Moreover, the benefits of the European corporate bond market are visible only in the larger EMU countries: France, Germany, Italy and Spain. Given the concentration of the European bond market among a few sectors, diversification in this market is limited at best. Hence, an investor is exposed to sectoral risk which cannot be diversified away in the corporate bond market.

The euro may entail significant portfolio readjustments, or it may not. Our analysis of optimal portfolio allocation strategies before and after EMU – taking into account the possibility to invest within and outside Europe (the US, Germany, the UK, Spain and the Netherlands) in several broad asset classes – suggests the disappearance of currency risk in itself is probably not a major event for investors. That is, our results suggest little change in the optimal portfolio allocation between now and five years ago.

When we look at the problem from a slightly different angle, however, we find out that the changes in the correlation structures of equity returns consecutive to the process of economic and monetary integration are more significant. It is shown that monetary and economic integration has been associated with increased correlations between countries on the one hand and between sectors on the other hand. The increase in sectoral correlations however is less pronounced than the increase in country correlations. The practical implications of this finding are investigated under three investment strategies. Based on equity correlations, the results indicate that the European sectoral investment strategy dominates the other two. This outcome implies that under EMU sectoral risk dominates country risk and that no European country offers enough sectoral breadth to make it unnecessary to invest in another EMU country. These results put to question, more than ever before, the common practice of the investment industry of allocating portfolios along geographical or country lines. The often-discussed impulse given by the euro in favour of portfolio allocations proceeding along sectoral lines thus appear warranted provided, however, the benefit of geographical diversification is not forgotten in the process. We confirm the superiority of a full diversification approach proceeding along both countries and sectors.

The impact of the euro on optimal portfolio strategies is probably less important, and certainly less portend of policy implications, than its contribution to the decrease in the effective and psychological obstacles to international diversification within the euro area. Some barriers to international investing within the area fell mechanically with the advent of a single currency; the decrease of other costs may, more indirectly, accompany its emergence. Thus currency risk may be more relevant when considering the gap between optimal and actual investment practices, i.e. the home bias in particular, than because of its impact on optimal practices.

On this front, we observe that significant room remains for the direct and indirect costs of international investing within the euro area to reach the level attained when investment is purely domestic. The obstacles to cross-border investment are still substantial in the European monetary area. These obstacles hinder the emergence of truly European capital markets and thus generate further barriers to international diversification in the form of under-developed and less liquid markets. The broad issue of the costs of cross-border investment and the related

issue of the size and depth of European capital markets is of importance when comparing the cost of capital for European firms with the financing opportunities opened to their main competitors or when observing that the full benefits of the euro are not yet within reach for the average European portfolio investor. These are legitimate sources of concern for policy-makers and they concentrate the bulk of our policy recommendations.

Policy Recommendations

The euro was meant to launch a new era of cross border financial trading and to end the maze of trading technologies that characterise Europe's financial markets. Europe has 15 stock exchanges, more than 20 derivatives markets and no national centre for bond trading. Fragmented markets are costly to investors that seek pan-European assets. Consolidation would bring benefits to consumers in the form of better and more diverse financial services, more liquid markets, and lower transactions costs. Despite this vision, the prospects for pan-European securities markets with centralized settlement have yet to emerge. Although the structure of European markets is changing rapidly in light of demutualization, mergers of exchanges with EU Member States, and various links between national exchanges, it appears unlikely that pan-European markets will evolve quickly. There are several obstacles that impede the transition.

The first barrier in creating pan-European securities markets is the lack of centralized settlement systems. For the most part this is a technical problem and it is assumed that the associated difficulties are straightforward to resolve. Although there are several models for a centralized settlement system, the project lacks consensus. The issues involve incompatible domestic systems or differences in trading platforms across exchanges. In many cases the technical problems can be resolved through linkages and mergers. In other cases, where linked systems are constrained by weak or obsolete technology, new investment will be required.

If a centralized settlement system is agreed to be an important milestone for integrated securities markets, a tougher attitude by a European authority is required. In the past, this function was performed by the central bank. It offered guidance and moral suasion in deriving a market-based solution or it participated directly in forging the desired outcome. At the European level however a vacuum exists because the European Central Bank does not have the legal mandate to seek a solution on this issue, nor has it until now expressed any clear willingness to offer leadership out of this quagmire.

The second set of barriers is policy-related and is more difficult to overcome because many of the impediments to converging markets serve to protect domestic markets. More action needs to be taken to decrease the costs of cross-border investment. Frictions of various sorts, discussed at length in Section 2, are difficult to tabulate and to compare directly, but it is clear that they create distortions. Differences in tax regimes, in accounting standards, and in regulatory frameworks heighten legal uncertainties about cross-border transactions. In several European countries, legal restrictions hinder pension funds from taking on a more diversified portfolio. Although there have been some efforts to foster harmonization (i.e. the EU's Investment Services Directive and the Financial Services Action Plan of the European Commission), in general progress is slow. The reluctance of domestic authorities to create a level playing field reflects in part the political dimension, since these obstacles serve to protect domestic institutions and markets from outside competition.

A further area where policy-makers could undertake greater initiative in fostering integrated bond markets is in harmonising the issuance of government bonds. The intention is to make European government bonds as substitutable as possible. At the moment, European governments have not unified their issuance strategy, which in turn heightens competition among European governments in their attempt to attract capital outside the euro area. The positive aspect of this strategy is that it allows governments to achieve a debt structure that satisfies national borrowing needs. However, the co-operative solution would ‘reopen’ each government's issues by matching each other’s coupons, maturity structure, instrument and cash flow. This policy of stable and predictable issuances would improve liquidity and possibly interest rate savings, at least for the issues that are

perceived as perfect substitutes. Such a development could help reduce the liquidity premium that smaller EMU member countries are currently paying. As the correlation increases among European government bonds, the rationale for having different futures contracts corresponding to different national issuers disappears. The emergence of a single futures contract would be an important step towards an integrated European government bond market.

The structural changes in securities markets also have implications for European policy-makers. The regulatory framework needs to encompass innovations in cross-border transactions, to foster competition between all types of standards, and to enhance co-operation between national regulators. On the one hand European regulators should pursue a hands-off policy by allowing markets to evolve quickly in response to new technological advances. There is the expressed concern on the part of some providers and users of information services that regulators are not abreast with the latest technology and its complexities. As a consequence there is the fear that regulators may stymie innovative change if an activist policy is taken. On the other hand, European regulators need to establish a new harmonized code on norms, rules and procedures to ensure stable competitive markets for the profit-oriented exchanges. Until now, most exchanges are self-regulated in that the listed companies through club membership or shares hold a vested interest in maintaining a well functioning exchange. Such a self-regulatory mechanism is not implicit under demutualized exchanges.

It should finally be mentioned that European policy-makers have undertaken a range of initiatives to encourage cross-border investment and underpin the development of more sophisticated financial markets. One prominent example has been the consolidation of national fiscal budgets and the privatization of the telecommunications industry. The fiscal framework has paved new ground for an improved investment environment. It also gave the European corporate bond market a much-needed boost. While these efforts should be acknowledged, it should be emphasized as well that such policies should be continued if the efficiency gains expected from the euro are to be fully realized.

1. Introduction

The advent of the euro is a significant event for portfolio managers, both within and outside the Monetary Union. The euro will affect portfolio decisions through a variety of channels. The emergence of a single currency marks the disappearance of explicit and psychological barriers to international investing. The set of investment opportunities qualifying as 'domestic' is expanding, while the need for diversification across currencies must now be met by an increased demand for assets which are not denominated in euros. The role of country risk among EMU countries is bound to decrease suggesting that portfolio shifts from the country to the sectoral level may occur. The disappearance of exchange rate uncertainty within the euro area also alters the demand for all types of securities issued within the zone, whether by private or by public institutions. The search for higher yield by investors, greater expertise in analysing credit risks by institutional investors, and reduced issuance by European governments should combine to spur growth in the European corporate bond market.

1.1 Aim of the Study

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The analysis has two dimensions. The first lays out the changing structure of European securities markets since the euro's introduction. The objective is to place the advent of the single currency within the context of the frictions to cross-border investment remaining in the euro area. Many of these barriers, which are discussed in the context of the existing home bias, stem from differences in tax regime, legal framework and transaction settlement. At a more indirect level but of equal importance, the reality of underdeveloped markets (i.e. corporate bond market) or of incomplete financial services (i.e. integrated securities markets) also impinge on the ability to fully utilise the investment opportunities under the euro and represent an alternative form of investment obstacle. This situation implies that the investor is required to make a sector specific investment (e.g. in telecommunications) in the case of the European corporate bond market or pay a liquidity premium due to the lack of integrated markets.

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1.2 The Roadmap

Development in financial markets is an ongoing process that is fostered in part by competition. In European financial markets, the pressures are stemming from several sources: new technologies (computing and telecommunications), repackaging information (i.e. securitization), the demand for pension reform (demographic change), and changing regulations. The euro is providing further stimulus. The elimination of currency risk potentially creates a level playing field in that funding costs are becoming more transparent. This enhances competition within the financial industry and introduces new investment strategies.

European financial markets have undergone tremendous structural change during the last decade. In the face of capital control liberalisation, globalisation, technology and other impulses, the euro represents just one further shock to which investors are having to respond. Attempts to decipher and rank these shocks are inherently complex. Section 2 attempts to identify the roadblocks to cross-border transaction remaining after EMU and offers a progress report on the integration of European securities markets.

Section 3 presents the empirical analysis on portfolio allocation before and after the introduction of the euro. Although the aim is to isolate the effect on asset allocation of the removal of currency risk within the euro area, currency risk is only one aspect of asset pricing. More generally, asset allocation is affected by a range of characteristics such as expected future inflation and default risk. Recognising the difficulties in identifying these risks, the empirical analysis focuses on how portfolio allocation between countries and sectors and between bonds and equity is influenced by EMU.

The conclusions and policy implications are discussed in Section 4. As to be expected, the empirical results on portfolio asset allocation have little direct bearing for policy-makers, but primarily for investor strategy. The policy conclusions arise out of the discussion on market structure and the obstacles that impede cross border transactions. It is argued that there is further room for government intervention to enhance market integration, to increase transparency, and to harmonise regulation across Europe.

2. European Securities Markets: Market Structures, Liquidity and Institutional Developments

The analysis of the effects of EMU on the portfolio structure of European investors is tributary to the existence of what is known as the 'home bias', the observed lack of international diversification of actual portfolios relative to what theory predicts optimal allocations should be. The home bias itself may be explained in part by various obstacles to cross border investment taking the form of higher transaction costs, settlement issues, tax disadvantages, etc. The next subsection (2.1) provides an overview of portfolio structure for several European countries. There we document the home bias from the viewpoint of different investor types. Subsection 2.2 documents the specific costs associated with cross-border investments, highlighting in particular the obstacles that arise from settlement, taxes and management fee structures. Subsection 2.3 completes the description of the institutional framework confronting European investors by discussing the structural and institutional changes currently occurring in European securities markets. These changes have the potential – unrealized thus far – of creating the largest capital markets in the world, with implications for market depth. Subsection 2.4 analyses the importance of these liquidity effects.

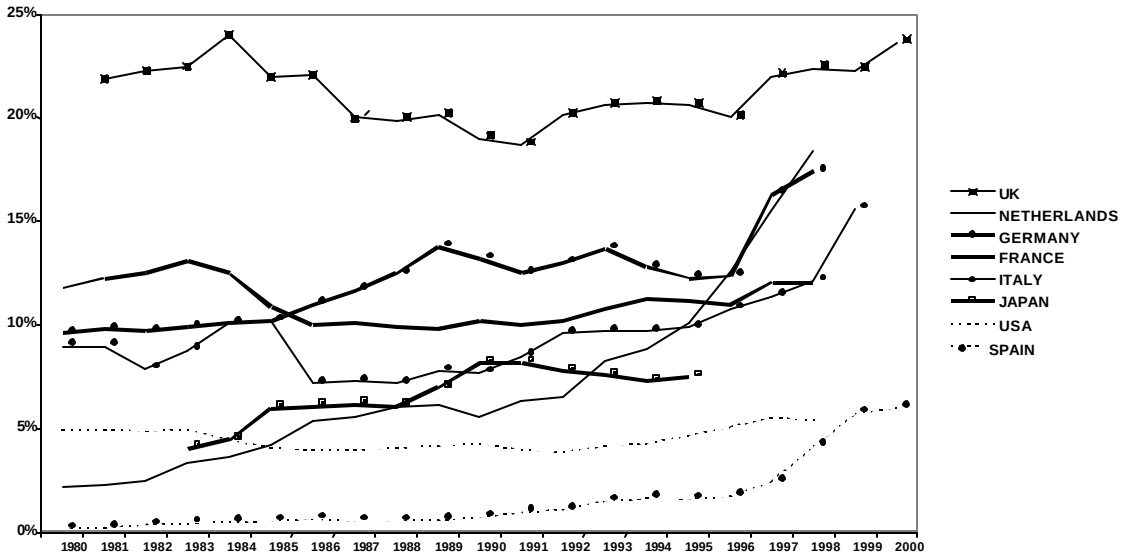
2.1 Historical Developments of Portfolio Structure

The undisputed theoretical paradigm in modern international finance emphasizes the effectiveness of global diversification strategies for cash-flow stabilisation and consumption risk-sharing purposes. Yet, the empirical evidence on international portfolio positions finds a widespread lack of diversification across countries. According to the often-cited estimates by French and Poterba (1991) and Tesar and Werner (1994), the percentages of aggregate stock-market wealth invested in domestic equities at the beginning of the 1990s were well above 90% for the US and Japan, and around 80% in the UK and Germany. To a lesser extent, home bias seems to characterise the net financial positions of small economies as well.[1] In this section, the portfolio structure is examined for the major European countries: UK, France, Germany, Spain, Netherlands and Italy.

Figure 2.1 (see below) shows the foreign financial assets over total financial wealth. Even if the share of foreign asset holdings has increased during the last five to ten years, the level of diversification remains quite low. The United Kingdom hold the highest share of foreign assets on total financial wealth (24% circa), whereas the United States and Spain have the smallest share of foreign assets (5%). The Netherlands, Germany and Italy have a share of foreign financial assets which is around 17% and the figure shows that it has increased sharply in the last years. Although the deregulation of financial markets and the relaxation of capital controls have brought about increasing opportunities for international investors, it is only recently that investors have begun taking advantage of these international opportunities.

[1] See for instance, Cooper and Kaplanis (1986). This pattern of asset holding is not restricted to equities, Golub (1990) and Tesar and Werner (1995) document a home bias of similar magnitude for the bond market.

Figure 2.1 **Foreign financial assets over total financial wealth**



Sources: Central Banks, OECD, Pozzolo, US Department of Commerce

Note: Annual data: 2000 data refer to March 2000. 1999 and 2000 data are preliminary

A number of possible explanations of the puzzle have been suggested (ranging from market inefficiencies to fluctuations in non-tradable consumption, see Lewis (1995 and 1999) and Obstfeld (1995)). One important drawback of the existing approaches in the literature is that the analysis of the portfolio decisions is in terms of a representative investor (i.e. treating all investors alike). While useful as a general and theoretical framework, this approach is not particularly insightful for understanding the determinants of the individual's portfolio choice and subsequently to understand how the elements that determine this choice might change with monetary union. Agents may have different objective functions, different risk aversions, and are subject to different costs and regulations. Our contribution to the debate is to document the various facets of the home bias once these elements of investors' heterogeneity are taken into account.

To gain a better understanding of the economic determinants of the home bias puzzle, the data in Table 2.1 are disaggregated into the percentage of foreign assets held by banks, insurance companies, investment companies, pension funds, and households. The analysis is for five countries: France, Italy, the Netherlands, Spain and the United Kingdom.[2] Table 2.1 (see below) shows the relative weights of the sectors. Households play a major role since they hold between 40% (in the UK) to more than 54% (in Italy) of financial assets. Banks are the second biggest agent. In the last decade, however, the role of banks and households has declined in favour of institutional investors. In fact since 1990 the weight of investment companies has more than quadrupled in countries like Italy, Spain and doubled in the Netherlands, while insurance companies have grown considerably in France, UK and Spain.

[2] We excluded the 'other sectors' that mainly include central and local public entities, non-financial companies and foreign investors, because we were not able to distinguish these investors, whose nature and behaviour is totally different. However their weight is quite important since it varies from 20% (in UK) to 50% (in France).Households also hold foreign assets 'indirectly', i.e. through mutual funds, insurance companies and pensions funds. Unfortunately we were not able to find data at this finer level of disaggregation for Germany, US and Japan. Sources are OECD and national accounts.

Table 2.1 Relative importance of each sector on total wealth*

Countries / Investors	FRANCE		ITALY		NETHERLANDS		SPAIN		U.K.	
	1990	1997	1990	1999	1990	1998	1990	1998	1990	1999
Households	43.1	44.3	62.9	54.8	n.a.	n.a.	44.2	49.8	39.0	39.2
Banks	41.0	34.5	32.8	31.4	60.3	59.2	51.2	37.7	41.7	35.5
Invest. Comp.	9.5	8.9	1.4	9.4	3.4	5.1	1.2	7.2	2.2	3.8
Insur. Comp.	6.4	12.3	2.9	4.4	12.2	12.0	3.4	5.3	7.8	12.0
Pens.Funds	n.a.	n.a.	n.a.	n.a.	24.1	23.7	n.a.	n.a.	9.3	9.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* We exclude wealth pertaining to 'the other sectors'

Table 2.2 Foreign financial assets over total financial wealth by type of investor*

Countries / Investors	FRANCE		ITALY			NETHERLANDS				SPAIN				U.K.			
	90-95	1997	88-90	91-95	99	80-85	86-90	91-95	98	80-85	86-90	91-95	98	80-85	86-90	91-95	99
Households	2.2	2.5	1.3	3.1	6.8	n.a	n.a	n.a	n.a	0.25	0.44	0.85	0.73	n.a	1.0	1.0	0.7
Banks	2.6	4.2	0.6	0.8	2.9	1.0	2.3	3.0	8.8	0.26	0.52	1.41	2.68	n.a	4.3	8.3	11.0
Inves.Comp.	4.8	10.5	13.5	23.7	38.4	51.1	44.3	37.2	37.9	3.00	3.14	2.56	6.95	37.7	37.1	39.0	39.1
Insur.Comp.	3.4	3.2	13.4	14.1	27.0	2.2	4.7	7.0	17.3	0.06	0.83	1.43	5.88	10.5	13.2	14.8	19.0
Pens.Funds	n.a	n.a	n.a	n.a	n.a	3.4	7.8	15.1	38.6	n.a	n.a	n.a	n.a	13.5	18.1	20.8	26.6

*We consider the end of year investment position in foreign equities and in foreign bills and bonds. The total financial wealth is the end of year amount of financial wealth of each investor.

Table 2.3 Portfolio composition by type of investor
(in % of end of period total financial wealth)

Countries / Investors	FRANCE		ITALY		NETHERLANDS		SPAIN		U.K.	
	1990	1997	1990	1998	1990	1998	1990	1999	1990	1999
Households										
Equities	43.2	38.9	21.0	31.9	n.a	n.a	13.0	31.2	16.7	17.7
Bonds	3.9	3.1	30.6	16.8	n.a	n.a	7.2	1.7	1.8	1.6
Others	52.9	58.0	48.4	51.3	n.a	n.a	79.8	67.1	81.5	80.7
	100.0	100.0	100.0	100.0			100.0	100.0	100.0	100.0
Banks										
Equities	4.2	7.0	1.6	4.7	0.3	3.6	3.0	4.5	2.5	2.7
Bonds	4.4	7.8	19.2	19.0	7.9	12.7	18.0	13.5	8.9	17.8
Others	91.4	85.2	79.2	76.3	91.8	83.7	79.0	82.0	88.6	79.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Invest.Comp.										
Equities	17.3	25.6	31.0	24.7	36.2	43.6	13.7	7.8	88.6	92.2
Bonds	37.2	31.0	60.0	67.2	23.9	17.8	65.4	47.4	4.8	5.0
Others	45.5	43.4	9.0	8.1	39.9	38.6	20.9	44.8	6.6	2.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Insur. Comp.										
Equities	35.0	34.5	27.6	35.4	9.6	36.8	8.9	9.0	53.7	55.8
Bonds	44.9	62.1	63.7	60.6	14.0	27.6	39.8	44.6	19.0	27.5
Others	20.1	3.4	8.7	4.0	76.4	35.6	51.3	46.4	27.3	16.7
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pens. Funds										
Equities	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	70.9	72.1
Bonds	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	12.2	21.6
Others	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	16.9	6.3
									100.0	100.0

Sources: Central Banks, OECD and only for Italy, Assogestioni
Notes: Insurance Companies include Pension Funds for Italy and Spain, since Pension Funds were created only recently. Banks include Bank of England for U.K. and Banks include Bank of Italy for Italy, for 1998 data. We use annual data; 1999 data refer to june 1999; 1998 and 1999 data are estimates.

The next table reports the degree of foreign assets held by sectors for the five countries. Table 2.2 (see above) shows that the investment[3] allocation differs strongly across sectors. Households and banks hold a low level of foreign assets (less than 5% for France and Spain and less than 10% for Italy and the Netherlands) in their portfolio. The investment profile of insurance companies and pension funds appears to be quite heterogeneous across countries, while investment companies diversify the most.

The benefit of international diversification depends heavily on the kind of assets agents hold: it is higher for equities, less so for bonds and subject to large feasibility constraints in the case of other assets (i.e. real estate). Table 2.3 (see above) shows interesting regularities between different agents that persist over time across countries. In particular, households, the sector that diversifies the least, keep a high share of wealth invested in liquid assets (between 50 and 80% of financial wealth). Despite this high degree of risk aversion shown by households, the amount of equities held by households is important, especially in France (39%) and Italy (32%). A large share of these equities however are probably in small non-quoted firms owned or at least controlled by households themselves. These are assets that are, in many cases, difficult to diversify. Also, it is only in Italy that households hold a significant amount of bills and bonds. This is primarily due to 'aggressive' policy followed by the Italian government in order to finance its public debt.

Bank's assets are primarily loans to domestic firms and deposits with other financial institutions (between 80% and 90%, defined as 'other assets' in Table 2.3). The remaining bank assets are in the form of bonds and bills that they use as a buffer for liquidity. It should be noted that prior to the start of EMU only domestic government bonds were eligible at the National Central Bank in most cases. Therefore the amount of assets that banks could diversify were extremely limited.

The investment profile of investment companies is substantially different. Their portfolios hold a high share of foreign assets. This phenomenon can be justified by the lower information costs and by the lower cost of access to the capital market that institutional investors face. Another possible explanation is the different attitude towards risk that characterises these investors as well as the different composition of their portfolio, which is more risky.

It is important to remember that the mutual funds industry is still highly regulated in most countries. Typically these regulations limit the freedom of fund managers to invest as they may wish: the nature of securities in which the funds can invest, the degree of leverage, the strict authorisation procedures, and the rules governing the powers of the fund management company. The specific legislation and regulations applying to investment funds differs among the EU Member States, although all those looking for a cross-border clientele must comply with the requirements of the EC Directives.

Mutual funds hold a higher portion of their portfolio in more liquid assets in France, Netherlands and, more recently, in Spain where money market mutual funds are becoming popular since Letras (Spanish government T-bills) are exempt from withholding taxes. France has instead experienced a consistent move out of bonds that has occurred, partly because of a change in taxes. Since 1996, income from bonds no longer qualifies for tax-free allowances. UK mutual funds instead appear to be specialised in equities, while in Italy bills and bonds funds play a more relevant role.

Next, let us consider insurance companies and the barriers that they face in investing abroad. Table 2.4 (see below) summarises the National Regulations of life insurance companies and on Pension fund portfolios. The allowable percentage of foreign assets held depends on the country and on type of asset. In Spain and Netherlands insurance companies used to invest and in part continue to invest a large amount of their wealth

in‘other assets’. In the UK more than fifty percent of the portfolio is invested in equities while in Italy andFrance bonds and bills play a predominant role. In the latter country, until 1997, life insurers invested mainly in bonds.

Table 2.4 **National regulation of life insurance companies and on pensions fund portfolios**

Countries	Restrictions		
	Life Insurance Companies		Pension Fund
Germany	Max 30% domestic equity, 25% property, 6% foreign equity, 5% foreign bonds, 10% unlisted securities, 50% combined limit for mortgages an loans		Max 30% EU equities, 25% EU property,6% non EU shares, 6% non EU bonds, 20% overall foreign assets, 10%self-investment limit
Spain	No specific limits		5% limit in securities issued by any one enterprises, 90% of assets must be invested in quoted securities, bank deposits, property or mortgages. 1% must be in current accounts or money market
France	65% combined limit on domestic equity, unlisted securities and foreign equity, 40% limit on property, 10% combined limit on mortgages and loans		At least 50% to be invested in EU government bonds, less than 33% in loans to sponsor
Italy	Max 20% domestic equity, 20% unlisted securities, 20% foreig equitiey, 50% foreign bonds, 50% property, 50%mortgages, 0% loans		NA
Netherlands	1% combined limit on listed securities and mortgages, 8% limit on loans		5% self-investment limit; prudent man rule
UK	10% combined limit on unlisted securities, mortgaes and loans. Prudent man rule		prudent man rule

In 1997 the trend reversed. This process is likely to continue boosted by the introduction of the so-called DSK insurance policies that benefit from a favourable tax environment, but must invest at least 50% in French securities. In Germany strict limitations to cross border investment are imposed on insurance companies that can hold no more than 6% in foreign equities and 5% in foreign bonds. An interesting case is the UK. Here, it is necessary to distinguish between linked and not linked funds. In the case of non-linked funds the matching of assets and liabilities is required. When liabilities in a foreign currency exceed 5% of the total liabilities the insurance company has to keep assets denominated in the same currency for at least 80% of this amount and 20% of the amount in domestic asset (80-20 rule).

In contrast to life insurance investments, there are no specific EU harmonization rules related to investments by pension funds. The draft proposal for pensions put forward as part of the Single Market Action Plan was withdrawn in 1996[4]. Points of divergence regarding pension regulation included the maximum level of foreign investment and investment liberalization . The most recent EU initiative on the pension industry has been a Green Paper on supplementary pensions in the single market. In the absence of co-ordination at an EU level of rules on the prudential supervision of pension funds, Member States are free to apply their own rules, as long as they do not violate Treaty rules on the free movement of capital. Dutch pension funds enjoy considerable

[4] More recently (on May 11, 1999), a Communication on Funded Pension Schemes was issued (COM(99)134), to be followed, in mid-2000, by a proposal for a Directive on the prudential supervision of pension funds.

freedom in investing. Apart from restrictions on investment in the sponsoring company and a 5% self-investment limit, they are not subject to specific restrictions.

UK pension funds have continued to invest only 27% of their assets abroad. There is no direct limitation to cross border investment on UK pension funds, but the Minimum Funding Requirement (MFR) introduced with the Pension Act in 1995 requires that the present discounted value of future liabilities of pension funds is computed using the yield on Gilts as the discount factor. This indirectly creates the incentive for pension funds to allocate their portfolio into Gilts.

In an attempt to separate the effect of portfolio composition from international diversification, Tables 2.5 and 2.6 (see below) consider respectively the ratio between foreign bills and bonds over total bills and bonds and the ratio between foreign equities over total equities. As expected for bill and bonds (Table 2.5), the level of diversification is substantial only for banks in the UK, France and Netherlands, i.e. the countries where intermediaries probably play an important role as market-makers in the eurobond markets. The same is true for Dutch pensions, a small country with a low public debt.

Table 2.5 All sectors: foreign over total bills and bonds

Countries / Investors	FRANCE			ITALY			NETHERLANDS				SPAIN				U.K.			
	85-90	91-95	1997	88-90	91-95	1999	80-85	86-90	91-95	1998	80-85	86-90	91-95	1999	80-85	86-90	91-95	1999
Households	4.3	2.9	1.7	2.5	5.4	16.7	n.a.	n.a.	n.a.	n.a.	0.5	1.3	5.7	16.7	n.a.	33.2	34.0	15.5
Banks	26.9	33.7	39.7	1.3	2.6	11.4	20.4	28.2	36.0	58.5	0.5	1.1	5.6	12.2	n.a.	34.3	32.3	57.1
Invest.Comp.	3.4	6.4	21.9	9.0	17.4	33.3	59.9	54.4	35.7	31.6	5.6	3.7	4.3	10.8	32.6	31.6	23.7	16.3
Insur. Comp.	1.1	3.8	2.3	11.6	9.7	33.0	9.8	20.8	19.2	30.7	0.1	2.0	2.5	9.6	7.2	12.2	15.6	16.7
Pens Fund	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	14.8	21.0	18.5	45.9	n.a.	n.a.	n.a.	n.a.	2.2	6.7	23.7	20.8

We consider the end of year investment position in foreign equities and in foreign bills and bonds. The total financial wealth is the end of year amount of financial wealth of each investor.

Table 2.6 All sectors: foreign over total equities

Countries / Investors	FRANCE			ITALY			NETHERLANDS				SPAIN				U.K.			
	85-90	91-95	1997	86-90	91-95	1999	80-85	86-90	91-95	1998	80-85	86-90	91-95	1999	80-85	86-90	91-95	1999
Households	10.6	4.2	6.5	7.3	7.2	12.5	n.a.	n.a.	n.a.	n.a.	1.6	2.3	6.5	1.5	n.a.	2.6	2.6	2.8
Banks	24.7	16.8	21.2	20.9	10.9	11.0	37.9	26.4	22.7	39.0	8.5	11.9	17.7	22.7	n.a.	40.8	50.9	30.2
Invest.Comp.	20.9	18.4	23.3	23.8	48.1	65.0	82.3	80.2	81.2	74.0	2.2	4.8	12.9	23.5	41.5	40.3	42.5	37.0
Insur. Comp.	8.2	5.4	5.5	18.3	27.9	49.3	13.6	22.2	21.3	24.0	0.2	1.0	4.7	17.7	18.1	19.7	19.9	25.9
Pens. Funds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	33.7	41.3	50.9	57.6	n.a.	n.a.	n.a.	n.a.	19.8	23.4	24.8	30.6

Sources: Central Banks, OECD and only for Italy, Assogestioni.

Notes: Insurance Companies include Pension Funds for Italy and Spain, since Pension Funds were created only recently Banks include Bank of England for U.K. and Banks include Bank of Italy for Italy, for 1998 data. We use annual data; 1999 data refer to June 1999; 1998 and 1999 data are estimates.

In the case of equities (Table 2.6), if banks and households are excluded, the level of diversification increases substantially and for certain agents it is close to what portfolio theory would have predicted: between 40% and

80% for investment companies in Netherlands, Italy, UK; pension funds in Netherlands; insurance companies in Italy; banks in UK and Netherlands.

Lastly, in order to verify if a higher weight of equities in agent's portfolios has a positive effect on international diversification, Tables 2.7 and 2.8 (see below) presents the correlation between the share of foreign equity over financial wealth and the share of total equities (that have a positive bias) and the share of foreign equity and the share of domestic equities (that have a negative bias) during the period 1995-8. The results show that the significant correlations are always positive, confirming the *a priori* belief that investors that own a higher share of equities tend to invest in foreign assets.[5]

Table 2.7: **Correlation between total equities and foreign equities**

	Italy	**Spain**	**UK**	**Netherlands**	**France**
Household	0,92 *	-0,03	-0,04	n.a.	0,07
Banks	0,61 *	0,96 *	0,11	0,99 *	0,85 *
Investment Comp.	-0,09	0,61 *	0,18	0,98 *	0,97 *
Insur. Comp.	0,49 **	0,03	0,81 **	0,97 *	0,76 *
Pensions Funds			0,63 **	0,99 *	

Table 2.8**: Correlation between foreign equities and domestic equities**

	Italy	**Spain**	**UK**	**Netherlands**	**France**
Household	0,9 *	-0,15	-0,45	n.a.	-0,02
Banks	0,48 ***	0,9 *	-0,27	0,97 *	0,66 **
Investment Comp.	0,08	0,6 *	-0,70	0,25	0,96 *
Insur. Comp.	-0,46	-0,36	0,53	0,93 *	0,83 *
Pensions Funds			-0,16	0,98	

Note: An asterisk denotes significance at 99% confidence level, two asterisks at 95% at confidence level and 3 asterisks at 90% confidence level.

In summary, while it has reinforced the view that the home bias is pervasive, this subsection has also introduced the possibility that the extent of the home bias varies according to investor types. Moreover, it has given support to the view that, ceteris paribus, equity investors are more internationally minded than investors whose portfolio allocation is less concentrated in equities. These observations are relevant for our inquiry as they lead to the conjecture that both the increasing importance of institutional investors and the growing equity culture be associated with an erosion of the home bias and an increasing importance of international investment flows. Of course we realise that, in the absence of a satisfactory theory for the home bias, definitive predictions are unwarranted.

In the following subsection, we complement the former discussion by focusing on the transaction costs associated with investing across national borders. Such costs provide a natural partial explanation for the tendency of investors to invest close to home. It is important to document these costs for it helps underline the fact that the introduction of a single currency is only one element of the home bias puzzle. Simultaneously the potential offered by EMU for reducing drastically these costs and the necessity to take the accompanying measures to reach this goal so as to permit the realisation of a single European capital market are worth emphasizing.

[5] The only exception is investment companies in UK that show a negative significant correlation between foreign equities and domestic equities, but this is a statistical effect, due to the fact that these intermediaries hold almost 100% of their wealth in equity.

2.2 Costs of Cross-Border Investment

2.2.1 The cost of settlement

Efficient and reliable cross-border payment and securities settlement services, in Europe as well as in US, are a necessary condition for free capital movements and optimal asset allocation. However, cross-border payments and securities settlement are still substantially more expensive and risky than domestic ones. In fact during the last fifteen years domestic market infrastructures have realised a substantial efficiency improvements in term of straight through processing.[6] In the European Union, the effect is even more critical since market fragmentation is particularly strong. As recently observed by Padoa-Schioppa:

> '… the euro area (still split in 11 countries) had 18 large-value systems, 23 securities settlement systems and 13 retail payments systems. The United States has 2 large payments systems, 3 securities settlement systems and 3 retails payments systems'.[7]

It is only with the recent preparations for the launch start of EMU that European payment systems have undergone a substantial upgrading with the birth of Target, the system created by the ESCB (European System of Central Bank), and of EURO1, the system created by EBA (Euro Banking Association). These systems however have handled only large payments. As regards the securities settlement system it is only recently that some progress to facilitate cross border transfers has been developed as a result of the ECSDA (European Central Securities Depository Association) project to link national central securities depositories (CSD) and due to the merger of some CSDs.

A recent study by the European Central Bank[8] shows that in spring 1999 fees charged to customers for domestic credit transfers rarely exceed the range of EUR 0.10 to EUR 0.15, while for cross-border transactions inside the euro area these fees vary from EUR 3.5 to EUR 26 for small amount, and they can reach EUR 31 and EUR 400 for higher amounts.

> 'In addition to these fees, bank in some countries add extra charges (e.g. balance of payments reporting, currency conversion, S.W.I.F.T., postage and other communication charges), which may be substantial compared with the basic fees'.

These costs have undoubtedly come down in the last five years, but they still remain unacceptably high when compared with domestic prices. The same conclusion is reached in a recent study by the Boston Consulting Group, which shows that the international payments are ten time more expensive than the domestic one.

In terms of time needed for cross-border credit transfers, the ECB study shows that payments need 4.8 working days on average to reach their destination, but with substantial differences between countries. In addition, over 15% of the transactions took more than a week to be executed. Domestic payments arrive usually in one to three days; hence there is a clear gap between the services level for domestic and cross border transfers.

The implementation, in August 1999, of the European Parliament and Council Directive No. 97/5/EC of 27 January 1997 on cross-border credit transfers, which establishes common rules in the area of transparency and performance of cross-border payments could remedy some deficiency of the correspondent banking practices.

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6 Straight through processing can be generally defined as the electronic handling of the payments, safekeeping and settlement process or, in other words, the elimination of any manual intervention.

7 'PSSS in EMU' Speech, ECB (1999).

8 ECB (1999) 'Improving Cross-border Retail Payment Services in the Euro Area – the Eurosystem's View', September.

However, as recognized by the ECB:

> '… since the Directive applies to the whole of the European Union, its scope is limited to addressing certain specific aspects of cross-border credit transfers within a multi-currency environment. The implementation of the Directive may not be sufficient to respond to the needs and expectations of the users of the payment services within the single currency area'.

In particular

> '… the Directive may not reduce transfer costs to a satisfactory degree since it may not be feasible to address issues of infrastructure and standardisation in such a legal instrument, despite the inadequacies in infrastructure and standardisation being a major source of costs'.

The Eurosystem has considered how it could best contribute to the realization of a single Euro payment area in the field of retail payments. After having discussed several alternatives the Eurosystem has taken the view that:

> '… its operational involvement would not, at present, be justified. The Eurosystem is convinced that it could best fulfil its responsibilities in acting as a catalyst for change in helping the banking and payment service industry of the euro area to find appropriate solutions'.

This approach might be insufficient. In fact central banks have tended to assume a direct role in managing interbank payment circuits in those countries where banking systems are more fragmented and spontaneous forms of co-operation has become more complex (Brizzi, Sasso and Tresoldi, 1998)[9]. This occurred in the United States and Germany but not in Canada and the UK, where primary banking groups have autonomously created clearinghouses, inhibited to smaller institutions. Central banks have managed the clearinghouses directly in Germany, Italy, Denmark, France, Greece and Portugal, while in other countries this responsibility has been assigned to banks or private organisations. In every single country the public authorities used extensive pressure to reach a reasonably solution. Since Europe at large can be described as a fragmented banking system, and the leadership powers of the ECB appears quite limited, we can envisage some difficulties in reaching an equilibrium in payment systems without public intervention. Even if new private initiatives have recently arisen in this area (see the new proposal of EBA for small value payments), these will be limited to a small number of large banks, so that the access to the private system will not in practice be open to a large amount of institutions.

The operational involvement of the Eurosystem does not appear inconsistent with the Treaty. Article 105, in fact, states that one of the basic tasks of the Eurosystem is to 'promote the smooth operation of payment systems'. While the annexed Statute goes further, granting regulating powers to the ECB under Articles 22:

> 'The ECB and national central banks may provide facilities, and the ECB may make regulations to ensure efficient and sound clearing and payment systems within the Community and with other countries'.

In this framework, the Eurosystem could envisage an operational role in the field of payments when the market itself either fails to deliver, or by its very nature cannot deliver the services considered.

9 As recently pointed out in a report of the Bank of International Settlements 'All central banks provide settlement services for retail payments, and some provide clearing services as well' (Committee on Payment and Settlement System, CPSS (1999) *Retail Payments in Selected Countries: A Comparative Study*, Basil Blackwell).

Clearing and settlement arrangement

Traditionally an investor that owns securities holds them in an account at his local custodian bank. If the securities are domestic, the local custodian bank keeps them in an account at its NCSD (national central securities deposit). If they are foreign, the local bank keeps them at a global custodian bank or an ICSD (international central securities deposit), such as Euroclear or Cedel, in an account at a subcustodian bank domiciled in the country where securities are held. While the processing of domestic trades has become a commodity, the cross-border processing is still structured and organised in a complicated and inefficient way in almost all of the European countries. In fact, given the extremely fragmented system of settlement, legal regulatory and taxation procedures of cross border securities transactions require frequent manual intervention with a consequent increase in risk and costs.

As far as risk is concerned, particular attention must be given to settlement and custody risk. In fact in cross-border transactions, due to the lack of proper Delivery Versus Payment (DVP) mechanisms available and to the longer time lag between the execution of a trade and its final completion, settlement risk is heightened. Moreover slow registration could deprive the owner of the right to receive distributions or to vote. Cross-border investments involve also a larger degree of custody risk since the number of intermediaries and jurisdictions involved in these kinds of transactions are higher. Broadly speaking, cross-border transactions seem to cost ten to twenty times more than domestic transactions: a domestic transaction costs from $1 to $5 that has to be compared with the $10 to $50 cost for a cross-border transaction between two European markets.

Tables 2.9 (see below) provides some additional information about the settlement fees of a domestic and a cross-border transaction. Given the heterogeneity and secrecy of fees charged by the different global custodian banks, it is impossible to have a precise measure of the domestic versus cross-borders settlement costs. An indirect estimate of these costs is derived using the Euroclear and Cedel fees structure since the cross-border transactions correspond to what is defined as ‘external’ transaction and the domestic transaction can be treated as an internal transaction when both counterparts are Euroclear clients. This is exactly what happens at a domestic level where both counterparts have an account at the NCSD. These costs are higher for equities than for debt instruments and decrease with the number of settlement instructions the client gives in each instrument and market.

It is also important to remember that together with settlement fees, an investor must also pay safekeeping fees, account fees, as well as communications fees that are quite sizeable and sometimes much higher for foreign assets. All these costs refer to an institutional investor like a bank, an insurance company or a mutual fund. When a private person invests at home or abroad, the fees that the bank or the broker charge him can amount to one to five times those previously mentioned depending on the level of competition of the market, the broker’s market power, the level of services received, and the technical instrument used to send the order (branch, phone, internet). In particular the use of the internet seems to increase in a substantial way the degree of competition and, as a result, to reduce costs for private investors.

Not unexpectedly the image emerging from this subsection is one of significantly higher costs of international investments, including investment within the euro area, as compared to the cost of investing at home. This difference is incompatible with the emergence of a true single capital market and it prevents European investors from reaping the full gains of international diversification within a single currency zone. We now turn to another facet of the same problem: the differential tax treatment of international versus domestic investments.

2.2.2 Taxes

To evaluate the taxation of portfolio investment income, it is important to distinguish between in- and out-bound investments. As far as interest from government bonds is concerned, in source countries there has been a gradual elimination of withholding taxes either unilaterally or under double taxation agreements. Frequently, as in the case of Italy, the exemption is subject to certain conditions, for example that the foreign recipient not be a

resident in a tax haven. At present only Belgium, Greece, Ireland and Portugal levy withholding taxes on interest payments to portfolio investors (individuals and companies) from other EU Member States. Denmark, Germany, Netherlands have withholding taxes on interest from profit-sharing bonds. For interest from out-bound investment, most residence countries allow unilateral relief by way of an exemption from tax on foreign source income or a credit on withholding taxes levied on foreign interest payments. Hence for taxable investors, the taxes paid to foreign governments can generally be credited against domestic tax liabilities through the system of foreign tax credits. The offset is not always perfect and even if it were it may be costly and time consuming to actually obtain tax credit.

Table 2.9 Settlement fees of international central securities

(average rates: USD per settlement instruction)

	Debt				Equities			
	Cedel*		Euroclear**		Cedel*		Euroclear**	
	Internal	External	Internal	External	Internal	External	Internal	External
Austria	1,25	35,00	2,88	12,00	4,50	35,00	3,75	33,50
Belgium	1,25	8,00	1,53	22,00	4,50	8,00	3,50	42,50
Denmark	1,25	21,00	1,25	22,00	4,50	25,00	3,50	22,50
Finland	1,25	30,00	2,88	22,50	4,50	40,00	3,75	33,75
France	1,25	25,00	1,75	17,00	4,50	25,00	3,50	36,00
Germany	1,25	8,00	0,95	3,70	4,50	8,00	3,50	6,00
Ireland	1,25	30,00	2,88	22,50	4,50	-	-	-
Italy	1,25	25,00	1,53	12,00	4,50	25,00	3,50	46,25
Netherlands	1,25	25,00	1,25	12,00	4,50	25,00	3,50	29,75
Portugal	1,25	15,00	2,88	22,50	4,50	45,00	3,75	33,75
Spain	1,25	12,00	1,53	12,00	4,50	30,00	3,50	42,50
Greece	1,25	60,00	2,88	45,00	4,50	100,00	-	-
Norway	1,25	25,00	2,88	22,50	4,50	75,00	3,75	73,75
Sweden	1,25	35,00	1,53	12,00	4,50	35,00	3,50	33,25
Switzerland	1,25	25,00	1,53	12,00	4,50	45,00	3,50	33,75
U.K.	1,25	10,00	1,25	12,00	4,50	-	-	-
Japan	1,25	25,00	-	-	4,50	22,00	3,50	22,00
U.S.A.	1,25	10,00	1,25	8,00	4,50	5,00	3,50	8,00
~~**AVERAGE**~~	1,25	23,56	1,92	17,16	4,50	49,88	3,57	33,15
MIN.(exter-inter)	Bel.-Ger. (6.75)		Germany (2.75)		U.S.A. (0.50)		Germany (2.50)	
MAX.(exter-inter)	Greece (58.75)		Greece (42.13)		Greece (95.50)		Norway (70.00)	

*Usually Delivery versus payment data;**average between min and max values that depend on the number of instructions the client gives

Source: Euroclear, Cedel

A UK investor, for example, is subject to UK income tax on the gross amount of foreign dividends received but takes a foreign tax credit for the withholding tax paid to the source country. Therefore, if the withholding tax is higher than the UK income tax rate, the UK tax rate on the foreign dividends income will be limited to the difference between the two rates. However, if the foreign withholding tax rate is higher than the UK tax rate on foreign dividends, income will be zero but the excess foreign credit cannot be deducted from UK source income. For pension funds, which are not subject to income tax in the UK, the foreign tax rate is a deterrent to foreign investment. In the absence of double taxation treaties, the withholding tax is a deterrent for any investor, independent of his tax position in his home country.

Table 2.10 (see below) shows those EU Member States that levy withholding taxes on dividends. At the same time under specific taxation agreements, a number of countries (France, Italy, UK) have extended to non-resident investors the tax credits available to domestic residents under the imputation system. In most instances tax relief is provided in the form of a tax credit, but just for the foreign withholding taxes.

With regard to capital gains, international double taxation is not frequent; only two countries (Italy and Netherlands) apply capital gains taxes on holdings of domestic securities by non-resident investors, but limit the taxation on gains from the sale of 'large' holdings in resident companies. Moreover, the taxation on capital gains is generally reserved to the country of residence by tax treaties. In the country of residence capital gains on foreign investments are generally taxed at the same rate as other capital gains. No tax relief is provided for capital gains taxes paid overseas.

It is important to note that Table 2.10 reports taxes paid by individuals when investing directly and not through a mutual fund. In fact, for tax purposes all EU Member States adhere to a system of effective transparency in respect to purchases of national funds by domestic investors. This entails that funds are viewed as see-through investment vehicles or at the very least that individuals should be indifferent between a direct purchase of the underlying assets and the acquisition of the same investment through a fund. Of course the concept of effective transparency becomes more difficult to apply in overlapping jurisdictions. Moreover, many of the problems which arise in extending domestic tax systems to cross-border transactions, such as corporate-shareholders tax integration, tend to be exacerbated in this case.

Other possible sources of non-neutrality between direct and intermediate investments result from tax deferral. When a mutual fund is not taxed on income received and on capital gains earned and the taxation is deferred to the moment of distribution or of disposal of units, there is a violation of the indifference principle for investments through mutual funds are taxed less heavily than the direct ones. These differences are important when comparing domestic versus cross border investments.

As regards investment in foreign securities by a domestic mutual fund a potential deviation from transparency might arise because of differences in both source and residence country provisions concerning direct investments carried out by mutual funds. In the source country, these relate to tax credits and withholding taxes. In the resident country, they concern the combination of these elements with the nature of double taxation relief available to funds and individuals and the existence of pass-through available from funds to ultimate beneficiaries. Broadly speaking, source countries tend not to extend the benefit of double taxation agreements to foreign funds set up as fully transparent entities. The principal reason for denying treaty protection is that the legal status of many of these funds is unclear since they are neither corporations nor individuals.

Another reason for not allowing treaty benefits is that unless specifically requested by the source, the ultimate beneficiary is unknown. Since the residence of the investor may not coincide with that of the fund, it is possible that the former is not covered by double taxation agreements (DTAs). Italian funds which are neither a legal entity nor technically transparent cannot request the tax credit to be passed-on by the Inland Revenue in the United Kingdom.

Table 2.10 Taxation of non-corporate investors

(rates in percentages where applicable)

	Tax rate on domestic investment (direct)			Tax rate on foreign investment (direct)		
Country	**Interest**	**Dividend**	**Capital Gains**	**Interest and dividend**	**Form of double taxation relief**	**Capital Gains**
Belgium	15	49.14	40.17	25/14[1]	E/CR/NR	NO
France	25	62.15	53.8	PI	E/CR/NR	YES
Germany	53	60	54.3	PI	CR	NO[2]
Italy	12.5	48.59 or 44.98	48.59	Dividends : 12.5 or 27 Interest: 12.5 WT and PI	NR/CR	YES
Netherlands	60	60	35	PI	CR	NO
Portugal	15	54.7	45.64	PI	CR/NUR	NO
Spain	56	56	48	PI	CR	YES
Sweden	30	49.6	49.6	PI	E/CR[3]	YES
U.K.	20	58.6	58.6	PI	CR	YES

Legend: E= exempt; NR: no relief (deduction), CR: direct tax credit; PI: taxed at progressive personal tax rates; NUR: no unilateral relief.

Note: Own calculations based on top marginal tax rates. When there exists an option between being taxed at progressive rates or on the basi of a withholding tax the latter has been chosen because unit because unit holders do not include dividend payments from a fund in their taxable income. The upshot of all this is that taxation also can also be a strong barrier to cross- border investment. This is true even when international investing means investing in another Euro-11 country.

1: The higher rate applies to dividends

2: Capital gains tax is levied on gains arising within six months of acquisition

3: A tax credit is allowed as unilateral relief; exemption applies under certain double taxation agreements

2.2.3 The Cost of Mutual Funds: A Closer Look

The fees charged on mutual funds allow direct cost comparisons to be made. Typically compensation for these services is paid in the form of entrance, redemption, management and performance fees. These fees tend to be deducted from the entry price or from the net asset value of the fund on a daily basis.[10]

[10] There are a variety of types of mutual funds. One important distinction is between open-ended funds (unit trust) and closed-ended funds (investment trust). Another distinguishing feature can be the nature of securities in which funds are invested: money market instruments, bonds, equity, balanced (bond and equities), domestic or foreign. Another characteristic which can differentiate funds is their risk profile, growth or income oriented, and whether they are indexed on a particular basket of securities.

Table. 2.11 Average fees: mutual funds investing in bonds

FRANCE

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	1.09%	0.15%	0.03%	1.28%
Europe	1.04%	0.18%	0.02%	1.24%
Global	1.12%	0.25%	0.02%	1.38%

GERMANY

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	0.63%	0.24%	0	0.87%
Europe	0.61%	0.24%	0	0.85%
Global	0.57%	0.29%	0	0.86%

ITALY

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	0.98%	0.12%	0.03%	1.13%
Europe	0.75%	0.13%	0.01%	0.89%
Global	1.09%	0.14%	0.04%	1.28%

NETHERLANDS

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	0.56%	0.01%	0	0.57%
Europe	0.65%	0.01%	0	0.67%
Global	0.43%	0.01%	0	0.44%

SPAIN

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	1.25%	0.07%	0.11%	1.42%
Europe	1.43%	0.02%	0.11%	1.57%
Global	1.56%	0.01%	0.11%	1.67%

U.K.

Type of fee / Geofocus	Annual fees	Initial charges	Redemption fees	Total
Domestic	0.99%	0.33%	0	1.32%
Europe	0.90%	0.33%	0	1.23%
Global	1.04%	0.43%	0	1.47%

Sources: Lippers Reuters

In the analysis, commission fees are computed assuming that investors, once they have invested in a mutual fund, keep the investment for ten years. Given this assumption, entrance and redemption fees become of secondary importance relative to management fees that are instead paid each year. Commissions charged to investors depend also on the characteristics of the domestic mutual funds and in particular on which sector they invest in and on its geo-focus. To compute the average costs charged, the sample is restricted to mutual funds that are not specialised in a particular sector and that were founded six to ten years ago. The funds are distinguished on the basis of the geo-focus: a geo-focus Europe indicates a fund that invests at least 80% in Europe and a global fund invests 80% of its assets or bonds in the world economy.

The results displayed in Table 2.11 (see above) show that mutual funds whose geo-focus is the domestic market charge a lower management fee while the highest fees are charged by mutual funds investing mainly in Europe. For some countries, such as the Netherlands and France, the cost to invest in a global fund is even lower than the one to invest in a domestic fund. That is due to the low cost that investors usually face when investing in American funds. Differences in cost are relatively small however. We also consider the same costs for funds that invest only in bonds. Here, the evidence is not so clear since for some countries such as the UK, Italy and Germany the costs to invest in a European bond mutual fund is even lower than investing in the domestic one.

2.3 Development of European Securities Markets

We now turn to two important institutional developments that should underpin investment in the euro: the emergence of a corporate bond market and the institutional changes needed to shape the future of securities exchanges in Europe. These institutional developments should facilitate the emergence of the largest capital markets worldwide. Although the stakes are high, the sought after outcome is not guaranteed.

2.3.1 The market for European corporate debt

Demand for the high-yielding bonds is coming from several sources. Due to the BIS capital adequacy rules, banks themselves are large holders of junk bonds. Under international capital adequacy rules, loans to companies must have a 100% ‘risk weighting’, which means banks must provision 8% worth of the loan against the risk of default. The risk weighting for bonds is 25% or 2% worth of the bond. European pension, insurance and mutual funds have also become significant buyers of corporate bonds since the launch of the euro. This in part reflects the historically low yields available on European government bonds and the need for investors to find higher-yielding alternatives. Demand is also being driven by retail investors, who are increasingly disenchanted with the low interest rates paid on bank deposits.

The market for private-sector debt securities is still relatively small in Europe compared to the volume of the public sector market. Domestic corporate bond markets, volumes, and structures vary across the euro area, with France and Germany being the most highly developed. In France, utilities have a substantial share, reflecting the large proportion of public enterprises in the French economy. The German Pfandbrief on the other hand is the only market that has achieved a significant degree of internationalisation. Domestic markets in Europe are extremely segmented compared to the US and are still dominated by government and state agencies and financial institutions.

The rating distribution of outstanding international issues in European private sector debt has been skewed toward the higher range of the spectrum, with more than 40% of the bonds rated Aaa by Moody’s. There is still clearly a lack of lower quality borrowers in the market compared to the US The need for ratings by borrowers is also changing. The German borrowers have primarily used the domestic market to raise funds from domestic investors. Until recently, hardly any company that issues exclusively domestic bonds has been rated, with investors generally content to rely on the issuer’s reputation. Most foreign investors, however, will be guided by

ratings. As EMU brings greater competition for investors' funds, ratings will play a more important role and, in general, disclosure of more information will be required[11].

The extensive use of bank loans, as opposed to capital markets to meet their financing requirements is another important feature of the European corporate bond market. This has been the result of several features of the European market. In Germany, for instance, it has mainly been due to the close links between banks and industry. This implies that commercial banks are prepared to loan large amounts on favourable terms. However, there is evidence that cross-border differences in capital structure are probably not substantial and that demand for external financing has not been driven by country-specific factors (see Rajan and Zingales, 1998). Although companies will find it increasingly possible to by-pass bank financing and so become more accustomed to using financial markets to meet their financing requirements, the switch from bank loans to corporate bonds across Europe will not be swift. The traditional close relationship between companies and their principal banks is not likely to disappear quickly.

The volume of bonds issued by companies in the European currency rose 46% over the first three quarters in 1999. This compares with 34.3% and 35.6% for the United States and the United Kingdom, respectively. Perhaps more importantly, the average credit rating of companies issuing bonds has fallen sharply, since the launch of the single currency. Of all corporate bonds issued this year, 46% have a credit rating of single A from international agencies. This compares with just 22% in 1998, itself a much higher proportion than earlier years. Before this, Europe's bond markets were dominated by AAA and AA-rated quasi-sovereign and financial bonds.

Although the European market for high yield bonds is still in its infancy, several features have emerged. First, the market is sector specific. Half of the high-yield bonds issued this year stem from the cable and telecommunications sector.[12] This is similar to what happened during the early stages of the US market, which was characterised by lumpiness in issuance in oil and gas, airlines and retail. Nevertheless, investors seeking high-yield returns in the European market are unable to fully diversify. Second, spreads between junk (BB rated) bonds and a risk free (AAA) bond are higher in Europe than in the US. In many cases, the difference is more than 100 basis points. This in part reflects the fact that the market in Europe is still immature and that there is room for convergence. Third, it should be emphasized that growth in the European corporate bond market has been uneven. The corporate bond market for Germany, France, Spain, and Italy grew 78.4% over the first three quarters in 1999, compared to only 9.2% for the remaining seven EMU countries.

The Development of New Products

The euro's introduction has not unleashed a series of new derivatives or instruments in the European bond market. Most of the new financial instruments fall in the area of benchmark indexes or are products used for hedging strategies.

The Development of Euro-Benchmark Indexes

If a broad based corporate bond market in Europe is to take off, well-established benchmark indexes, which facilitate comparison with other asset classes, are necessary. Furthermore, the disappearance of currency risk within the EMU zone requires performance to be measured against euro indexes. As of yet there is no widely accepted benchmark used by the market to price risk. Instead two types of instruments have emerged; government bonds and credit indexes of high investment grade.

One reason why no dominating benchmark has emerged is that European bond markets themselves are in a transition phase. Government bonds need to be integrated more tightly before issues of liquidity and a unified

[11] The BIS (1999, 2000) revision of the capital adequacy rules should generate a greater role to external credit ratings.

[12] Bouhuys and Jaeger (1999) note that this characteristic is also currently prevalent in the US junk bond market.

futures market are resolved. An additional motive is that many institutions have only recently announced their intention to construct a credit index. Once this occurs, a performance record needs to be established before an index is regarded to be representative.

Table 2.12 (see below) presents the weights of various providers for European bond government indexes. Although there are slight differences in the weights of the indexes, the EMU countries are divided into three country groups with near equal weighting. Germany, France and Italy represent the largest share of just over 66% on average. This is followed by the subgroup: Spain, Netherlands and Belgium. On average their combined weight is less than 25%. The last subgroup is made up of Austria, Finland, Ireland and Portugal. Their combined weight in the index is almost insignificant. Market liquidity at different maturity structures is a primary factor behind the composition of the indexes.

A wide range of institutions (investment banks, stock exchanges and rating agencies) have jumped into the business of constructing specific bond indexes with the intention that it will used by the market for hedging purposes. These are indexes of investment-grade European companies used to assess credit risk. Some indexes use option-adjusted spread methodologies that neutralise the impact of a bond's individual characteristics such as sinking funds, call provisions, and other covenants.

Table 2.12 **Weights of euro government bond indices**

	Salomon	*Barclays*	*Morgan St.*	*Reuters*	*JP Morgan*
Germany	24.3	23.6	24.95	25.3	25.5
France	23.6	21.5	22.09	22.1	24.6
Italy	21.1	23	22.23	22.6	19.3
Spain	9.5	8.8	8.68	8.2	9.3
Netherlands	8.8	8.2	8.26	8.8	8.6
Belgium	7.1	8.1	7.47	6.4	8
Finland	1.9	2	1.97	1.7	2.3
Ireland	1	1	0.98	0.9	1
Austria	1.8	2.7	2.33	3	-
Portugal	0.9	1.1	1.04	0.9	1.3

Source: Lamedica (1999)

Table 2.13 (see below) summaries the Euro credit index by Salomon Smith Barney. It is presented as a representative credit index to highlight certain features, which again are reflective of the European bond market. Issuer type is primarily made up of Pfandbriefe and Government agency bonds. The weight on corporate bonds is only 3%. 84% of the index is defined by AAA bonds and 60% of the country origin is German. Until the European corporate bond market grows in size, credit indexes will probably be dominated by German high investment grade bonds (i.e. Pfandbriefe).

Inflation Indexed Linked Bonds

France is the only euro area country to issue inflation-linked bonds. There was more than enough demand for the most recent issue in March 1999, but it is not expected that other issuers of the same instrument will follow. The government agency, Cades is in a unique position, as it is willing to bear the inflation risk of such bonds without hedging it. The development of a swaps market to hedge inflation risk has been slow, so borrowers are not able to protect themselves from the risk.

Table 2.13 **Salomon's euro credit index**

By Issuer Type						
Government Ag.	Supranational	Corporate	Asset backed	Financial	Pfandbriefe	
32%	8%	3%	0.4%	22%	35%	
By Credit Rating						
AAA Public agency	AAA Pfandbriefe		AAA Other	AA	A	BBB
36%	35%		13%	10%	5%	1%
By Country Origin						
German Pfandbriefe	German Other	France	Other EMU	Supranationals	Non-EMU	
36%	24%	24%	2%	8%	6%	

Source: Salomon Smith Barney

The Demise of Pfandbrief futures

German Pfandbriefe make up a large share of the European bond sector. They have begun to compete with German Bunds because of their high liquidity and their use as tier-one assets for refinancing operations with the European Central Bank. Their success in becoming an acknowledged benchmark depends in part on the development of a futures market. The jumbo futures contract was launched as a means of hedging jumbo Pfandbriefe - bonds over 0.5 billion euro in size, backed by pools of mortgages or public sector loans. At the beginning of March, trading of Germany's jumbo Pfandbriefe futures contracts on the Eurex was terminated just eight months after its launch. Trading volume in the future, based on five-year jumbo Pfandbriefe, fell from 380 contracts, each worth 128,000 euro, last December to zero in January 1999. As a result the hedging instruments of choice in Germany will be swaps and the cash market.[13]

The de-listing of the contract by Eurex deals a severe blow to the development of the jumbo Pfandbrief as a credible euro benchmark. Jumbo Pfandbrief bond issuances have accelerated in Germany over the past two years, staking their claim in being a liquid, pan-European product. However, without a corresponding futures market, growth prospects of Jumbo Pfandbrief issuances may be restrained.

2.3.2 Challenges facing European stock exchanges

A traditional stock exchange is built on layers of intermediaries, made up of brokers and market makers. This structure is designed to provide liquidity and serve the needs of different market participants. Institutional investors seeking to unload large blocks of shares are treated differently – and get different prices – from investors trading via a low-cost execution-only broker. The stock exchanges have fought hard to preserve the current structure, by seeking to ensure that investment decisions are channelled through this network of intermediaries.

The harsh reality however is that with globalisation and the introduction of virtual exchanges, stock exchanges are no longer about having a physical presence, buildings, traders, history or a culture, but about providing services to a footloose clientele. The reform process has begun with the automation of certain exchanges.

[13] The demise of this derivative was blamed on a badly timed launch last summer, just before the Russian crisis. Before the crisis, there was a high correlation between bund and Pfandbrief bond prices at the time the new contract was launched. The low volatility meant that investors had little incentive to use the Pfandbrief futures for hedging purposes. The Russian crisis resulted in a flight to quality, which meant that the spreads on the Pfandbrief bonds widened out to over 50 basis points over Bunds.

Although the elimination of open outcry trading has reduced the cost structure, further reform is being stimulated by two recent developments. On the one hand, in part sparked by the euro, European banks seek centralized global clearing, so that trades done on one exchange can be matched with trades on another exchange. On the other hand, the introduction of ECNs which have the capacity to perform execution and matching functions as an exchange could lead to more fragmented markets. In the extreme, the exchanges could end up being centralized IT houses with product capabilities.

The call for a European platform

The call for a European stock exchange is primarily in the interests of investors and of the financial services industry.[14] As European stock markets become more integrated and move closer together, the diversification benefits of investing in many European countries is reduced, particularly given that the intra-European exchange rate risk is also eliminated. The role of country risk should be less important, thus diversification should result in a portfolio shift from the country to the sectoral level. In this sense the required services on the part of the investor could be more readily fulfilled by creating a European exchange. This in turn would heighten liquidity and transparency of the most heavily traded shares.

Institutional investors in particular have been demanding a common platform for European stocks. This would ease matching problems for large positions and reduce the execution time of the order flow. This could lead to lower transaction costs and the greater transparency in price could lead to lower price volatility of stocks. Institutional investors could reduce their costs further for they no longer would have to be members of all the European exchanges.

Electronic communications networks and online trading

ECNs represent the most serious challenge to traditional exchanges for they are able to settle transactions more efficiently in terms of cost and time. ECNs can tailor themselves more readily to the demands of the individual investors (hours, limit order books, access to IPO). Currently, ECNs handle between 25 and 30% of the volume on the Nasdaq and 4% of the NYSE. By 2001, many analysts believe more than half of the Nasdaq trading volume will be matched within ECNs. The future success depends on the liquidity generated from online trading, which settles a large share of their trades with ECNs. The Securities Industry Association in the United States estimates that 27% of household securities transactions are conducted using the internet. If ECN and online trading were to succeed in Europe this could possibly fragment rather than centralize markets. Yet, regardless of the market's structure this force is beneficial in that it enhances cost competitiveness of exchanges.

Currently, the online trades are handled by a discount broker and are fed into the stock exchange through the traditional channels. There is no technical reason why orders from end users cannot be aggregated electronically and fed directly into the stock exchange, thus bypassing the intermediaries. An even more radical alternative is to ignore the stock exchange altogether. If sufficient buy and sell orders can be aggregated together by an online brokerage, many can probably be matched without having to be passed onto an exchange. The aim would be to generate enough liquidity in cyberspace to allow shares to be traded outside the restrictions imposed by traditional markets.

ECNs also represent not only a threat to stock exchanges but to the financial services industry as well. The potential for disintermediation stems from the cheaper services and trades offered by ECNs. The online investor now has access to services, such as research and comprehensive price information in real time, that traditional brokers previously reserved for the wealthiest clients. More importantly, the pricing structure of ECNs enables them to undercut the fees charged by brokers and investment houses. The ECN's fees in many cases are based on a flat rate for trading on their systems and range from as little as a half a cent per share to 1.5 cents per share.

[14] See Hardouvelis *et. al.* (1999) that consider the savings to corporate firms through increased integration of European stock exchanges.

Brokers and financial institutions on the other hand often structure their commission fees on a percentage basis of the total transaction.

Structural Reorganization

One way in which the stock exchanges have responded to the competitive pressures is to reduce costs. Such reforms demand hard decisions. This means cutting manpower and management overhead. It also means throwing away modern technology before it reaches obsolescence. The European exchanges have announced several strategies (demutualization and alliances with other exchanges) in their efforts to reduce costs.

Stock exchanges have long been viewed as static. However now the market's landscape in Europe is changing in another dimension. The Viennese and the Swedish exchange have gone public. Recently, the Paris bourse has announced that it will follow the same path in 2000.[15] In a similar manner, Liffe will no longer be a club of exchange members but will operate as a commercial company whose ability to fund development depends on its success in producing results. The trend towards demutualization of the exchanges should create a management structure that can respond quicker to the necessary reform measures that need to be undertaken than under a club or membership structure.

There have been a series of announced alliances between European stock exchanges. The main objectives for these agreements are twofold: to create a common platform for European stocks and to reduce costs. The pace in moving towards a common platform among European bourses however is not expected to be fast. European bourses have a bitter history of discord. This is because many members seek to maintain the status quo. The static nature of exchanges explains why the largest exchanges have been slow to move away from floor-based to screen trading. It also accounts for why many successful mergers have not taken place, despite the obvious benefit to customers.

Recently European bourses have also sought alliances outside the euro area. The Deutsche Börse and the Chicago Board of Trade have reportedly had on-going talks to establish tighter links. The Montreal Exchange and MATIF announced a strategic alliance, giving the Canadian exchange access to the French electronic trading platform. Alternative future alliances may include individual exchanges merging with ECNs. The NASDAQ and Liffe, which are currently exploring such a possibility, have remarked that such an option is more cost effective and flexible than considering a merger with another stock exchange.

2.3.3 Providers of new instruments and markets

A second manner in which stock exchanges have responded to competition is to broaden their revenue base by acting as providers of new financial instruments and markets.

Exchanges for Small Growth Stock

The move to pan-European sector trading and investing, spurred by the launch of the euro has given new impulses for growth stocks. These stocks are primarily startup companies that are too small to have access to the bond market. New exchanges for growth and high-technology stocks have been recently created in Frankfurt, Amsterdam, London, Paris, Brussels and Zurich. Euro.NM, the pan-European network of stock markets for high growth companies, is made up of Frankfurt, Paris, Milan, Amsterdam and Brussels.

The Neuer Markt, starting on March 10, 1997 as part of the Deutsche Börse, dominates the European exchanges for growth stocks (see Table 2.14 below). It began with two quoted firms, growing to 63 firms at the end of 1998

[15] This development is certainly not a European phenomenon for recently the New York Stock Exchange and the NASDAQ made similar announcements.

with 150 additional listed firms expected for 1999. The market capitalisation of the Neuer Markt was over 25 billion euro at the end of 1998. In the first 10 months of 1999, market capitalisation has doubled to over 50 billion euro.

Table 2.14 **Euro.NM in comparison (October 2000)**

	Number of firms	Capitalisation (euro (mill.))
Neuer Market (Frankfurt)	324	165.544
Nieuwe Markt (Amsterdam)	15	1.190
Nouveau Marché (Paris)	153	30.490
Euro. NM Belgium (Brussels)	16	421
Nouvo Mercato (Milan)	34	30.837

Source: Financial Times

Equity Index Providers

Stock index providers are not just stock exchanges but include publishers, credit ratings agencies and investment banks. Although revenues are relatively modest, estimated to be $150 million a year for the four providers, some are enjoying growth of 40 to 50 percent a year. One area where index providers anticipate further growth is in the licensing of their indexes to investment banks, which are then used in swap transactions and other over-the-counter transactions.[16]

Stock indexes are not only becoming more numerous, but are growing in influence. The inclusion of a share in a widely accepted index can raise the share value of a company. The increased volatility of share prices stemming from the excluded or included companies from an established index is expected to continue against the current backdrop of mergers and acquisitions. This influence is partly due to a change in investor behaviour. Continental European fund managers are beginning to follow the established practice in the United States and United Kingdom of passive investment or index tracking. This strategy invests in leading indexes rather than selecting individual shares.

Stock exchanges devising bond indexes

The Deutsche Börse AG announced that it plans to offer a new series of pan-European and euro area bond indexes for both institutional and individual investors in September 1999. The move is seen as a way for stock exchanges to remain competitive in the expanding world of trading European bonds electronically and also to gain market share on other index providers. Many companies already provide European fixed-income indexes. While some are used as the basis for custom-made derivative products, none have become the basis for standardised futures and options contracts traded on exchanges. The new indexes are designed to serve as benchmarks to track the performance of fixed-income securities on a pan-European level.

Another issue is that publicly traded contracts such as stock exchange or currency futures are now a small proportion of total derivatives business. The big growth area is the so-called over-the-counter derivatives, tailor-made instruments to hedge interest rate risk. The bulk of these contracts is offered by banks to other banks and

[16] Along with the rise in prosperity and influence of stock indexes has come controversy. Some investors have questioned whether enterprises that influence profoundly financial markets should remain unregulated. Some providers have responded by becoming more transparent by publishing names of members who sit on the committee that decide on changes to index rules and the dates of future committee meetings.

financial institutions, rather than through exchanges. The drawback is that these contracts are only as good as the bank you bought them from, whereas exchange-traded contracts are guaranteed by the exchange and can be freely bought and sold without risk of default.

2.4 Credit and Liquidity Effects

The euro has stimulated a new range of investment opportunities. At the same time, the removal of currency risk has altered the way risk has traditionally been evaluated. This section looks at how credit and liquidity risk has become more important in the investment strategy.

2.4.1 Credit trading

Many investment banks foresee that the euro will spur growth in bond credit trading. Trading credit spreads, which are driven by market liquidity and credit risk, is a simple arbitrage technique where traders try to profit by buying and selling volatile higher-yielding bonds such as corporate and emerging market debt, both on a proprietary and client basis. These markets are expected to grow rapidly as investors seek bigger returns from higher risk securities. Trading in credit derivatives such as swaps and spread options are also expected to grow as a result of the increased volatility of corporate and high-yield bonds compared to government or bank debt.

The optimism for rapid growth in credit spread trading stems from three factors. First, investors, particularly pension fund managers, are looking for riskier but higher yielding securities such as corporate bonds. Second, increased European merger and acquisition activity is expected to produce a wave of corporate bond issues as companies seek to raise funds in their restructuring efforts. And third, there is the view that banks are now reluctant to provide low margin loans to companies. In the past, it was cheaper for banks to issue a loan rather than lead-managing a bond. However, with shareholder value taking on a new urgency in the euro area, achieving an acceptable return-on-equity is becoming increasingly hard for banks to do with just loans.

2.4.2 Technical factors replacing traditional concerns

Technical factors such as liquidity, issuance volumes, and the efficiency of individual repo markets, are replacing concerns about individual country risk. Investors are having a harder time establishing the absolute credit spread between euro area countries at different parts of the yield curve. Sovereign bonds are judged not against each other, but against a homogenous swap curve that is calculated from the rate at which fixed-rate money can be swapped into floating money. While in the most liquid market, the 10-year German bund remains the benchmark with a yield of 10 basis points below French bonds, Spanish two-year bonds are trading at the same level as German bonds despite the country's lower credit rating.

Investors are prepared to pay a premium for a liquid bond, even if on a relative basis it does not offer the best return on investment. This may explain why Italy, with a AA rating and trading at more than 500 basis points over Germany in the early 1990s, is now trading below some AAA-rated countries such as Finland. If this is the case, then the market has overestimated the importance of liquidity and not adequately recognized the credit risk. While a large market, Italy for example, is less likely to come under a liquidity squeeze, its size reflects the level of the country's indebtedness with relatively greater prospect of a default. Alternatively, investors may feel that they will always be bailed out by the ECB. If this is the case, then it is necessary to upgrade all euro area countries to the highest level and if rating agencies have not done so, they may have a good reason for it.

2.4.3 Revision of Capital Adequacy Rules

Banks in the G10 countries are required under BIS capital adequacy rules to reserve at least 8% of the total capital as a cushion against potential losses from non-performing loans or debt defaults. At least half of this

amount must be tier-one capital, mainly in the form of common shareholder's funds such as common stock, disclosed reserves or retained earnings. A recent revision to the BIS capital adequacy rules allows banks to issue bonds that counts as tier-one capital on their balance sheet is likely to support a new market[17]. Banks that buy Pfandbriefe have to put aside only 0.8% of their value as capital against them; bonds issued by other banks that issue mortgages require, at a minimum, 1.6% capital. Germany's mortgage banks are the largest issuers of Pfandbriefe. Because the German state has provided them with capital on subsidised terms, and they benefit from an implicit public guarantee that allows them to raise capital cheaply, this gives the mortgage banks a funding advantage over European rivals.

[17] The BIS (1999, 2000) is in the process of establishing a new framework for capital adequacy in which the importance of credit risk will be heightened. The European Commission (1999) is also engaged in a review of capital adequacy rules, which will ultimately result in a revision of the relevant EU Directives.

3. Scope of Portfolio Adjustment

Having described in details some important features of the world of portfolio investments in Europe after EMU, we now take a radically different tack and adopt the perspective of Modern Portfolio Theory to discuss other implications of EMU for investments. In so doing we are going to abstract from most of the factors we have considered as relevant: taxes, transaction costs, institutional developments and market liquidity. Our focus will be on returns. The reason for doing so is that it provides a useful benchmark, all the more so in the perspective of a diminishing home bias. It remains, however, that the approach is partial and limited by technical feasibility constraints. These limitations justify approaching the problem from two alternatives angles.

As mentioned in the Introduction, there are three main areas of portfolio reallocation: domestic versus international, equity versus fixed income securities and finally private versus public debt. Each of these aspects can be treated within the context of standard portfolio investment models subject to a proper account of the changes brought about by the introduction of the single currency. Some aspects of European fixed income securities markets have been covered in the previous section, and the aim of the current section is to tackle the asset allocation problem from the remaining two angles. The first subsection (3.1) concentrates on portfolio reallocation within Euroland with a focus on equity markets. The basic question addressed is: what is the optimal asset allocation strategy of a Euroland investor if he/she restricts the investment opportunity set to his home country equity market and other Euroland equity markets? The second subsection (3.2) extends the analysis to an investment opportunity set comprising risky and riskless assets outside the euro area.

3.1 Equity Portfolio Reallocation in the Euro Area

The evidence presented here is based on equity markets and is meant to shed light on the impact on risk diversification opportunities of the economic and monetary integration process at work in Euroland in the 90's. Portfolio theory tells us that diversification gains stem from the imperfect correlation between asset returns. In the context of Euroland, international diversification is performance improving to the extent that national stock markets are imperfectly correlated. The advent of the Euro has at least two possible implications in this respect. First, it corresponds mechanically to the disappearance of currency risks, and second, it is part of a broader set of structural changes likely to alter the traditional forces underlying asset returns and thus, the relevant correlations between stock indices. To shed light on these issues and their implications for portfolio allocation decisions, we start by focusing on the characteristics of the variance-covariance matrix of returns within Euroland. The question we address is the following: have we observed significant changes, over the recent past, as the monetary and economic convergence process was unfolding (and with the advent of the Euro), in the characteristics of returns? And, if so, what are their implications for optimal portfolio allocations? In other words, we inquire how the advent of the Euro, preceded by the intensification of co-ordination between national policies, has affected the variance-covariance matrix of asset returns in the Euro area (and to what extent can further changes be expected)?

A closely related issue is whether the evolution of return correlations at the country level would justify abandoning the traditional country allocation model in favour of an approach based on a diversification across industrial sectors. To get an insight into this question, the time evolution of the variance-covariance matrices of

sectoral returns is also studied. Two disaggregation levels are considered: at a first level, four sectors per country are considered, and at the second level, 10 sectors are taken into account.

Given the persistence and the importance of the home bias in equity investments, the section pursues with the following question: do the changing economic structures within Europe and the disappearance of currency risks tend to increase or decrease the cost of restricting one's investment universe to home equities?

For the purpose of comparison, we need pre-Euro and post-Euro periods. Given the relatively short post-Euro period, the available data constitute a severe hindrance. To bypass the difficulty, the problem is approached from two perspectives, both making the assumption that 1 January 1999 was but the final consecration of a movement of convergence started earlier. Our first, stronger, hypothesis is that the start of the convergence period may be identified with January 1995, the date of entry of the Maastricht Treaty. This enables the use the period from September 1990 to the end of 1994 as representative of the 'pre-convergence' period and to make full use of the data sample available. A more realistic hypothesis is to use the information provided by opinion polls. In fact, while one may argue that the prospects of a monetary union were surrounded with considerable uncertainty in January 1995, this uncertainty for most participating countries was resolved much ahead of the starting date of January 1999. Indeed, Table 3.1 (see below) indicates that for Germany, France, Netherlands, Belgium and Austria, the prospects of EMU were close to certainty as early as August 1996; by August 1997, only for Italy were there some doubts which were lifted by January 1998. The ambiguity over the exact date of the convergence period is inevitable, since it is linked – at least in present study - with private investors' expectations about the realisation of EMU. It strengthens the case for pursuing alternative hypotheses and exploiting data samples available to date as thoroughly as possible.

Table 3.1 **Expected participation in EMU 1996-8**

Country	Poll taken in:				
	January 1996	August 1996	January 1997	August 1997	January 1998
Germany	100	100	100	100	100
France	97	100	100	100	100
Netherlands	76	100	100	100	100
Belgium	79	95	100	100	100
Austria	79	93	97	96	100
Ireland	60	82	88	96	100
Spain	7	7	31	90	100
Finland	36	48	76	91	94
Portugal	0	4	32	84	97
Italy	2	3	19	67	99
Denmark	50	42	25	16	7
Sweden	7	13	13	4	11
United	22	8	4	1	0
Kingdom	0	0	0	1	0
Greece					

Note: The polls of over 200 financial and economic forecasters indicate the percentage of respondents predicting that countries will join monetary union at the outset. Respondents' assumptions regarding the likely starting date differed. Luxembourg was not included in all polls.

Source: McCauley (1997) Consensus Economics

3.1.1 The Data

To conduct the study outlined above, *weekly* data on national stock market indices as well as sector indices for the Euroland 11 countries are collected. The indices used are the Datastream Global Equity indices. These indices are good representations of the national markets in the sense that they are broad and cover between 75% and 80% of the total capitalisation of the respective markets. Moreover, they represent valid benchmarks for comparison with other indices used in current empirical studies and have the added advantage of being available for the set of countries that are of interest to us[18]. The whole sample runs from 10 September 1990 to 19 April 1999, which yields a total of 450 weekly return observations per index[19]. The pure equity returns thus obtained are converted into local currency by adding the national currency returns for all dates prior to 1 January 1999. The spot exchange rate series are also retrieved from Datastream.

Customarily, tests of asset pricing models are conducted using monthly return observations because non-normality issues are less severe at sampling intervals greater than or equal to one month. However, if we elect to work with monthly data, the sample size becomes extremely small, particularly when it comes to comparing pre-euro and post-euro sub-periods. The concern with non-normality is illustrated in Table 3.2 (see below) which contains summary statistics on national index returns for the pre-1999 portion of our sample. As will be done systematically, we illustrate our arguments by taking the viewpoints of the German and French investors. Based on the Jarque-Bera statistic (which is a chi square with two degrees of freedom), the normality assumption is rejected for all 11 countries and both types of investors. The normality is rejected both because of fat tails and asymmetry as indicated by the kurtosis and skewness coefficients. In fact, given that the kurtosis coefficient $k \to N\left(3,\ \frac{24}{T}\right)$ and the skewness $s \to N\left(0,\ \frac{6}{T}\right)$ and that the Jarque-Bera is a combination of the latter two statistics, it is easy to see that asymmetry is present in all but three stock returns (Austria, Finland and Italy) when we focus on returns expressed in DMK. With no exception, index returns are characterised by fat tails. Belgium, Finland and Italy exhibit asymmetry when returns are expressed in FRF and fait tails are present for all countries.

The main question here is to figure out the likely consequences of this non-normality on the battery of tests that are going to be undertaken in this part of the study. Given the evidence of fat tails, the primary message is that sample second moments are unreliable estimates of the true population moments, which might not even exist[20]. The very simple and conservative assumption that is maintained here is that the *general form* of the underlying return distribution (whatever it is) does not change significantly over the time period of our study, so that correlation and covariance matrices computed over two consecutive sub-periods can be viewed as coming from the same distribution.

Table 3.3 (see below) reports the unconditional correlations obtained for the pre-1999 part of our sample.

[18] We used the FT Actuaries indices for *eight countries* and obtained outputs qualitatively similar to those reported here. We therefore decide to work with Datastream Global Equity indices which are available for *all the Euroland countries*, in contrast to FT Actuaries.

[19] The total return observations is 380 for Luxembourg rather than 450.

[20] Fat tails suggest that returns can be modelled by stable paretian distributions which can have infinite second moments.

Table 3.2 **Euroland country index returns: pre-99 summary statistics**

a) Returns in DMK

	Austria	Belgium	Germany	Spain	Finland	France	Ireland	Italy	Luxem.	Neth.	Portugal
Mean	0.006683	0.152334	0.119917	0.14267	0.227939	0.13043	0.18674	0.09262	0.12745	0.17795	0.12409
Median	0.039258	0.164229	0.162868	0.24149	0.194118	0.20265	0.163	0.17367	0.15412	0.20724	0.06831
Maximum	5.45129	3.822995	4.917269	6.11959	8.027822	4.09096	4.63247	7.64595	2.78089	3.81916	5.1023
Minimum	-4.10076	-5.60237	-6.50709	-5.85532	-8.22668	-5.61873	-6.1001	-7.45092	-5.18211	-7.198	-6.3702
Std. Dev.	1.154506	1.043792	1.171001	1.61138	2.019024	1.34975	1.35494	2.03477	0.89676	1.21888	1.25712
Skewness	0.093372	-0.34847	-0.70753	-0.42946	-0.18779	-0.45904	-0.3415	-0.1542	-0.79187	-0.8438	-0.299
Kurtosis	4.87744	5.455887	6.64091	4.71451	4.795005	4.6387	5.58872	3.79131	7.44067	8.77074	6.41768
J.-Bera	61.9973	113.5064	265.7541	64.0461	58.57412	61.4499	124.842	12.5624	240.801	629.604	209.664
Probability	0	0	0	0	0	0	0	0.00187	0	0	0
Observ.	418	418	418	418	418	418	418	418	260	418	418

b) Returns in FRF

	Austria	Belgium	Germany	Spain	Finland	France	Ireland	Italy	Luxem.	Neth.	Portugal
Mean	0.002797	0.148449	0.116032	0.13879	0.224054	0.12654	0.18286	0.088735	0.12418	0.17407	0.12021
Median	-0.001154	0.14253	0.130832	0.197105	0.151529	0.18546	0.17483	0.152552	0.1707	0.15952	0.0943
Maximum	5.81735	3.963525	5.283329	6.393852	7.785446	4.45702	4.873	6.71786	2.79443	3.59612	5.37656
Minimum	-4.52516	-5.578945	-6.48366	-5.66917	-8.25724	-5.53013	-5.9949	-7.31701	-5.1588	-7.1746	-6.3468
Std. Dev.	1.161068	1.070855	1.206177	1.576226	1.997849	1.27124	1.31963	2.019268	0.88358	1.18859	1.27752
Skewness	0.265701	-0.222488	-0.61948	-0.29749	-0.20292	-0.40396	-0.2617	-0.10622	-0.9155	-0.7891	-0.2169
Kurtosis	5.229234	5.300714	6.480786	4.616246	4.860617	4.69561	5.64081	3.561202	7.82736	9.41663	6.09074
Jarque-Ber	91.47014	95.63994	237.7532	51.66226	63.1648	61.4425	126.232	6.271359	288.793	760.48	169.654
Probability	0	0	0	0	0	0	0	0.04347	0	0	0
Observ.	418	418	418	418	418	418	418	418	260	418	418

Note: This table gives the unconditional whole sample moments of the Euroland index returns. The sample used runs from 31 December 1990 to 28 December 1998 and observations are sampled weekly. Returns are continuously compounded and annualised. The Jarque-Bera is a chi square with two degrees of freedom and tests for both asymmetry and fat tails in the series.

Table 3.3 **Unconditional whole sample correlations**

a) Returns in DMK

Austria	1.000									
Belgium	0.503	1.000								
Germany	0.608	0.641	1.000							
Spain	0.474	0.559	0.658	1.000						
Finland	0.425	0.473	0.525	0.487	1.000					
France	0.539	0.599	0.715	0.669	0.507	1.000				
Ireland	0.501	0.504	0.527	0.498	0.495	0.547	1.000			
Italy	0.333	0.451	0.532	0.593	0.432	0.550	0.398	1.000		
Netherlands	0.597	0.684	0.744	0.657	0.581	0.721	0.640	0.499	1.000	
Portugal	0.383	0.512	0.556	0.524	0.413	0.534	0.439	0.428	0.551	1.000

b) Returns in FRF

Austria	1.000									
Belgium	0.516	1.000								
Germany	0.622	0.661	1.000							
Spain	0.456	0.541	0.645	1.000						
Finland	0.412	0.460	0.514	0.472	1.000					
France	0.504	0.566	0.697	0.646	0.487	1.000				
Ireland	0.485	0.491	0.522	0.473	0.480	0.506	1.000			
Italy	0.324	0.442	0.525	0.583	0.422	0.537	0.382	1.000		
Netherlands	0.588	0.678	0.745	0.640	0.568	0.693	0.621	0.488	1.000	
Portugal	0.397	0.531	0.575	0.512	0.404	0.511	0.431	0.422	0.549	1.000

Note: sample used runs from 31 December 1990, to 28 December 1998. The table gives the unconditional whole sample correlations of the Euroland index returns. Returns are continuously compounded and annualised.

3.1.2 Statistical analysis of correlation and variance-covariance matrices of returns based on country indices

To assess the extent to which the adoption of a common policy in the convergence phase has led to a significant modification of the investment opportunities within Euroland, the whole sample is partitioned into two sub-samples of equal size. In a first approach, the first sub-sample runs from 31 December 1990 to 26 December 1994 and corresponds to the four years preceding the starting date of the Maastricht Treaty. The second sub-

sample runs from 2 January 1995 to 28 December 1998 and corresponds to the first definition of the convergence period. The corresponding summary statistics can be found in Table 3A of the Appendix to this section. Subsection 3.1.3 presents the corresponding results for a more restricted definition of the convergence period.

The modification of the investment opportunity set, if any, must manifest itself in the changing structure of the variance-covariance matrices of the pre convergence and convergence periods. In principle, a test of the stability of the covariance matrices can suffice. But given that correlation matrices are more appropriate to judge on the significance of international diversification benefits, we will consider tests of stability of both correlation and covariance matrices. The tests that are used are the Jenrich (1970) and Box (1949) c^2 statistics which are popular to some extent in empirical studies (Longin and Solnik (1995), Kaplanis (1985, 1988) to cite a few). Operationally, denote by m_{1v} and m_{2v} the variance-covariance matrices of the first sub-sample (pre-convergence) and second sub-sample (convergence), respectively. The corresponding correlation matrices are denoted by m_{1c} and m_{2c} respectively. For a test based on covariance matrices, the Box test is based on a ratio of determinants: $|m_{1v} + m_{2v}| / |m_{1v}| + |m_{2v}|$, while the Jenrich uses as its principal input the quantity $trace\ (m_{1v} - m_{2v})/(m_{1v} + m_{2v})$. The detailed computation of these test statistics is given in the technical note at the end of this section, and we just need to mention that they are asymptotically distributed as chi squares with degrees of freedom equal to $\frac{n(n+1)}{2}$ where n is the number of countries (assets). The small sample properties of both tests have been investigated by Kaplanis [1985]. It turns out that if the sample size is too small, the two tests can give conflicting conclusions. Hence, the use of both tests here can give guidance on possible sample issues.

For a test of stability of correlation matrices, the test statistic is a Jenrich test which is computed in exactly the same way as the test for stability of covariance matrices after making appropriate substitutions (replacing covariance matrices by correlation matrices) and adjusting for the number of degrees of freedom. That is, the Jenrich based on correlation matrices uses as its principal input the quantity $trace\ (m_{1c} - m_{2c})/(m_{1c} + m_{2c})$. The adjustment in the number of degrees of freedom is necessary because the diagonal elements of the matrices are not an object of test, so that the relevant degrees of freedom is $\frac{n(n-1)}{2}$. To summarise, in the context of the present study involving 11 countries, the Box and Jenrich statistics based on covariance matrices have 66 degrees of freedom whereas the Jenrich statistic using correlation matrices has 55 degrees of freedom. For practical reasons, Luxembourg is excluded from our sample and we adjust the degrees of freedoms accordingly. The output of the calculations is reported in Table 3.4 (see below).

Table 3.4 **Test of stability of covariance and correlation matrices when returns are expressed in DMK and FRF**

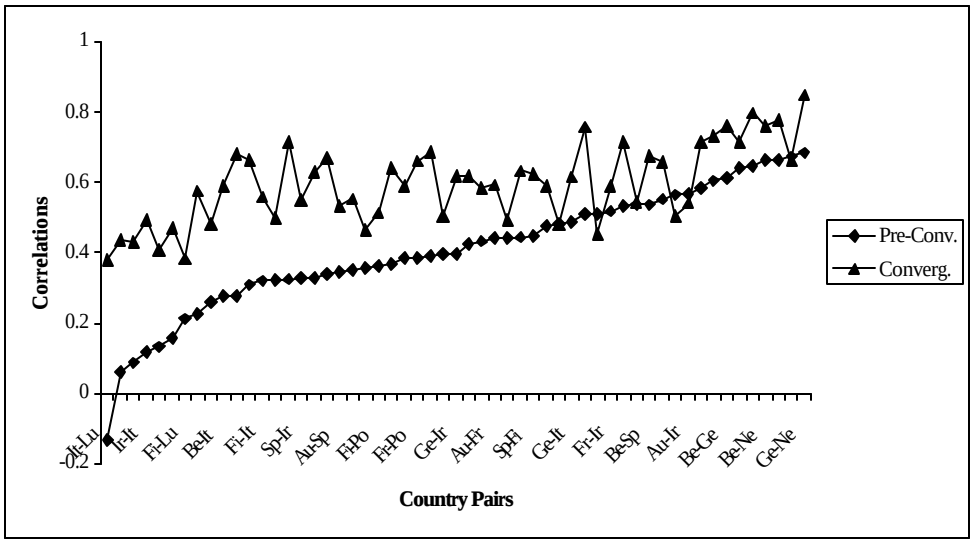
	Test of correlation matrices	**Test of covariance matrices**
	Jenrich	**Jenrich**
Returns in DMK	171.752	231.681
	(0.0000)	*(0.0000)*
Returns in FRF	172.259	230.489
	(0.0000)	*(0.0000)*

When we focus on pre convergence versus convergence periods, the first sub-sample runs from December 31, 1990 to December 26, 1994 while the second sub-sample runs from January 2, 1995 to December 28, 1998. The p-values are given in parentheses below each statistic.

Clearly, there is a strong evidence that both the correlation and variance-covariance matrices are unstable over time. The extremely low p-values given in parentheses reject the null hypothesis of equality of the two matrices, implying that the diversification benefits during the convergence period are different from those prevailing in the period before convergence. Additional information is presented in Figures 3.1 and 3.2 (see below) where we display the pre-convergence and convergence period country pair correlations. The corresponding numerical figures are reported in Tables 3D and 3E in the Appendix to this section. The pre-convergence correlations are sorted in ascending order, and plotted along with the unsorted corresponding convergence period correlations. It is striking that every convergence period correlation is higher (with 3 or 4 exceptions when returns are expressed in DMK or FRF respectively) than its pre-convergence period counterpart. The formal Jenrich tests confirm that these differences are statistically significant.

Of course, it is a relevant question to inquire whether this pattern of increasing return correlations is specific to Euroland countries and thus, presumably, associated with the process of economic and monetary unification, or whether it is merely a reflection of a broader world wide trend, possibly as a consequence of increasingly mobile international capital flows. Evidence on this question is provided in Figure 3.3 (see below) where we display the evolution of the return correlations between stock indices representing the major regions of the world. The regions that are considered here are: Americas (AM), Far East (FE), Pacific-Basin (PB), Australasia (AU), Non-European Union (NE), European Union (EE) and Asia (AS). While there is some increase in the level of correlations as the data in the Appendix to Section 3 (see Table 3C of the Appendix to Section 3.1 below) suggest, the changes in correlations are significantly more pronounced in the case of Euroland countries (the average of region pair correlations was 0.454 during the pre convergence period, and it moved to only 0.585 during the convergence period)[21]. In addition, with the exception of the correlations involving the Far East and Pacific Basin regions, the level of correlations tend to be lower than those observed within Euroland.

Figure 3.1 **Evolution of country pair correlations (returns in marks): before and during convergence**



[21] Contrast this with an average pre convergence correlation of 0.333 and a convergence period average correlation of 0.585 for Euroland countries.

Figure 3.2 **Evolution of country pair correlations (returns in FRF): before and during convergence**

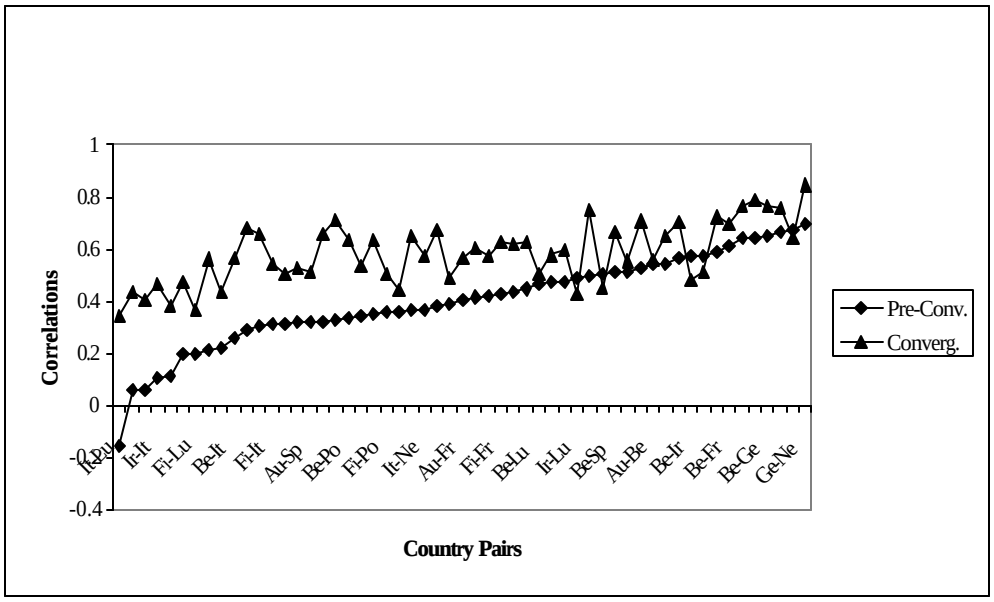


Figure 3.3 **Evolution of region pair correlations: before and during convergence**

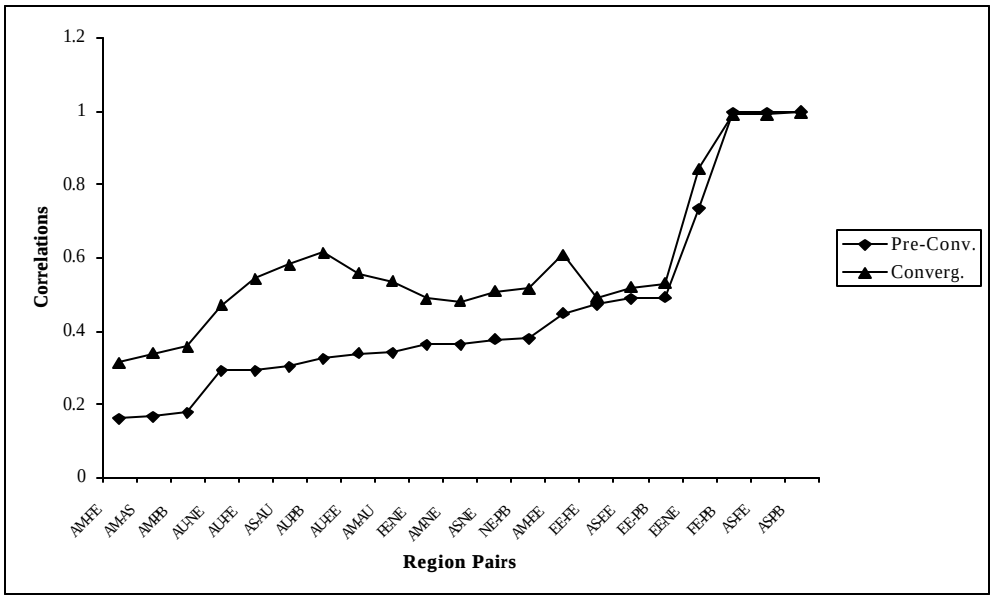


Table 3.5 (see below) indicates that these changes in correlations were accompanied by an increase in the standard deviations of returns across Europe, with Italy being the sole exception and the Netherlands the extreme illustration. While it is easy to find some rationale for the increase in correlations (see subsection 3.1.6), it is not clear that the increase in the risk level has any causal relationship with EMU or the process of European economic integration, i.e., it is difficult to decide whether this increase in standard deviations is likely to be permanent or not. It is interesting to notice however, that there is some presumption that return correlations increase during periods of high volatility (e.g., see the contagion literature). The increase in the standard deviations in returns may in this sense explain part of the common increase in correlations both in Euroland and elsewhere in the developed world.

Table 3.5 **Return volatilities in Euroland**

Country	Pre-Convergance	Convergance
Netherlands	0.7306081	1.39186
Belgium	0.7774509	1.114882
Germany	0.9380667	1.286281
Portugal	0.9956962	1.376585
Austria	1.0016007	1.027208
Ireland	1.1253629	1.268636
France	1.1486571	1.355324
Spain	1.3931264	1.565336
Finland	1.7876227	1.972845
Italy	1.815288	1.796955

The intermediate conclusion to draw from the analysis of this section is that *the process of economic and monetary integration in place in Europe seems to be accompanied with an increase in the correlation of national stock indices indicating that the benefits of international diversification using country allocation models within Euroland have diminished*. A similar but less pronounced process of increasing correlations among country or regional indices seems to be at work elsewhere in the world, suggesting that EMU factors are not the only ones at work. It remains true that diversification opportunities on a purely geographical basis are better if extended outside the European region.

3.1.3 A more cautious definition of the convergence period

In this subsection, the analysis above is revisited using the 'Consensus Economics' definition of the convergence period. On the basis of the information provided in Table 3.1 (see above), we date the start of the convergence period at August 1997 (extending until the end of our data sample, i.e. 19 April 1999) and accordingly, define a pre-convergence period of similar length, i.e. starting on 13 November 1995.

Table 3.6 (see below) reports the return correlations obtained for the pre-convergence and convergence periods for both types of investors. The results strikingly confirm what was obtained with the first sample decomposition. Whether returns are computed in DMK or FRF, only two of the 45 correlations are lower in the convergence period than in the pre-convergence one! Not surprisingly, Table 3.7 (see below) confirms that the pre-convergence and convergence covariance and correlation matrices differ significantly.

Thus, even with a narrower definition of the convergence period, the data send the same message. The recent years, associated with increasing economic integration in Europe culminating with EMU, have seen an increase in the equity return correlations confronting European investors with reduced diversification opportunities. An important question is whether these changes are an (almost) mechanical consequence of decreasing currency risk (which altogether disappeared in the latter part of our sample) or whether they rather reflect underlying changes in the 'real' structures of economies engaged in a process of monetary and economic integration. Some insight into this question is provided by repeating the previous exercise in a context where currency fluctuations prior to January 1, 1999 have been neutralised.

Table 3.6 **Correlations based on Consensus Economics periods**

a) Pre-convergence, returns in DMK

Austria	1									
Belgium	0.63	1								
Germany	0.58	0.575								
Spain	0.39	0.478	0.51	1						
Finland	0.4	0.376	0.489	0.37	1					
France	0.38	0.549	0.61	0.43	0.3451	1				
Ireland	0.46	0.521	0.528	0.38	0.3219	0.541	1			
Italy	0.33	0.512	0.326	0.37	0.3905	0.479	0.3799			
Netherlands	0.56	0.663	0.778	0.58	0.4533	0.586	0.6041	0.3788	1	
Portugal	0.27	0.426	0.471	0.41	0.3729	0.393	0.3225	0.3457	0.4435	1

b) Convergence period, returns in DMK

Austria	1									
Belgium	0.55	1								
Germany	0.66	0.822	1							
Spain	0.62	0.745	0.834	1						
Finland	0.68	0.665	0.815	0.73	1					
France	0.73	0.801	0.907	0.83	0.7992	1				
Ireland	0.59	0.501	0.639	0.56	0.6688	0.596	1			
Italy	0.53	0.692	0.76	0.85	0.6894	0.813	0.5075	1		
Netherlands	0.7	0.809	0.902	0.82	0.8281	0.911	0.6661	0.7671	1	
Portugal	0.59	0.694	0.753	0.75	0.6053	0.779	0.5013	0.7298	0.745	1

c) Pre-convergence, returns in FRF

Austria	1									
Belgium	0.63	1								
Germany	0.61	0.586	1							
Spain	0.38	0.464	0.501	1						
Finland	0.44	0.405	0.518	0.38	1					
France	0.35	0.518	0.586	0.4	0.3532	1				
Ireland	0.46	0.511	0.53	0.36	0.3463	0.506	1			
Italy	0.3	0.485	0.3	0.35	0.3888	0.452	0.3486	1		
Netherlands	0.56	0.658	0.775	0.57	0.4726	0.564	0.5946	0.3538	1	
Portugal	0.3	0.441	0.495	0.4	0.401	0.376	0.3282	0.3268	0.4493	1

d) Convergence, returns in FRF

Austria	1									
Belgium	0.57	1								
Germany	0.67	0.825	1							
Spain	0.62	0.746	0.834	1						
Finland	0.66	0.658	0.81	0.72	1					
France	0.73	0.803	0.907	0.83	0.7947	1				
Ireland	0.58	0.497	0.633	0.56	0.663	0.586	1			
Italy	0.55	0.699	0.765	0.85	0.6882	0.818	0.5084	1		
Netherlands	0.69	0.806	0.901	0.82	0.8253	0.91	0.6588	0.77	1	
Portugal	0.6	0.699	0.755	0.75	0.6011	0.781	0.4952	0.7344	0.7443	1

Note: The Pre-convergence period based on Consensus Economics runs from 13 November 1995 to 28 July 1997 whereas the Convergence Period runs from 4 August 1997 to 19 April 1999.

Table 3.7 **Test of stability of covariance and correlation matrices when returns are expressed in DMK and in FRF (Consensus Economics)**

	Test of correlation matrices Jenrich	**Test of covariance matrices Jenrich**
Returns in DMK	92.971 *(0.00003)*	198.125 *(0.00000)*
Returns in FRF	92.476 *(0.00004)*	197.148 *(0.0000)*

Note: The Pre Convergence period based on Consensus Economics runs from 13 November 1995 to 28 July 1997 whereas the Convergence Period runs from 4 August 1997 to 19 April 1999.

3.1.4 Taking the viewpoint of the Euro- investor

Given the evidence reported in the previous subsections, the rest of the analysis will abstract from currency risk and concentrate on the implications for diversification benefits of the changes in economic structures associated with EMU. While the argument can be made that currency fluctuations within the Euro area have been significant in the years before full convergence, the impact of these fluctuations do not seem to be visible in a portfolio diversification context (offsetting effects). Hence, the single viewpoint of the European investor is adopted; this is appropriate post 1 January 1999 and return data are expressed in Euro at single conversion rates: the official, permanent conversion rates of 31 December 1998. That is, we convert all national and sector indices in Euro at the 31 December 1998 conversion rates, also for index values preceding the formal advent of EMU and compute our returns on that basis. The implicit underlying hypothesis is that the currency exchange rate movements since 1990 have been mostly neutral to stock returns and that the main measurable effect of the advent of the Euro is not so much the result of the disappearance of currency risks but rather follows the changes in economic structure that the process of economic and monetary unification has provoked. The

justification of this choice can be debated in relation to currency variations shown in the Appendix to this Section. We will indeed show that, as far as our analysis is concerned, currency fluctuations have played a minor role in the 1990s (in Europe). That is, the result of the two preceding subsections will be fully confirmed in this hypothetical context of this subsection, suggesting that the increase in return correlations measured in the preceding subsections may be due, to a greater extent, to the evolving economic structure rather than to the simple elimination of currency risk. If this is so, one may conjecture that the described evolution may not have terminated its course with the arrival of the single currency.

Turning to the full sample and using the broader definition of convergence period mentioned in section 3.1.2, Figure 3.4 (see below) corresponds to Figures 3.1 and 3.2 (see above) for the return data 'purged' from currency fluctuations (where consequently, the single viewpoint of the Euro-investor is relevant) – the corresponding numerical results are to be found in Table 3A of the Appendix to this section. The upward shift in the correlation matrix is clearly visible, confirming the decrease in international diversification benefits. If the convergence period is further decomposed in two sub-periods, it is also found that the correlations of the second period of convergence are much higher than those of the first phase (results not reported here). Thus, not only have correlations increased between pre convergence and post convergence, but they also continue to do so during the post convergence period!

Figure 3.4 **Evolution of country pair correlations: before and during convergence**

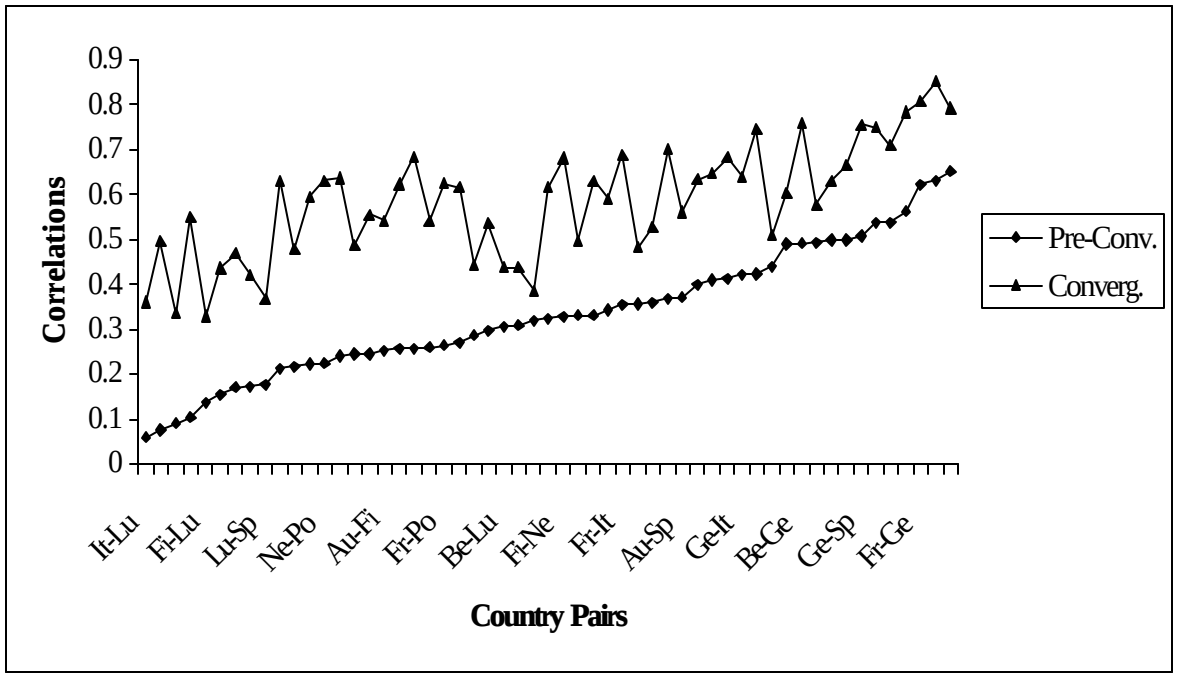


Table 3.8 (see below) confirms, not surprisingly, that for these return data as well the covariance and correlation matrices are significantly different in the pre and post convergence sub-periods.

Table 3.8 **Test of stability of covariance and correlation matrices**

	Test of correlation matrices	**Test of covariance matrices**	
	Jenrich	**Jenrich**	**Box**
Pre-convergence versus convergence	124.507	201.437	161.568
	(0.0000)	*(0.0000)*	*(0.0000)*

Note: The pre- convergence period runs from 10 September 1990 to 26 December 26, 1994 while the convergence sub-sample runs from 2 January 1995 to 19 April 1999. The p-values are given in parentheses below each statistic.

3.1.5 Countries or sectors?

In order to gain further insights on the process at work, the analysis above is repeated mutatis mutandis, using sector indices available for the Euroland economies. The results obtained in the previous subsection suggest that one may use the single Euro-investor viewpoint since it applies equally to investors of all EMU member countries and leads to a much clearer picture. Unless otherwise noted, the broader definition of the convergence period is retained and this enables the use of the full data sample.

First, consider a broad decomposition into four sectors per country distinguishing the 'Resources', 'Financials', 'Non-financials', and 'Non-financials excluding resources' (partially overlapping) sectors. Figures 3.5 to 3.8 (see below) report the results when country/sector returns are paired, i.e., we look at the country to country correlations among 'Financials' returns, then 'Non-financials', etc. Although somewhat less so for the 'Resources' sector, the same pattern of increasing correlations over the period under review is observed. Note as well that the sector by sector return correlations tend to be lower than the corresponding correlations using aggregate country indices.

Figure 3.5 **Evolution of pair correlations: resources**

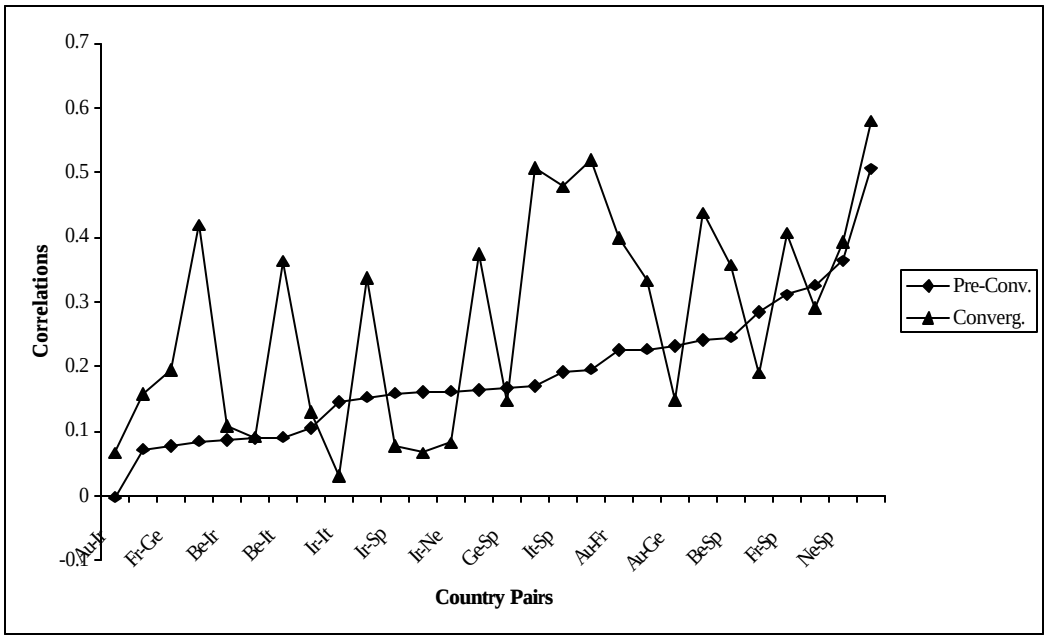


Figure 3.6 **Evolution of pair correlations: non-financials**

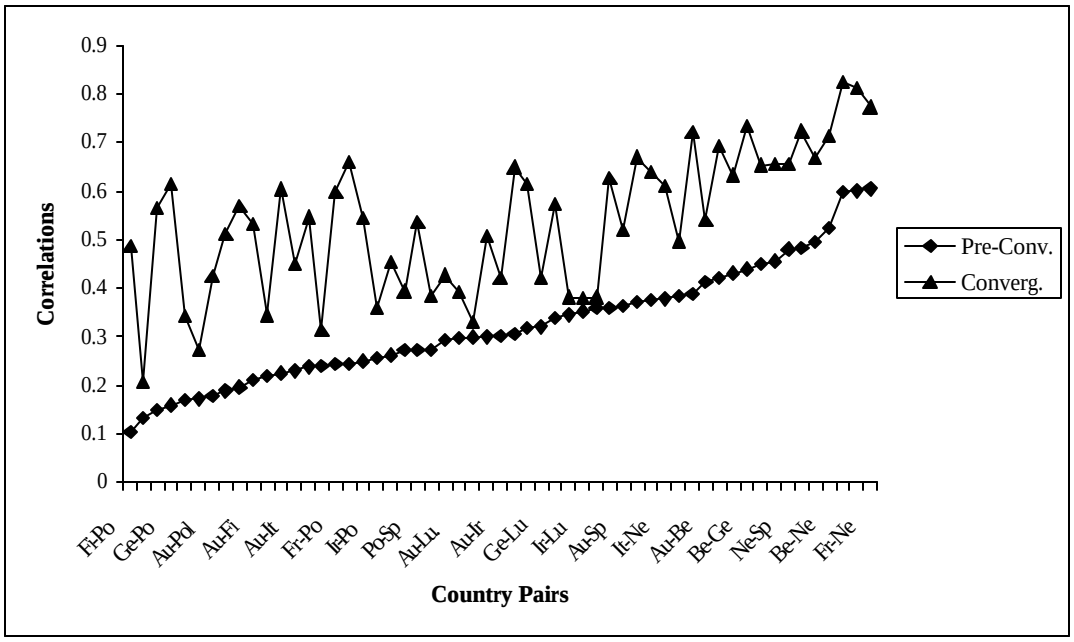


Figure 3.7 **Evolutions of pair correlations: financial**

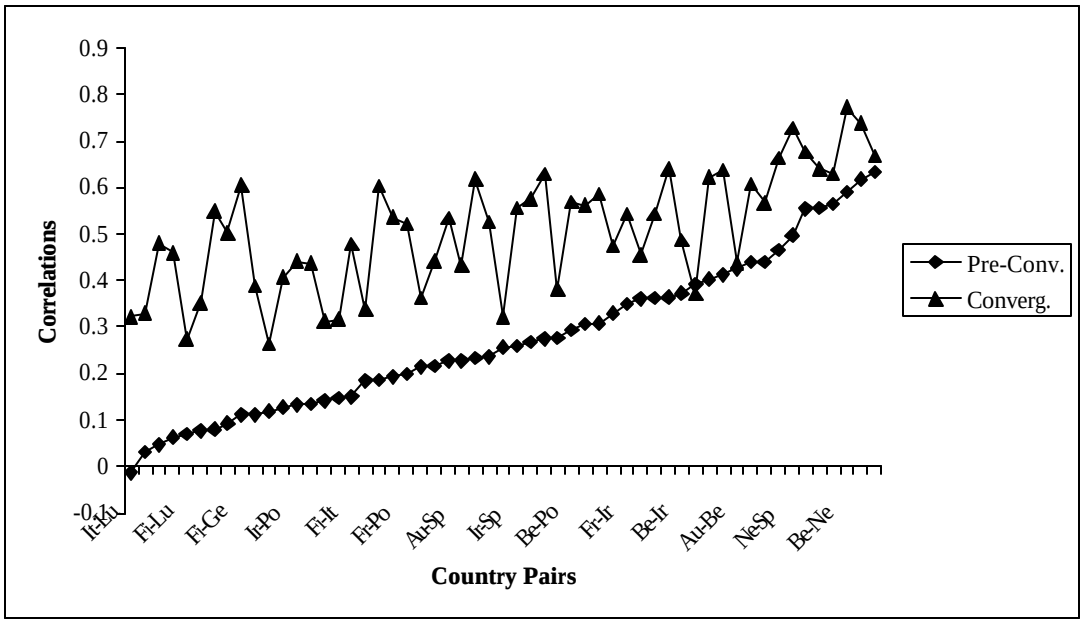
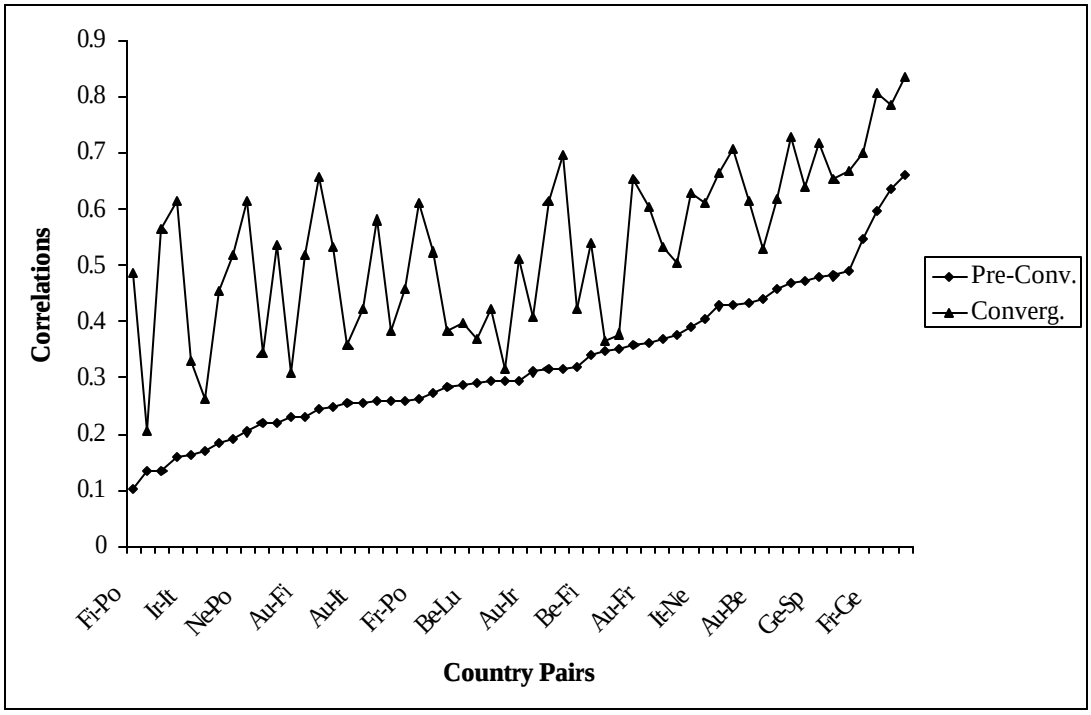


Figure 3.8 **Evolution of pair correlations: non-financials, excluding resources**



These results are confirmed at a finer level of disaggregation as indicated in Table 3.9 (see below) where a ten-sector decomposition is used. The average (across countries) pair-wise correlations increases in nine sectors out of ten, the UTILS sector being the single exception. The correlation increases range from 4.15 percentage points (from 0.2944 to 0.3359 for the CYSER sector) to 19 points ((from 0.20875 to 0.39883 for the NYCSR sector). Quite understandably, correlation levels are rather lower at this higher level of disaggregation.

It follows from the current results that diversification opportunities are much better at the sector level than at the country level despite the fact that the European unification process appears manifest here as well in the form of an increase in the correlation among sector index returns. The suggested implication seems to be that allocating simultaneously across sectors and countries is a superior investment option. This assertion is next investigated by addressing the question of whether the gains from diversification require investing internationally or whether they can be reaped by limiting one's portfolio allocation to national equities.

3.1.6 The Cost of the Home Bias

The focus here is placed on the characteristics of the optimal portfolios of national investors constrained to investing in home equities and those of optimally diversified portfolios across Euroland. The diversification in Euroland can be achieved along two distinct lines: either across countries or across countries *and* sectors. We use the 10 sector disaggregation of Table 3.9 (see below). Tables 3.10 to 3.14 (see below) report the characteristics of the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP) of a European investor selecting freely (without short-selling constraints) among the 10 sector indices either in his home country (French and German perspectives) or in 10 Euroland countries. Here, we consider the pre-convergence and convergence periods as well.

Table 3.9 **Average correlations of ten industry groups within Euroland**

	BASIC	CYSER	CYCGD	GENIN	ITECH	NYCG	NYCSR	RESOR	TOTLF	UTILS
Pre Convergence Period										
Mean	0.197	0.2944	0.2046	0.2703	0.122	0.27	0.20875	0.1872	0.3707	0.2403
Median	0.159	0.2797	0.1687	0.2453	0.1449	0.2581	0.21266	0.1662	0.37901	0.2631
Maximum	0.536	0.5814	0.5783	0.5987	0.2213	0.5263	0.36925	0.5063	0.62549	0.4256
Minimum	-0.048	0.0763	0.0027	0.0352	-0.0479	0.081	-0.003	-0.002	0.06102	0.0388
Std. Dev.	0.157	0.1245	0.1486	0.121	0.0808	0.1079	0.11328	0.1057	0.15929	0.1093
Skewness	0.633	0.4142	0.973	0.4627	-1.0455	0.4416	-0.3622	0.9523	-0.0224	0.0453
Kurtosis	2.501	2.2264	3.2397	2.7709	3.1004	2.7591	1.933	4.3306	1.96855	2.4956
Convergence Period										
Mean	0.285	0.3359	0.297	0.4035	0.2908	0.3339	0.39883	0.2747	0.5457	0.1889
Median	0.184	0.3079	0.2645	0.4023	0.2446	0.3258	0.4123	0.3117	0.54873	0.161
Maximum	0.689	0.6244	0.6624	0.6726	0.4708	0.6403	0.57649	0.5797	0.77234	0.5034
Minimum	-0.06	0.1152	0.0689	0.1857	0.1275	0.0708	0.2467	0.0317	0.31699	0.0393
Std. Dev.	0.222	0.1395	0.1562	0.1256	0.1291	0.1374	0.09471	0.1655	0.10549	0.1284
Skewness	0.078	0.347	0.8001	0.0884	0.5009	0.2541	-0.0358	0.1048	-0.0953	1.162
Kurtosis	1.483	2.0187	2.9309	2.0654	1.7085	2.2009	1.91191	1.657	2.54756	3.5651

Note: The industry groups considered are: RESOR = resources, BASIC= basic industries, GENIN = general industrials, CYCGD = cyclical consumer goods, NCYCG = non-cyclical consumer goods, CYSER = cyclical services, NCYSR = non-cyclical services, UTILS = utilities, ITECH = information technology, TOTLF = financials. For each industry group, we compute the cross country correlation matrix of the returns and report the relevant statistics.

To provide relevant outputs, let $m_{s,T}$ denote the vector of expected returns for a chosen investment opportunity set 's' over a sample period T. 's' refers to country indices when one diversifies by country, to sector indices in the case of an asset allocation by sectors within a given country, or to sector indices when we consider diversification by country and by sector in Euroland. $\Omega_{s,T}$ is the variance-covariance matrix associated with the expected returns of the selected investment opportunity set. If $W_{s,T}^{MVP}$ and $W_{s,T}^{TP}$ are the vector of weights of the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP) respectively, then:

$$W_{s,T}^{MVP} = \frac{\Omega_{s,T}^{-1}\underline{1}}{\underline{1}'\Omega_{s,T}^{-1}\underline{1}}$$

$$W_{s,T}^{TP} = \frac{\Omega_{s,T}^{-1}m_{s,T}}{\underline{1}\Omega_{s,T}^{-1}m_{s,T}}$$

Here, $\underline{1}$ is a column vector of ones with the appropriate dimension. Given the portfolio weights $W_{s,T}$, one can then easily compute the expected return, $E(R_p)$, and variance, $V(R_p)$, as well as the Sharpe ratio of the MVP or TP:

$$E(R_p) = W_{s,T}^{'} m_{s,T}$$

$$V(R_p) = W_{s,T}^{'} \Omega_{s,T} W_{s,T}$$

$$Sharpe = \frac{E(R_p)}{\sqrt{V(R_p)}}$$

As is explicit from the computation of the optimal weights of the minimum variance and the tangent portfolios, we abstract from the existence of a riskless asset in our allocation problem. Also, short sales are permitted and the only constraint that we impose is that the portfolio be fully invested (sum of the weights equal to one: $\underline{1}' W_{s,T} - 1 = 0$).

As mentioned above, we provide portfolio characteristics by considering three leading diversification alternatives:

1. diversification by country within Euroland
2. diversification by sectors within a given country (France and Germany)
3. diversification by sectors across Euroland (focus on countries and sectors simultaneously)

For each of these strategies, we provide output for both the pre-convergence and convergence periods.

Table 3.10 **International diversification by country**

	MVP1	**MVP2**	**TP1**	**TP2**
Austria	-0.06933255	0.570661882	-0.62271807	-1.16619701
Belgium	0.308530748	0.470652149	-0.12049101	1.236503643
Finland	-0.00208894	-0.11074957	0.192321883	0.318590949
France	-0.08367694	-0.03404844	-0.11085488	0.154834482
Germany	0.068656228	0.083483691	0.143535964	-0.92480574
Ireland	-0.0321054	0.256168385	0.281323804	0.939672073
Italy	-0.01034946	-0.01726868	-0.2063736	-0.25492938
Netherlands	0.65309373	-0.27128428	1.463967615	0.327838054
Portugal	0.260021694	0.119516657	-0.00957495	-0.01655405
Spain	-0.09274911	-0.06713179	-0.01113675	0.385046983
$E(R_p)$	0.0663	0.10435	0.20462	0.545432
$V(R_p)$	0.408247	0.738017	1.259972	3.857566
Sharpe	0.103765272	0.12146727	0.18229201	0.277705148

Note: This table gives the weights of country indices in the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP). MVP1 and MVP2 stand for pre convergence and convergence Minimum Variance Portfolios respectively, while TP1 and TP2 are the corresponding Tangent Portfolios.

Table 3.11 **Diversification by industry: the German Case**

	MVP1	MVP2	TP1	TP2
Basic	0.037579682	0.062220805	0.528788734	0.045000088
Cyclical CG	-0.03401575	-0.0075316	-0.72729458	0.120363192
Cyclical Serv.	0.028285357	0.024787093	-0.12361212	0.095861844
General Ind.	-0.00740825	-0.08798103	-0.18703055	-0.29005986
Inform. Tech	-0.00647038	-0.0289989	0.371687999	0.071076729
Non-cyclical CG	-0.06471365	0.01297134	0.168466113	0.189494875
Non-cyclical serv.	0.21049095	0.255489085	0.396243799	0.177823157
Resources	0.097105103	0.070845689	-0.36753543	-0.27940601
Financials	-0.01234226	-0.05028437	-0.1778627	-0.042295
Utilities	0.751489187	0.748481884	1.11814874	0.912140978
$E(R_p)$	0.054796823	0.099563835	0.233041347	0.244106326
$V(R_p)$	0.370899277	0.394250433	1.577370059	0.966606252
Sharpe	0.089976146	0.158567992	0.185552233	0.248287145

Note: This table gives the weights of German sector indices in the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP) in an allocation by sector within Germany. MVP1 and MVP2 stand for pre convergence and convergence Minimum Variance Portfolios respectively, while TP1 and TP2 are the corresponding Tangent Portfolios.

Table 3.12 **Diversification by industry: the French case**

	MVP1	MVP2	TP1	TP2
Basic	0.36208588	0.332294768	0.259203949	0.183930167
Cyclical CG	0.0543102	-0.22635855	0.710216008	-0.44067269
Cyclical Serv.	0.112585812	0.605366994	-1.08417612	0.700872994
General Ind.	-0.08256922	-0.16604577	-0.38574462	-0.11781442
Non-cyclic. CG	0.170272377	0.114348042	1.006522077	0.475409974
Non-cycli. Serv.	0.202783421	0.078369438	0.48664666	0.011633146
Resources	0.118992511	0.12393848	-0.03512431	0.176207984
Financials	-0.0368079	0.01797704	-0.53585876	-0.02223691
Utilities	0.098346925	0.120109556	0.578315111	0.032669748
$E(R_p)$	0.108841419	0.189244698	0.434585734	0.286764745
$V(R_p)$	0.744838624	0.711841471	2.974017101	1.07866186
Sharpe	0.126113942	0.224301448	0.252001853	0.276110611

Note: This table gives the weights of French sector indices in the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP) in an allocation by sector within France. MVP1 and MVP2 stand for pre convergence and convergence Minimum Variance Portfolios respectively, while TP1 and TP2 are the corresponding Tangent Portfolios.

Table 3.13 **Euroland-wide diversification by sectors**

	MVP1	**MVP2**	**TP1**	**TP2**
$E(R_p)$	0.072706294	0.070393514	0.892045234	0.967017345
$V(R_p)$	0.104725897	0.115190696	1.284898912	1.58241002
Sharpe	0.224669937	0.207407255	0.786959526	0.768731632

Note: This table gives the weights of sector indices in the Minimum Variance Portfolio (MVP) and the Tangent Portfolio (TP) in an allocation by country and sector. MVP1 and MVP2 stand for pre convergence and convergence Minimum Variance Portfolios respectively, while TP1 and TP2 are the corresponding Tangent Portfolios. The industry groups considered in each Euroland country are : RESOR = resources (8 indices), BASIC= basic industries(10 indices), GENIN = general industrials(10 indices), CYCGD = cyclical consumer goods(7 indices), NCYCG = non-cyclical consumer goods(10 indices), CYSER = cyclical services(10 indices), NCYSR = non-cyclical services(8 indices), UTILS = utilities(6 indices), ITECH = information technology(5 indices), TOTLF = financials(10 indices). In principle, if each industry group is available in each of the participating countries, then we should have a total of 11 x 10 = 110 investable indices. However, some sectors are not available in some countries so that the number of investable indices is reduced to 84.

Table 3.14 **Consensus Economics optimal portfolio weights**

a) Returns in DMK

	MVP1	MVP2	TP1	TP2
Austria	0.3717	NA	-0.124	NA
Belgium	0.1764	0.66452	0.1876	2.15722217
Germam	0.31076	0.01197	0.1594	-1.947099
Spain	0.03135	-0.0725	0.0873	0.42383197
Finland	-0.03522	-0.215	-0.0309	1.03349291
France	0.00514	0.65668	-0.1584	1.11786848
Ireland	0.2526	0.43514	0.5102	0.45547633
Italy	-0.04078	-0.073	-0.0466	0.23830925
Netherlands	-0.27758	-0.4987	0.1122	-2.6569123
Portugal	0.20563	0.09096	0.3032	0.17781023
E(Rp)	0.28975	0.2343	0.436	1.0926901
V(Rp)	0.34502	1.89031	0.5192	8.81558653
Sharpe	0.4933	0.17042	0.6051	0.36801998

b) Returns in FRF

	MVP1	MVP2	TP1	TP2
Austria	0.35174	NA	-0.1892	NA
Belgium	0.1632	0.60309	0.1754	2.01706698
German	0.22646	-0.0321	0.0613	-2.7362388
Spain	0.0526	-0.0433	0.1137	0.52227575
Finland	-0.06069	-0.2099	-0.056	1.17994922
France	0.07425	0.70293	-0.1042	1.87293984
Ireland	0.27259	0.4618	0.5537	0.49829915
Italy	-0.02441	-0.1154	-0.0308	0.02642717
Netherlands	-0.23966	-0.4583	0.1857	-2.5982244
Portugal	0.18391	0.09117	0.2904	0.2175051
E(Rp)	0.28088	0.23245	0.4405	1.2162967
V(Rp)	0.36496	1.93997	0.5724	10.1510126
Sharpe	0.46494	0.16689	0.5823	0.3817551

While our results have to be taken with a grain of salt because no short selling restriction is imposed (with the result that in some instances, the considered portfolios would have included unusually large short positions), the results of the strategy consisting of diversifying by sectors across all of Euroland are impressively superior (both in terms of the Sharpe ratios and risk of the MVP). Such a strategy would also have permitted a minimal loss of performance between the pre-convergence and the convergence periods despite the increase in correlation of returns noted above.

The home bias – leading to a strategy of diversifying 'at home' across industry would have been very costly in terms of both measures of performance, but so is the pure country allocation strategy across Euroland. On the other hand, limiting one's investment horizon to the home country would have entailed a minimal loss of performance for either the French or the German investors (the two types of investors considered) if the alternative is a pure country allocation strategy. To put it differently, if the international investment alternative is based on a pure country allocation, the 'home bias' is not very costly in terms of performance (Sharpe ratio) or in terms of risk (for the investor interested in the minimum variance portfolio). In fact, for the French investor, a 'home biased' portfolio would have outperformed the international 'country allocation' strategy during the 'pre-convergence' period.

These results underline the sub-optimality of the traditional two-step allocation procedures consisting in first allocating to countries, and then, operating a 'value oriented' stock selection within each country. They also suggest that this frequent practice of the investment advisory industry may have a causal relationship with the home bias.

The arguments made above on the cost of the home bias and its implication for optimal portfolio allocation are further reinforced by restricting the analysis to the Consensus Economics sub-periods and using the DMK and FRF as numeraire currencies. As the results in Table 3.14 (see above) indicate, the convergence period performance ratios are lower, irrespective of the type of portfolio and the currency of reference. Again, the valid

alternative portfolio allocation strategy in the post convergence era seems to be the one focusing on sectors and countries simultaneously.

3.1.7 What Do Our Results Suggest as to the Impact of EMU on the Underlying Economic Structures?

It is helpful at this stage to conceptualise the environment in which the individual investor operates. Variations in firm profitability as reflected in country-wide stock indices result from the interaction of shocks affecting economies, economic structures themselves and their evolution through time, and macro-economic policies. To see this interaction, one may start by wondering whether the nature of shocks affecting economic agents is affected by the economic integration process. Let us think of supply shocks first. It is unlikely that the process of economic and monetary integration would result into an increase in the commonness of supply shocks. It may however affect the structure of national economies in a way that technology disturbances will increasingly show up at the country level. This is the case if economic integration increases the degree of specialization of national economies. At the limit in a one-sector economy, sectoral shock and economy-wide shocks fully coincide. If, however, EMU is accompanied with a higher degree of diversification in national economic structures, supply shocks will become less important at the macroeconomic level in the sense that either they wash out (if the number of sectors is large enough and under the plausible assumption that sectoral shocks are little correlated) or they show up as EU-wide risk factor if all the national EMU economies represent the same portfolio of economic sectors.

Thinking of demand shocks now, it is clear that policy shocks within EMU – be they associated with monetary policy (interest rate shocks, foreign exchange shocks) or fiscal policy are fully or increasingly common in nature. If one believes in the importance of animal spirits, it can similarly be argued that the impact of EMU, if any, must be to make European consumers and investors more alike and subject to the same sort of psychological factors. Finally, demand shocks associated with foreign demand are bound to get more similar under a common currency, besides being influenced by the same structural factors as those discussed above (more common if economies are getting to be more diversified and thus more alike, less so if specialisation is increasing).

In a sense, the above discussion illustrating the interactions between shocks, policies and structures suggests the possibility of two polar outcomes from the process of economic and monetary integration. In the unfavourable case, European economies are getting more specialised, foreign demand shocks translate more and more into differential country shocks calling for differentiated stabilisation policies (at variance with the constraints of a monetary union). The other polar case is one where economic structures become more diversified, countries represent better diversified and also more homogenous portfolios of sectors and common macroeconomic policies are increasingly appropriate.

Our results seem to clearly support the latter interpretation of what has been and is currently happening within Euroland. They appear to accord with a large portion of the recent macro literature. Fatas (1997), among others, looks at the correlation between employment growth rates and finds that European countries represent increasingly better diversified portfolios of regions. Imbs (1999) also finds that developed, increasingly service related economies are getting more and more alike.

3.2 A Model of Optimal Asset Allocation with EMU and Foreign Assets

The approach of the previous section focuses on the impact of EMU on the economic structures and on the resulting correlation of returns. We now approach the problem from a different angle, assuming structures are not changing and focusing on the specific impact of the disappearance of currency risk. We continue to work with the same theoretical model provided by Modern Portfolio Theory reiterating the many practical limitations that might prevent the investor from acting in accordance to the theoretical predictions, in particular, the home bias abundantly documented in Section 2.1. Of course, since currency risk is one of the explanations offered in

support of the home bias and since currency risk has disappeared in Euroland as a result of EMU, one may expect both a decrease in the extent of the home bias and an effect on optimal asset allocation for both euro area and foreign investors.

This section provides a provisional (and rough) initial quantitative estimate of the likely impact of the introduction of EMU based on **long-run considerations** of the main factors affecting asset allocation. It does so by focusing not only on assets in Euroland, but also by introducing foreign risky and riskless assets. This is critical to have a broader view on the three main areas of portfolio reallocation.

The main impact of EMU will be *ceteris paribus* a lower risk-free rate for some euro area countries due to greater competition in Treasury bill prices, lower risk for the whole portfolio due to the removal of exchange risk for all euro area holders of euro-denominated assets and greater market liquidity (Section 2.4). Investors may, of course, choose to hold a portfolio with the same risk as before, and take the benefits from EMU by raising their required return. There will also be an impact on the composition of portfolios as changes in the return-risk characteristics of individual classes of assets will cause a re-balancing of portfolios. This is the aspect most difficult to be precise about.

Although the aim will be to try to isolate the effect on asset allocation of the removal of currency risk within the euro area, currency risk is only one aspect of asset pricing and hence asset allocation. More generally, asset allocation is affected by other characteristics. The prices of bonds over the term structure will still be affected by the usual factors such as expected future inflation, default risk and other features. Equity and corporate debt will still retain their domestic risk features, and investors will still be faced with currency risk when they hold other international assets. Moreover, the prices of euro-denominated assets and the cost of issuing euro-denominated government and corporate bonds will be affected by foreign demand. Thus all of the standard problems will remain and will affect the answer.

A first step is to consider how one might choose an optimal allocation of assets. In an ideal world, one would like to achieve an optimum asset allocation that takes account of all assets and sources of risk, and is continuously re-balanced to retain the required optimality characteristics. Only in this way could one give a full explanation of the effects of the euro on portfolio holding. In practice, this is impossible; current best practice techniques do not allow us to get even close to this. The correct theoretical models to use are still a matter of dispute, there are enormous data requirements, and the size and complexity of the computational burden limits the number of assets that one can handle. There is also insufficient data yet to be able to carry out meaningful estimation of asset pricing models since the introduction of EMU. The methodology chosen is therefore to construct a theoretical model and to calibrate this for individual euro area countries. The model is then used to compute the effect of EMU.

3.2.1 The Asset Allocation Model

The asset allocation model used in this study is the MPT model used in the previous section. One assumption is that that investors are looking one-period ahead. The model is based on the mean and covariance matrix of asset returns, and can be implemented using estimates of the historical unconditional moments of asset returns, or estimates of the conditional means and covariance matrix. Here, versions of both approaches are considered. The situation prior to EMU is considered first, followed by the case after EMU.

The general problem is very complicated. A number of simplifying assumptions are made to allow tractability. A step-by-step discussion of our approach and of the underlying theory is presented in the appendix to this section. First, it is assumed initially that the monetary union consists of only two countries: Germany and each of the other EU Member States in turn (i.e. a ‘small’ EU country). We consider, in turn, one of the following countries: Belgium, France, Ireland, Italy, The Netherlands, Spain and the UK. The choice of EU Member States was

restricted by the availability of data. The UK is not, of course, a member of EMU, and is included for comparative purposes. This implies that investors in the small EU country only hold their own country's assets and those of Germany. There is also a third country, not in the monetary union, but whose assets are also held by domestic investors, namely, the United States.

Second, it is assumed that foreign exchange risk affects all of the assets of the foreign country in the same way whether, for example, they are government bonds or the equity of the foreign country. It is further assumed that currency risk is additive. The data are quarterly for the 5-year period 1994-8, inclusive. The risk-free is the 3-month euro-rate, the bond is a representative 10-year, zero-coupon, government bond and equity is the return on the stock market assuming that dividends are re-invested.

We further assume that prior to EMU, each country issues a risk-free asset and two risky assets: a long bond and equity, and that investors in each country hold all three domestic assets, plus the risk-free asset and the equity of the two foreign countries. This makes a total of seven assets. After EMU, it is assumed that there are six assets, since there will be only one risk-free asset among the two EMU countries. Finally, we postulate that short sales are not permitted.

3.2.2 Results and Discussion

The average annualised returns and the standard deviation of these asset returns (in domestic currency terms) and of the exchange rate change against the deutsche-mark and the US dollar are reported for each country in Table 3.15. This table shows that average equity returns, measured in domestic currency, are much larger than either bond or euro-rate returns and have much greater volatility. The average returns for French and UK equities are about half those of the other countries, while the standard deviations of UK and US equity are much smaller. This implies that US equity has been a very attractive asset with relatively high returns and low volatility. The main problem for non-US investors is that the volatility of US equity returns, when measured in domestic currency instead of dollars, becomes comparable to the volatility of domestic equity. In contrast, average exchange rate movements over this period against the dollar have not been large enough to have much effect on average US equity returns.

Turning to the likely consequences for the introduction of EMU, we note that before EMU on average there has been little change in the exchange rate against the DM, and for Belgium, France, and especially the Netherlands, their exchange rates against the DM show low volatility. If we also recall that the average return on German equity has been either about the same or lower than the returns on domestic equity, then the incentive to hold German equity is not high. This would suggest that the introduction of EMU may not have much effect on asset allocation.

As the optimal asset allocation is sensitive to the choice of the coefficient of relative risk aversion a, and this is an unknown (even hypothetical) parameter, the results are reported for different values. Table 3.16 shows that the optimal allocation differs across countries, differs before and after EMU and is strongly affected by the choice of a. As a increases, (i.e. as investor's aversion to risk increases) asset allocation shifts in favour of less risky assets, in particular, from domestic equity to domestic bonds. This change is very abrupt between $a = 4$ and $a = 10$.

It is optimal for most countries to hold domestic equity, but the share decreases as a increases. As anticipated from the data on returns, it is also optimal for most countries to have a substantial holding in US but not in German equity. The exceptions are the French and UK investors, both of whom have much lower domestic equity returns over this period. It is optimal for these two countries to hold German equity. Neither before nor after EMU is it optimal for investors in any country to hold the German or US risk-free asset (in domestic

currency terms) due to the foreign exchange risk. Nor are bond holdings greatly affected by the advent of the EMU; the degree of risk aversion is the main factor affecting bond holdings.

A number of strong assumptions have had to be made in order to carry out this analysis. These limit the generality of the results. It may be that the lack of any substantial effect on asset allocation as a result of introducing EMU is due to the choice of Germany as the representative EU country over which asset allocation can take place. Since a substantial proportion of the optimal portfolio should be allocated to equity, but German equity returns are lower than those of most other countries, extending the choice of assets to include the equity of other EMU countries may produce a different effect. For example, Dutch equity offers roughly a 50% increase in average return over German equity with almost no difference in volatility, and the NLG/DMK exchange rate has been almost constant. It would be more logical, therefore to diversify in the Netherlands rather than German equity. To examine whether this is likely to affect the results, this calculation is carried for the case of $a = 10$. In the earlier results, this choice of a entailed a considerable diversification of asset holding to less risky assets, including domestic bonds. These results are reported in Table 3.17 (see below).

As anticipated, one of the main changes from the previous results is that the Netherlands equity takes a large allocation both before and after EMU. There is, however, no consistent pattern across countries of whether the Netherlands equity is more attractive after EMU than before. For some countries such as Belgium, Italy and Spain it is, but for Ireland or the UK it is not. Nor, for most countries, are bond holdings much affected by EMU. Exceptions are Spain and the UK which, optimally, should make a substantial increase in their holding of the EMU bond.

The attempt made in this subsection to capture the implications of the introduction of the single currency in terms of portfolio reallocation with an international dimension and various asset classes has produced only limited results. Not much can be said about how investors outside the euro area (i.e., US investor) will be handling the currency risk concentration inherent to the disappearance of 10 currencies and their replacement by one single currency. Nor does the analysis give us guidance on how Euroland investors would be transacting in fixed income securities versus equity or domestic assets versus foreign assets. There are a few reasons for these results. It may very well be the case that the disappearance of currency risk in itself is probably not a major event for investors. However, the simplified version of the conditional model could only use a limited number of assets to circumvent the dimensionality problem and the sectoral allocation potential that has been identified in Section 3.1 could not be handled in this setting. Indeed, the country index returns that are used may not be a good representation of the investment opportunities in the countries under consideration. The exercise is however useful in pointing to the directions that need to be explored in future empirical research.

Putting together what we have learned from the two set of exercises carried out in this section, we are tempted to conclude that, as far as asset returns are concerned, the importance of EMU is likely to come to a greater extent from the evolving economic structures that affect return correlations than from the mechanical effect associated with the disappearance of currency risk. This conclusion would confirm the prognosis of those who have proclaimed that the euro would be only a minor event for investors while also asserting that currency risk is not the explanation for the home bias. Notwithstanding the theoretical debate, our first asset allocation exercise strongly suggests that the cost of the home bias will remain high and may even increase, that the traditional country allocation model should be scrapped and that appropriate diversification should proceed along sectoral as well as geographic lines. These are non-trivial consequences of the changing world of European investors.

Table 3.15 **Mean and standard deviation of annualised returns and exchange rate changes (%)**

	Mean					Standard Deviation				
	risk free	bond	equity	DM	$	risk free	bond	equity	DM	$
Belgium	4	6.1	16.3	-1	-0.9	1	1.2	26.8	3.5	16.1
France	4.6	6.1	9.5	-0.6	-0.9	1.3	1.1	32.2	3.4	16.2
Ireland	5.8	6.8	18.1	-0.8	-1	0.5	1.3	29.8	10.1	14.6
Italy	7.6	8.4	16.4	0.3	-0.1	1.9	2.4	42.8	19.8	13.2
Netherlands	3.8	5.8	18.3	0.1	-0.2	0.8	0.9	30.2	0.6	16.3
Spain	6.7	7.5	19	-0.9	-0.7	1.8	2.4	35.7	6	15
UK	7.1	6.3	8.5	-0.8	-2.3	1.1	0.7	17.6	16.9	11.4
Germany	3.9		11.8		-0.6	0.8		28.9		17
US	5.3		15.2	0.6		0.6		17.4	17	

Table 3.16 **Optimal asset allocation before and after EMU based on quarterly returns for 1994-8**

	Before EMU						After EMU				
CRRA	dom.	dom.	German	German	US	US	EMU	dom.	German	US	US
α	bond	equity	risk free	equity	risk free	Equity	bond	equity	equity	risk free	equity
Belgium											
2	0%	94%	0%	0%	0%	6%	0%	86%	0%	0%	14%
4	0%	75%	0%	0%	0%	25%	0%	72%	0%	0%	28%
10	29%	47%	0%	0%	0%	24%	26%	48%	0%	0%	25%
France											
2	0%	0%	0%	0%	0%	100%	0%	0%	7%	0%	93%
4	0%	0%	0%	26%	0%	74%	0%	0%	30%	0%	70%
10	51%	0%	0%	15%	0%	36%	50%	0%	17%	0%	32%
Ireland											
2	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%
4	0%	82%	0%	0%	0%	18%	0%	81%	0%	0%	19%
10	36%	44%	0%	0%	0%	20%	37%	44%	0%	0%	19%
Italy											
2	0%	34%	0%	0%	0%	66%	0%	46%	0%	0%	54%
4	0%	28%	0%	0%	0%	72%	4%	36%	2%	0%	58%
10	53%	13%	0%	0%	0%	34%	60%	15%	1%	0%	23%
Netherlands											
2	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%
4	0%	79%	0%	0%	0%	21%	0%	81%	0%	0%	19%
10	32%	44%	0%	0%	0%	23%	31%	47%	0%	0%	22%
Spain											
2	0%	94%	0%	0%	0%	6%	0%	86%	0%	0%	14%
4	0%	75%	0%	0%	0%	25%	0%	72%	0%	0%	28%
10	29%	47%	0%	0%	0%	24%	26%	48%	0%	0%	25%
UK											
2	0%	0%	0%	9%	0%	91%	0%	0%	7%	0%	93%
4	0%	0%	0%	30%	0%	70%	0%	0%	30%	0%	70%
10	0%	0%	0%	23%	0%	40%	51%	0%	17%	0%	32%

Table 3.17 **Optimal asset allocation before and after EMU based on quarterly returns for 1994-8 (**a **=10)**

	Before EMU						After EMU				
	dom. bond	dom. equity	German risk-free	NL equity	US risk-free	US equity	EMU bond	dom. equity	NL equity	US risk-free	US equity
Belgium	21%	38%	0%	28%	0%	13%	15%	35%	34%	0%	17%
France	33%	0%	0%	46%	0%	21%	33%	0%	46%	0%	21%
Ireland	16%	31%	0%	42%	0%	11%	23%	33%	32%	0%	11%
Italy	42%	10%	0%	26%	0%	22%	44%	80%	35%	0%	13%
Spain	0%	21%	0%	18%	0%	61%	37%	21%	32%	0%	10%
UK	0%	0%	0%	67%	0%	27%	34%	0%	45%	0%	21%

4. Conclusions and Policy Recommendations

Development in financial markets is an ongoing process that is fostered in part by competition. In European financial markets, the pressures are stemming from several sources: new technologies (computing and telecommunications), repackaging information (i.e. securitization through Pfandbriefe), the demand for pension reform (demographic change), and changing regulations. The euro, which is the focus of this report, is providing further stimulus. The elimination of currency risk potentially creates a level playing field in that funding costs are becoming more transparent. This enhances competition within the financial industry and introduces new investment strategies.

4.1 Portfolio Allocation under a New Landscape

As a result of these global trends and EMU, the greatest changes are predicted to take place in the European corporate bond market. The search for higher yields by investors, greater expertise in analysing credit risks by institutional investors, and reduced issuance by European governments have combined to spur growth in the European corporate bond market. The European corporate bond market outpaced the American and the British markets, which also enjoyed growth of over 35%, for the first nine months of 1999. The average credit rating of European issues fell, reflecting the fact that the European market is gaining greater depth. All of this occurred against the backdrop of weaker than anticipated economic growth in Europe and the Russian crisis, which produced a flight to quality.

Although our analysis of the European corporate bond market was largely descriptive, several implications for portfolio management emerge. Despite enjoying strong growth in the euro market, corporate bond issuance grew unevenly among the European sectors and the EMU countries. Growth came primarily from large companies in the telecommunications sector. Moreover, the benefits of the European corporate bond market are only appearing in the larger EMU countries: France, Germany, Italy and Spain. Given the concentration of the European bond market among a few sectors, diversification in this market is limited at best. Hence, an investor is exposed to sectoral risk which cannot be diversified away in the corporate bond market.

The euro may entail significant portfolio readjustments, or it may not. Our analysis of optimal portfolio allocation strategies before and after EMU – taking into account the possibility to invest within and outside Europe (the US, Germany, the UK, Spain and the Netherlands) in several broad asset classes – suggests the disappearance of currency risk in itself is probably not a major event for investors. That is, our results suggest little change in the optimal portfolio allocation between now and five years previously.

When we looked at the problem from a slightly different angle, however, we discovered that the changes in the correlation structures of equity returns following the process of economic and monetary integration are more significant. It is noted that monetary and economic integration has been associated with increased correlations between countries on the one hand and between sectors on the other hand. The increase in sectoral correlations, however, is less pronounced than the increase in country correlations. The practical implications of this finding are investigated under the three investment strategies. Based on equity correlations, the results indicate that the European sectoral investment strategy dominates the other two. This outcome implies that under EMU sectoral risk dominates country risk and that no European country offers enough sectoral breadth such that it is not

worthwhile to invest in another EMU country. These results put in question, more than ever before, the common practice of the investment industry of allocating portfolios along geographical or country lines. The often-discussed impulse given by the euro in favour of portfolio allocations proceeding along sectoral lines thus appears warranted, provided, however, the benefit of geographical diversification is not forgotten in the process. We confirm the superiority of a full diversification approach proceeding along both countries and sectors.

The impact of the euro on optimal portfolio strategies is probably less important, and certainly has fewer policy implications, than its contribution to the fall in the effective and psychological obstacles to international diversification within the euro area. Some barriers to international investing within the area fell mechanically with the advent of a single currency; the decrease of other costs may, more indirectly, accompany its emergence. Thus currency risk may be more relevant when considering the gap between optimal and actual investment practices, i.e. the home bias in particular, than because of its impact on optimal practices.

On this front, we observe that significant room remains for the direct and indirect costs of international investing within the euro area to reach the level attained when investment is purely domestic. There was clear segmentation on national lines within Europe in the period immediately before EMU, some of it due to informational obstacles and asymmetries. The obstacles to cross-border investment are still substantial in the European monetary area. These obstacles hinder the emergence of truly European capital markets and thus generate further barriers to international diversification in the form of under-developed and less liquid markets. The broad issue of the costs of cross-border investment and the related issue of the size and depth of European capital markets is of importance when comparing the cost of capital for European firms with the financing opportunities open to their main competitors or when observing that the full benefits of the euro are not yet within reach for the average European portfolio investor. These are legitimate sources of concern for policy-makers and they occupy the bulk of our policy recommendations.

4.2 Policy Recommendations

The euro was meant to launch a new era of cross border financial trading and to end the maze of trading technologies that characterise Europe's financial markets. Europe has 15 stock exchanges, more than 20 derivatives markets and no national centre for bond trading. Fragmented markets are costly to investors that seek pan-European assets. Consolidation would bring benefits to consumers in the form of better and more diverse financial services, more liquid markets, and lower transactions costs. Despite this vision, the prospects for pan-European securities markets with centralized settlement have yet to emerge. Although the structure of European markets is changing rapidly in light of demutualization, mergers of exchanges with EU Member States, and various links between national exchanges, it nevertheless appears unlikely that pan-European markets will evolve quickly. There are several obstacles that impede the transition.

The first barrier in creating pan-European securities markets is the lack of centralized settlement systems. For the most part this is a technical problem and it is assumed that the associated difficulties are straightforward to resolve. Although there are several models for a centralized settlement system, the project lacks consensus. The issues involve incompatible domestic systems or differences in trading platforms across exchanges. In many cases the technical problems can be resolved through linkages and mergers. In other cases, where linked systems are constrained by weak or obsolete technology, new investment will be required.

If a centralized settlement system is agreed to be an important milestone for integrated securities markets, a tougher attitude by a European authority is required. In the past, this function was performed by the central bank. It offered guidance and moral suasion in deriving a market-based solution, or it participated directly in forging the desired outcome. At the European level, however, a vacuum exists because the European Central Bank does not have the legal mandate to seek a solution on this issue nor has it until now expressed any clear willingness to offer leadership out of this quagmire.

The second set of barriers is policy related and is more difficult to overcome because many of the impediments to converging markets serve to protect domestic markets. One further area where more action needs to be taken is to harmonise the costs of cross-border investment. These frictions, discussed at length in section 2, are difficult to tabulate and to compare directly, but it is clear that they create distortions. Differences in tax regimes, in accounting standards, and in regulatory frameworks heighten legal uncertainties about cross-border transactions. In several European countries, legal restrictions hinder pension funds from taking on a more diversified portfolio. Although there have been some efforts to foster harmonization (i.e. the EU's Investment Services Directive and the Financial Services Action Plan of the European Commission), in general progress is slow. The reluctance of domestic authorities to create a level playing field reflects in part the political dimension, since these obstacles serve to protect domestic institutions and markets from outside competition.

A further area where policy-makers could undertake greater initiative in fostering integrated bond markets is in harmonising the issuance calendar and maturity of government bonds. The intention is to make European government bonds as substitutable as possible. European governments are currently doing the opposite and are essentially pursuing a non co-operative solution. Such a strategy heightens competition among European governments in their attempt to attract capital from outside the euro-area. The positive aspect of this strategy is that it allows governments to achieve a debt structure that satisfies national borrowing needs. However, the co-operative solution would 'reopen' each government's issues by matching each other's coupons, maturity structure, instrument and cash flow. This policy of stable and predictable issuances would improve liquidity and possibly interest rate savings, at least for the issues that are perceived as perfect substitutes. Such a development could help reduce the liquidity premium that smaller EMU member countries are currently paying. As the correlation increases among European government bonds, the rationale for having different futures contracts corresponding to different national issuers disappears. The emergence of a single futures contract would be an important step towards an integrated European government bond market.

The structural changes in securities markets also have implications for European policy-makers. The regulatory framework needs to encompass innovations in cross-border transactions, to foster competition between all types of standards, and to enhance co-operation between national regulators. On the one hand European regulators should pursue a hands-off policy by allowing markets to evolve quickly in response to new technological advances. There is the expressed concern on the part of some providers and users of information services that regulators are not abreast with the latest technology and its complexities. As a consequence there is the fear that regulators may stymie innovative change if an activist policy is taken. On the other hand European regulators need to establish a new harmonized code on norms, rules and procedures to ensure stable competitive markets for the profit-oriented exchanges. Until now, most exchanges are self-regulated in that the listed companies through club membership or shares hold a vested interest in maintaining a well functioning exchange. Such a self-regulatory mechanism is not implicit under demutualised exchanges.

It should be finally mentioned that European policy-makers have undertaken a range of initiatives that have encouraged cross-border investment and underpinned the development of more sophisticated financial markets. One prominent example has been the consolidation of national fiscal budgets and the privatisation of the telecommunications industry. On the one hand the fiscal framework has paved new ground for an improved investment environment. On the other hand it gave the European corporate bond market a much-needed boost. While these efforts should be acknowledged, it should also be emphasized that such policies should be continued if the efficiency gains expected from the euro are to be fully realised.

Appendices

Appendix to Section 3.1

Table 3A Unconditional pre- and convergence periods summary statistics

a) Pre-convergence summary statistics

	Austria	Belgium	Finland	France	Germany	Ireland	Italy	Luxem.	Neths.	Portugal	Spain
Mean	-0.0401	0.0319	0.1191	0.0557	0.0301	0.10346	0.006	0.2121	0.0924	0.0161	0.05
Median	-0.0705	0.0724	-0.008	0.1291	0.0554	-0.0749	-0.104	0.1084	0.0991	0	-0.0175
Maximum	5.5086	2.5657	6.7605	4.457	4.9172	5.39144	5.084	3.3797	2.3794	2.8432	4.7624
Minimum	-7.2925	-3.4116	-6.46	-4.177	-4.5389	-4.4701	-4.879	-1.957	-2.039	-5.291	-4.5158
Std. Dev.	1.3618	0.8583	1.8083	1.19	1.0778	1.30524	1.734	0.8985	0.7593	1.0455	1.4388
Skewness	-0.2504	-0.1002	0.4039	0.0657	-0.1896	0.55686	0.149	0.7486	0.067	-0.431	-0.0371
Kurtosis	7.648	4.0832	4.1495	3.864	6.1948	4.93809	3.1	4.1553	2.9708	5.8544	4.0929
Jarque-Bera	204.89	11.377	18.506	7.1605	97.038	46.8431	0.926	23.097	0.1763	83.352	11.248
Probability	0	0.0034	1E-04	0.0279	0	0	0.629	1E-05	0.9156	0	0.0036
Observation	225	225	225	225	225	225	225	155	225	225	225

b) Convergence period summary statistics

Mean	0.0448	0.2183	0.3246	0.192	0.1766	0.25467	0.203	0.1783	0.2323	0.1842	0.2523
Median	0.1237	0.3023	0.3181	0.2492	0.2368	0.26826	0.145	0.2323	0.2456	0.1149	0.3044
Maximum	3.4464	3.8328	5.8755	3.9867	2.7848	3.93614	5.169	6.3828	3.656	5.0664	6.3164
Minimum	-3.6196	-5.6564	-8.184	-5.53	-6.5061	-5.9338	-7.438	-5.244	-7.109	-6.502	-5.6296
Std. Dev.	1.0295	1.1174	1.9772	1.3583	1.2891	1.27147	1.801	0.9551	1.395	1.3797	1.5688
Skewness	-0.3505	-0.657	-0.994	-0.696	-1.0512	-0.9153	-0.426	0.2961	-1.007	-0.312	-0.3442
Kurtosis	4.3426	6.7352	6.4728	4.9877	6.4779	8.06502	4.802	14.553	8.0789	6.762	5.2008
Jarque-Bera	21.505	146.98	150.15	55.225	154.83	271.93	37.23	1254.5	279.89	136.33	49.852
Probability	2E-05	0	0	0	0	0	0	0	0	0	0
Observation	225	225	225	225	225	225	225	225	225	225	225

Note: This table gives the unconditional summary statistics of the first sub-sample (pre convergence period) of the Euro-land index returns (in Euro). The sub-sample runs from 10 September 1990 to 26 December 1994 and observations are sampled weekly. Returns are continuously compounded and annualized.

Table 3B Pre and Convergence Period Correlation Matrices

a) Pre-convergence correlation matrix

Austria	1										
Belgium	0.493	1									
Finland	0.252	0.342	1								
France	0.400	0.424	0.3323	1							
Germany	0.499	0.491	0.2569	0.6219	1						
Ireland	0.357	0.44	0.2601	0.3603	0.324	1					
Italy	0.218	0.213	0.2456	0.3543	0.4228	0.1539	1				
Luxemb.	0.287	0.307	0.1361	0.1731	0.3087	0.3196	0.0593	1			
Netherl.	0.499	0.562	0.3291	0.6522	0.6305	0.4895	0.4102	0.332	1		
Portugal	0.171	0.257	0.0763	0.2643	0.2414	0.2451	0.1052	0.091	0.2254	1	
Spain	0.371	0.413	0.2237	0.5388	0.5076	0.2975	0.3692	0.178	0.5388	0.271	1

b) Convergence period correlation matrix

Austria	1										
Belgium	0.577	1									
Finland	0.542	0.591	1								
France	0.635	0.745	0.6308	1							
Germany	0.632	0.759	0.6835	0.8069	1						
Ireland	0.483	0.509	0.5417	0.5271	0.6162	1					
Italy	0.479	0.631	0.5551	0.6886	0.6397	0.437	1				
Luxemb.	0.445	0.438	0.3303	0.4218	0.4388	0.3863	0.3604	1			
Netherl.	0.666	0.784	0.6819	0.7931	0.8512	0.602	0.6481	0.497	1		
Portugal	0.47	0.624	0.4961	0.6249	0.6375	0.4864	0.5504	0.337	0.6316	1	
Spain	0.561	0.683	0.5946	0.7097	0.7569	0.5356	0.7006	0.368	0.75	0.616	1

Note: This table gives the unconditional correlations of the pre- and convergence periods of the Euro-land index returns (in Euro).

Table 3C Unconditional correlations of other regions of the World

a) Pre-convergence correlations

AMERICAS	1						
ASIA	0.1676907	1					
AUSTRALASIA	0.3420364	0.304517	1				
EEC	0.4502127	0.489253	0.3411	1			
FAR_EAST01	0.1626266	0.9985	0.295	0.47406	1		
NON_EEC01	0.3653845	0.378988	0.2942	0.73584	0.36538	1	
PACIFIC_BASIN01	0.1784735	0.999236	0.3265	0.49204	0.99842	0.38137	1

b) Convergence period correlation

AMERICAS	1						
ASIA	0.340735	1					
AUSTRALASIA	0.53693	0.581872	1				
EEC	0.609744	0.520372	0.5587	1			
FAR_EAST01	0.314605	0.992436	0.5446	0.49291	1		
NON_EEC01	0.48334	0.510832	0.4704	0.84359	0.48922	1	
PACIFIC_BASIN01	0.358277	0.998625	0.6164	0.53208	0.99059	0.51753	1

Table 3D Unconditional correlations (returns in DMK)

a) Pre-convergence period

Austria	1										
Belgium	0.53660	1									
Germany	0.42548	0.61400	1								
Spain	0.34662	0.53700	0.51013	1							
Finland	0.22558	0.43324	0.32515	0.44608	1						
France	0.44165	0.64169	0.64824	0.58506	0.44458	1					
Ireland	0.56784	0.56479	0.39787	0.32783	0.47566	0.5190	1				
Italy	0.13218	0.27485	0.48755	0.39328	0.32058	0.3401	0.1178	1			
Luxem.	0.51173	0.44318	0.15807	0.08708	0.21185	0.2583	0.4833	-0.131	1		
Neths.	0.55339	0.66233	0.68473	0.60430	0.53363	0.6626	0.6735	0.38571	0.3956	1	
Portugal	0.32355	0.32783	0.27588	0.36832	0.36315	0.3865	0.3571	0.35229	0.0611	0.3088	1

b) Convergence period

Austria	1										
Belgium	0.54415	1									
Finland	0.61771	0.76077	1								
France	0.53261	0.67593	0.75791	1							
Germany	0.57565	0.58523	0.71716	0.62506	1						
Ireland	0.59345	0.71413	0.79854	0.71750	0.63393	1					
Italy	0.54165	0.50692	0.61905	0.55238	0.58875	0.5897	1				
Luxemb.	0.40944	0.58876	0.61559	0.68786	0.55865	0.6715	0.4939	1			
Netherl.	0.45167	0.49397	0.47167	0.42956	0.38286	0.4831	0.4794	0.38157	1		
Portugal	0.65913	0.76101	0.84972	0.73301	0.71369	0.7806	0.664	0.59127	0.5045	1	
Spain	0.50001	0.63002	0.68002	0.64024	0.51435	0.6612	0.4643	0.55410	0.4351	0.6640	1

Table 3E Unconditional correlations (returns in FRF)

a) Pre-convergence period

Austria	1										
Belgium	0.544759	1									
Finland	0.447629	0.6481	1								
France	0.320727	0.50972	0.49896	1							
Germany	0.212673	0.42360	0.32802	0.43437	1						
Ireland	0.407621	0.61340	0.64224	0.56586	0.43029	1					
Italy	0.571723	0.57090	0.41642	0.31698	0.47287	0.5115	1				
Luxemb.	0.111494	0.25914	0.47427	0.37989	0.31048	0.3208	0.1090	1			
Netherl.	0.505567	0.46604	0.19873	0.05718	0.20135	0.2179	0.4893	-0.1525	1		
Portugal	0.545713	0.66567	0.69838	0.58657	0.52613	0.6417	0.6774	0.37051	0.3907	1	
Spain	0.315576	0.33706	0.29318	0.35213	0.35614	0.3651	0.3590	0.34090	0.0560	0.3023	1

b) Convergence period

Austria	1										
Belgium	0.560095	1									
Finland	0.624814	0.76615	1								
France	0.515230	0.66354	0.74898	1							
Germany	0.562725	0.57482	0.70905	0.61659	1						
Ireland	0.565067	0.69744	0.78857	0.70390	0.62503	1					
Italy	0.511510	0.48560	0.60279	0.52877	0.57751	0.5547	1				
Luxemb.	0.379878	0.56544	0.59664	0.67469	0.54617	0.6549	0.4662	1			
Netherl.	0.453979	0.50558	0.47534	0.40233	0.36547	0.4356	0.4314	0.34241	1		
Portugal	0.649089	0.75488	0.84613	0.72360	0.70777	0.7693	0.6459	0.57307	0.4860	1	
Spain	0.507949	0.63725	0.68413	0.63195	0.50716	0.6499	0.4457	0.53693	0.4382	0.6603	1

Table 3F Currency returns

a) DMK returns against other Euroland currencies

	ATS	BEF	ESP	FMK	FRF	IRP	ITL	LUF	NLG	PSC
Mean	0.002639	0.0008	-0.03305	-0.02625	0.003885	-0.007	-0.0339	0.00262	0.00303	-0.0169
Median	0.005454	0.003028	-0.00514	-0.00397	0.016873	0.02536	-0.0074	0.00457	0.00464	-0.0017
Maximum	1.887337	1.962902	1.64792	2.13159	1.391829	1.84225	2.6263	0.89609	1.74339	1.5577
Minimum	-1.79991	-1.65267	-4.13025	-5.91884	-1.44092	-4.9629	-5.07	-0.84166	-1.5620	-2.644
Std. Dev.	0.365714	0.345744	0.49111	0.64257	0.349599	0.57194	0.5989	0.21593	0.39249	0.3575
Skewness	-0.11509	0.369364	-1.72232	-2.85751	-0.24802	-1.7080	-1.9056	-0.03205	0.00547	-1.8214
Kurtosis	7.240137	11.99241	15.6363	26.8432	5.326523	16.5303	18.905	5.36255	6.57419	16.069
J-Bera	314.0529	1417.876	2987.71	10470.2	98.55711	3391.69	4659.0	60.5124	222.497	3206.0
Probability	0	0	0	0	0	0	0	0	0	0
Observ.	418	418	418	418	418	418	418	260	418	418

b) FRF returns against other Euroland currencies

Mean	-0.001247	-0.00308	-0.00389	-0.03694	-0.03013	-0.0108	-0.0378	-0.00065	-0.0008	-0.0208
Median	-0.012703	-0.01966	-0.01687	-0.03089	-0.00504	-0.0012	-0.0209	-0.00804	-0.0112	-0.0114
Maximum	2.146706	1.661731	1.44092	1.41996	1.581367	1.65214	2.0754	1.22244	2.00276	1.7372
Minimum	-1.497532	-1.60836	-1.39183	-4.39867	-5.70711	-4.5014	-3.6291	-1.13835	-1.5483	-2.4522
Std. Dev.	0.353941	0.400917	0.34959	0.41529	0.577941	0.49808	0.5685	0.24317	0.34025	0.4203
Skewness	0.472881	0.270928	0.24802	-3.05414	-3.31913	-1.7410	-0.991	0.1087	0.62903	-0.7327
Kurtosis	9.207642	6.207924	5.32652	34.0739	33.20284	19.1469	9.7371	8.80195	9.61644	7.5216
J-Bera	686.7267	184.3447	98.55711	17467.18	16655.18	4752.06	858.944	365.1914	790.02	393.487
Probability	0	0	0	0	0	0	0	0	0	0
Observ	418	418	418	418	418	418	418	260	418	418

Technical Note to Section 3.1

For the sake of completeness, this technical note provides computational details of the Jenrich test statistics reported in Section 3.1. Let m_{1c} and m_{2c} be the sample correlation matrices of pre convergence and convergence periods, respectively. The two matrices are based on samples of size T_1 and T_2, and the null hypothesis to be tested through the Jenrich statistic is $m_{1c} = m_{2c} = m_c$.

Define:

$\overline{m_c} = (T_1 m_{1c} + T_2 m_{2c})/(T_1 + T_2) = (\bar{r}_{ij})$ = 'average' correlation matrix.

d_{ij} = Kronecker delta = identity matrix of the same dimension as $\overline{m_c}$

$$S = \left(d_{ij} + \bar{r}_{ij} \bar{r}^{ij} \right)$$

$$Z = \left[\frac{T_1 T_2}{T_1 + T_2} \right]^{1/2} \overline{m_c}^{-1} (m_{1c} - m_{2c})$$

The Jenrich test statistic can then finally be computed as:

$$c^2 = \frac{1}{2} tr(Z^2) - dg'(Z) S^{-1} dg(Z)$$

As discussed in the body of this section, this test statistic is a chi square with degrees of freedom equal to $\frac{n(n-1)}{2}$ where n is the number of assets (or countries). If we replace the correlation matrices with the corresponding covariance matrices, then the appropriate test statistic becomes:

$$c^2 = \frac{1}{2} tr(Z^2).$$

Hence, the second term in the statistic for testing the equality of correlation matrices can be viewed as a correction term, since comparison of covariance matrices involves a higher degree of freedom ($\frac{n(n+1)}{2}$).

Appendix to Section 3.2

In this Appendix we describe our approach to the asset allocation problem phrased in section 3.2 and the underlying theory. First, it is assumed that the monetary union consists of only two countries: Germany and each of the other EU Member States in turn (i.e. a 'small' EU country). This implies that investors in the small EU country only hold their own country's assets and those of Germany. This model is then extended to include a third country, not in the monetary union, but whose assets are also held by domestic investors, namely, the United States. Second, it is assumed that foreign exchange risk affects all of the assets of the foreign country in the same way whether, for example, they are government bonds or the equity of the foreign country. It is further assumed that currency risk is additive.

The situation prior to EMU is considered first, followed by the case after EMU. The analysis will be for one period. To illustrate the argument, the case of two assets, two countries and conditional matrix of variances and covariances is described. This is then generalised in various ways: to three assets (two risky assets: bonds and equity), by the inclusion of the US and by the imposition of the restriction that asset shares are non-negative in order to avoid short sales.

The Theory

The model used is based on the notion of investors maximising a function of the expected return and variance of the portfolio. A standard formulation of this due to Pulley (1981) is:

$$F[E(r^p), V(r^p)] = w'E(r - \ell f) - \frac{1}{2}a.w'V(r - \ell f)w$$

where r is a vector of returns on the risky assets, f is the risk-free rate, so that $r - \ell f$ is a vector of excess returns on the risky assets with ℓ a vector of ones. w is the vector of weights of the risky assets, and a is the coefficient of relative risk aversion (a measure of investors' attitude to risk). $E(r - \ell f)$ and $V(r - \ell f)$ are the expected future mean and variance of the excess returns. The aim is to choose w to maximise the function. This can be achieved subject only to the constraint that the asset shares add up to unity (which allows assets to be shorted), or subject to the additional constraint that short sales are not permitted. Many institutional investors are compelled by law to impose this constraint. In this case, there are two constraints: that each share is non-negative ($w \geq 0$) and the sum of the shares of the risky assets does not exceed unity ($\ell' w \leq 1$).
The optimal asset allocation in the absence of a constraint on short sales is:

$$w = aV^{-1}E(r - \ell f)$$

This implies that a is not independent of the units of measurement of the returns (i.e. whether they are annualised or in percentages). When there is a short selling constraint, the solution cannot be written down in such a convenient form. For illustrative purposes, we now consider in more detail the case of two countries each with two domestic assets.

A Two Country Model

Prior to EMU

It is assumed that each country has an asset which is risk-free in terms of the domestic currency and a risky asset. Thus, in the two country model, investors in each country have four assets available. For the domestic economy, let *f* denote the risk-free rate and r_1 be the risky return. Denote by e the logarithm of the domestic price of foreign exchange and by Δe the depreciation of the domestic currency over the next period. The return on the foreign risk-free asset expressed in domestic currency can be written as $f^* + \Delta e$, and that on the foreign risky asset $r_2 + \Delta e$.

The risk characteristics under unconditional and conditional versions of the model are different. The conditional version assumes that the risk-free rates are known and hence, the variations in the risk-free rates make no contribution to the conditional variance of the foreign returns. For the domestic investor in the small country, the foreign risk-free asset becomes a risky asset only due to pure currency risk, while foreign equity will have two sources of risk. The variance of the domestic risky asset can therefore be written as s_{11}, the conditional variance of r_1. Similarly, the conditional variance of the foreign risk-free asset measured in domestic currency is due only to exchange risk and is the conditional variance of Δe, denoted s_{ee}. The conditional variance of the foreign risky asset measured in domestic currency is $s_{22} + s_{ee} + 2s_{2e}$ where s_{2e} is the covariance between r_2 and Δe. Other relevant conditional covariances are s_{12} and s_{1e}.

The optimal asset allocation for a domestic investor in the small country is to hold the following shares in the three risky assets, measured as excess returns over the domestic risk-free:

$$\begin{bmatrix} w_1 \\ w_e \\ w_2 \end{bmatrix} = a \begin{bmatrix} s_{11} & s_{1e} & s_{12} + s_{1e} \\ s_{1e} & s_{ee} & s_{ee} + s_{2e} \\ s_{12} + s_{1e} & s_{ee} + s_{2e} & s_{22} + s_{ee} + 2s_{2e} \end{bmatrix}^{-1} \begin{bmatrix} E(r_1) - f \\ E(\Delta e) + f^* - f \\ E(r_2 + \Delta e) - f \end{bmatrix}$$

where w_1, w_e, w_2 are the shares held in the domestic risky, the foreign risk-free and the foreign risky assets, respectively. The share held in the risk-free asset is obtained by noting that all four shares must sum to unity. The precise value will depend on α.

In order to establish a useful benchmark, it is instructive to consider the following special case. If the expected depreciation is zero, the two risk-free rates are the same, and the expected returns on the two risky assets measured in their own currencies are the same, then it can be shown that the ratio of the shares in the two risky assets is:

$$\frac{w_1}{w_2} = \frac{s_{22} - s_{12} + s_{ee} - s_{1e} + 2s_{2e}}{s_{11} - s_{12} + s_{ee} - s_{1e} + 2s_{2e} + (s_{2e}^{\ 2} - s_{1e}^{\ 2})/s_{ee}}$$

This expression has the virtue of being independent of a, a parameter that is unknown. In practice, of course, these assumptions are not true, and they are not made in the estimates reported below.

After EMU

As a result of EMU, there will only be three assets: a single risk-free asset with return $f^{\#}$ and two risky assets with returns r_1 and r_2, all denominated in the same currency. The shares held in the two risky assets are:

$$\begin{bmatrix} w_1 \\ w_2 \end{bmatrix} = a \begin{bmatrix} s_{11} & s_{12} \\ s_{12} & s_{22} \end{bmatrix}^{-1} \begin{bmatrix} E(r_1) - f^{\#} \\ E(r_2) - f^{\#} \end{bmatrix}$$

In the special case where the expected returns on the two risky assets are the same, the ratio of the weights is:

$$\frac{w_1}{w_2} = \frac{s_{22} - s_{12}}{s_{11} - s_{12}}$$

Comparing this with the ratio above gives a direct, but very approximate, measure of the impact of the introduction of EMU. Again, in practice, the ratio of the shares will differ from this because the risky returns will not be the same. The difference is clearly due to exchange rate fluctuations.

If the variances of the two risky assets were also the same, the last result implies that after EMU, the two assets would be held in the same proportions. This would also be true before EMU if, in addition, the squared correlation between the returns on the two risky assets and the exchange rate were the same. (The two correlation coefficients would be likely to have opposite signs.) Thus, in this special case, EMU would have no impact on asset allocation between the two risky assets. This establishes a useful benchmark for comparison with the actual data. The estimates presented here, and reported below, are based on the full model and are not constrained by these simplifying restrictions.

Using the unconditional version of the model would require that the variability of the risk-free assets be incorporated in the covariance matrices above. Thus, s_{11} would become $s_{11} + s_{ff} + 2s_{1f}$ etc.

A Three-Country Model

An alternative to the two-country model is to allow for a third country that is not part of the monetary union, but whose assets are held by the countries in the monetary union. This country is taken to be the United States. This extends the range of assets by two: the US risk-free (for the dollar-based investor) and the US risky asset. From the perspective of the small country, the returns on these two assets, measured in domestic currency, are denoted by $f^{us} + \Delta e^{us}$ and $r^{us} + \Delta e^{us}$.

Before the introduction of the Euro, the five asset shares would be:

$$\begin{bmatrix} w_1 \\ w_e \\ w_2 \\ w_\$ \\ w_{us} \end{bmatrix} = aV^{-1} \begin{bmatrix} E(r_1) - f \\ E(\Delta e) + f^* - f \\ E(r_2) - f \\ E(\Delta e^{us}) + f^{us} - f \\ E(r^{us} + \Delta e^{us}) - f \end{bmatrix}$$

where:

$$V = \begin{bmatrix} s_{11} & s_{1e} & s_{12}+s_{1e} & s_{1\$} & s_{1us}+s_{1\$} \\ s_{1e} & s_{ee} & s_{2e}+s_{ee} & s_{e\$} & s_{eus}+s_{e\$} \\ s_{12}+s_{1e} & s_{2e}+s_{ee} & s_{22}+s_{ee}+2s_{se} & s_{2\$}+s_{e\$} & s_{2us}+s_{2\$}+s_{eus}+s_{e\$} \\ s_{1\$} & s_{e\$} & s_{e\$} & s_{\$\$} & s_{2e}+s_{ee} \\ s_{1us}+s_{1\$} & s_{eus}+s_{e\$} & s_{2us}+s_{2\$}+s_{eus}+s_{e\$} & s_{2e}+s_{ee} & s_{us\mu s}+s_{\$\$}+2s_{us\$} \end{bmatrix}$$

After the introduction of the single currency, there is now just one exchange rate to take into account, that is, the one between the euro and the dollar. This will still be denoted by e^{us} as it is still the exchange rate between the small country and the United States. The four asset weights are given as:

$$\begin{bmatrix} w_1 \\ w_2 \\ w_{\$} \\ w_{us} \end{bmatrix} = aV^{-1} \begin{bmatrix} E(r_1)-f^{\#} \\ E(r_2)-f^{\#} \\ E(\Delta e^{us})+f^{us}-f^{\#} \\ E(r^{us}+\Delta e^{us})-f^{\#} \end{bmatrix}$$

where:

$$V = \begin{bmatrix} s_{11} & s_{12} & s_{1\$} & s_{1us}+s_{1\$} \\ s_{12} & s_{22} & s_{2\$} & s_{2us}+s_{2\$} \\ s_{1\$} & s_{2\$} & s_{\$\$} & s_{us\$}+s_{\$\$} \\ s_{1us}+s_{1\$} & s_{2us}+s_{2\$} & s_{us\$}+s_{\$\$} & s_{us\mu s}+s_{\$\$}+2s_{us\$} \end{bmatrix}$$

The Actual Model Used

The actual model used retains the assumption of three countries (two EMU countries and one outside), but involves two further assumptions. One is that prior to EMU, each country issues a risk-free asset and two risky assets: a long bond and equity, and that investors in each country hold all three domestic assets, plus the risk-free asset and the equity of the two foreign countries. This makes a total of seven assets. After EMU, it is assumed that there are six assets, since there will be only one risk-free asset among the two EMU countries. The second extra assumption is that short sales are not permitted.

The three countries are taken to be Germany, the United States and, in turn, one of the following countries: Belgium, France, Ireland, Italy, The Netherlands, Spain and the UK. The choice of EU Member States was restricted by the availability of data. The UK is not, of course, a member of EMU, and is included for comparative purposes. The data are quarterly for the 5-year period 1994 to 1998, inclusive. The risk-free is the 3-month euro-rate, the bond is a representative 10-year, zero-coupon, government bond and equity is the return on the stock market assuming that dividends are re-invested.

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