Analyse, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union

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28 January 2002

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Executive Summary

This report reviews, analyses and applies alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union.

More specifically, the report pursues the following three objectives: Firstly, it provides a comprehensive review of the methodologies and indicators proposed in the literature on capital market integration. Secondly, it discusses and analyses the various methodologies underlying the construction of such indicators and then applies the most suitable indicators to recent data to obtain measures of the actual degree of capital market integration. Thirdly, the report makes explicit proposals as to which of the indicators to follow and suggests methodological improvements to existing indicators.

Based on an extensive review of the literature on financial integration, the reports classifies existing indicators of financial integration into four broad categories:

A) indicators of **credit and bond market** integration;

B) indicators of **stock market** integration;

C) indicators of integration based on **economic decisions of households and firms**, and

D) indicators of **institutional differences** that may induce financial market segmentation.

The report then evaluates the existing indicators according to four criteria. Firstly, the availability of data needed to construct the considered indicators. Secondly, the reliability of the data on which these indicators are based. Thirdly, the economic meaning of the indicators. Finally, the ease with which they can be constructed and updated.

When evaluating the indicators proposed in the literature against the above criteria, the report suggests that indicators based on price and return data tend to dominate indicators based on quantities, i.e. stock or flow data. Price data are more easily available and more accurate. Moreover, with reference to the law-of-one-price, price-based indicators also have a clear-cut interpretation, which is often lacking for quantity indicators when based on flow data. Quantity indicators based on stock data, however, sometimes can be interpreted in the light of portfolio theory and thus deserve serious consideration.

From a methodological viewpoint, whenever theoretical benchmark values for the indicators are available, the report proposes to analyse financial market integration in terms of **β-convergence** and **σ-convergence**. These concepts have been developed in the economic growth literature but can be adapted for measuring financial market integration. β-convergence measures the speed of adjustment of deviations of countries to the long-run benchmark value. σ-convergence measures if countries tend to become more similar over time in terms of deviations from the benchmark.

After a careful evaluation of the four groups of indicators, the report computes and applies several indicators to measure financial market integration in the European Union. The results of this analysis are summarised below.

A) INDICATORS OF CREDIT AND BOND MARKET INTEGRATION

1. A first set of indicators used **interest-rate differentials** to analyse the degree of convergence in the interbank market, the government bond market, the mortgage market, and the short-term corporate loan market in the EU.

   - In the **interbank market** convergence was achieved by January 1999 for Euro area countries and almost achieved by September 2001 for the EU as a whole.

   - In the government **bond market** (maturity of 10 years) there are signs of increased β-convergence and σ-convergence after January 1999. However, the largest part of the reduction of interest rate differentials took place already before the end of 1997. There is also evidence that convergence in the Euro zone is stronger than convergence in the EU as a whole. Overall, convergence is almost achieved in this market.

   - In the **mortgage market** the report finds evidence of β-convergence, which gains strength after January 1999. But the degree of σ-convergence is weak and does not increase after January 1999. Considerable interest rate differentials persist by September 2001. The report takes this as evidence that mortgage markets are not fully integrated yet.

   - The symptoms of convergence in the **corporate loan** market are very weak. In this market there are no signs of β-convergence before 1999 and only feeble signs thereafter. Also, no signs of σ-convergence can be spotted. The report concludes that this is the least integrated market of the ones considered so far.

2. The report also constructs quantity-based indicators of money market and bond market integration, using data on the **international portfolio composition** of institutional investors.

   - The analysis of **money market funds** reveals that in most countries money market funds moved to an international investment strategy after January 1999, which indicates a high degree of integration and confirms the findings based on interest-rate differentials.

   - The analysis of **bond market funds** indicates that the bond market is less integrated than the money market. While in some Euro-area countries the adoption of the Euro caused a strong shift towards internationally investing bond funds, these developments are not equally strong everywhere. Especially outside the Euro area, there is no tendency towards more internationally oriented investment strategies.

3. The report also considers price-based indicators of **credit market integration** based on **bank charges' differentials** for cross-country credit transfers. The proposed indicators provide only limited evidence in favour of convergence. While the within-country dispersion of foreign bank transfer charges decreases, the average cost of cross-country transfers does not appear to converge across countries. Moreover, costs depend on the direction of the bank transfer, suggesting that credit markets in Europe be not fully integrated yet.

4. Finally, the report analysed quantity-based indicators of **credit market integration**. A first set of indicators considered the importance of foreign banks in terms of the **number of foreign banks** present in the domestic markets and the overall **share of assets held by foreign banks**. These indicators provide little evidence of increased banking market integration. Except for Ireland, Luxembourg, and the United Kingdom, foreign banks play a marginal role for the national banking systems. Moreover, Ireland is the only country with a significant increase in the number and asset share of foreign banks.

   A second set of indicators considered cross-border lending and borrowing as an alternative way of achieving credit market integration. In particular, the report analysed the **shares of foreign**

assets and liabilities held by each national banking sector and evaluated them relative to a benchmark portfolio to assess the degree of the home bias in these portfolios:

- In most European Union countries, national banks did not increase their share of foreign assets and liabilities after the EMU. Finland and Ireland are the only notable exceptions.
- With the exception of Luxembourg, the home bias on the asset and liability side of banks' balance sheets is large and stable for all countries, which suggests an insufficient international integration of the banking markets.

Overall, this set of indicators suggests that convergence is achieved in the money market and government bond market. In contrast, most indicators of credit market integration suggest that progress in financial integration has so far been modest and is still far from being complete.

B) INDICATORS OF STOCK MARKET INTEGRATION

1. The report first considered price-based indicators of stock market returns. Since asset pricing models are difficult to estimate and require long time series to provide reliable estimates, the report considered the **correlation of stock market returns** as an alternative indicator, mainly due to its simplicity. While the correlation of returns increased from 1997 until 1999, a strong offsetting trend arises after 1999. Given the instability of the indicator and the questionable economic interpretation of ex-post return correlations, the report recommends not to draw any conclusions based on such kind of indicators.
2. The report also considered quantity-based indicators of stock market integration based on the **international investment strategy** of equity funds. Such indicators show an increasing degree of stock market integration in the Euro area:
   - The analysis of the **investment fund industry** reveals that the share of equities that is managed by funds with an international investment strategy increased for the Euro area countries from December 1997 until June 2001. Moreover, the average increase for the Euro area countries is much stronger than for the remaining European Union countries.
   - The evidence based on the analysis of the share of foreign equities in **pension funds** is similar. Most countries saw an increase in the share of foreign equities during 1999, which contrasts with their relative stability before 1999. Unfortunately, data availability problems prevent a more timely monitoring of these developments.
   - These results were further confirmed by evidence on the share of foreign assets held by **insurance companies**. For most countries these shares increased from 1997 until 1999. Again, data availability problems preclude an analysis of more recent developments.

C) INDICATORS OF INTEGRATION BASED ON HOUSEHOLD AND FIRM CHOICES

The report analysed indicators based on the **economic decisions of households and firms**. These indicators provide mixed evidence on the process of financial market integration in Europe:

1. The correlation between national saving and investment has decreased in the EU after 1995. According to Feldstein and Horioka (1980) this signals increased financial integration. The pattern of this correlation should be interpreted with care, however, because it might be affected by the endogeneity of the saving rate with respect to the investment rate.

2. The analysis based on the **correlations of consumption growth** rates across European countries highlights that consumption in all countries reacts to idiosyncratic income shocks, suggesting that financial markets in the European Union still allow only incomplete risk sharing.

3. The analysis of the cross-border versus within-border **mergers and acquisitions** in the European countries based on the Shorrocks mobility index provided no evidence in favour of increased cross-border merger and acquisition activities during the 1990s.

D) INDICATORS OF INTEGRATION BASED ON INSTITUTIONAL DIFFERENCES

The report discusses the effects of different **legal and institutional frameworks** on the degree of financial market integration. Quantitative indicators corroborate qualitative evidence on strong differences between the legal systems in EU countries and suggest that these differences represent a considerable obstacle to financial market integration.

1. The index of **regulation of dispute resolution**, proposed by Djankov et al. (2001), which measures the extent to which legal procedures differ from informal dispute resolution, suggests that, within the EU, civil law countries are more heavily regulated than common law countries (Ireland and the U.K.). Large differences exist also across civil-law countries, depending on legal traditions (French, German, or Scandinavian).

2. An index of the expected duration of a **collection procedure for a bounced check** largely confirms those obtained from the dispute resolution index.

RECOMMENDATIONS

Based on the empirical performance of the indicators and taking into account data availability, data reliability, and economic content conveyed by the indicators, and the ease with which they can be constructed, the report makes the following **recommendations**.

To monitor **credit and bond markets**, the report suggests two indicators. Firstly, the degree of β-convergence and σ-convergence for interest rate differentials in the mortgage and corporate loan markets. Convergence in these markets has not yet been achieved but should in principle be achieved, as it has in the money and bond markets. Secondly, the report suggests to monitor the evolution of the share of foreign assets held by the national banking sectors. The difference between these shares and the proposed benchmark portfolios measures the home bias and, thus, the degree of segmentation of European credit markets. The analysis of the asset structure is preferable to that of the liability structure because the benchmark values have sounder theoretical underpinnings.

To monitor **stock markets**, the report recommends a quantity-based indicator, namely the shares of equities managed by equity funds with an international investment strategy. This indicator seems more reliable than simple price-based indicators such as stock market correlations. Moreover, it is much easier to compute than more sophisticated indicators based on asset price models, and can be recomputed on a regular basis.

Finally, the report recommends one indicator based on the **decision of firms**: the mobility index of merger and acquisition (M&A) activity in the European economies. Although benchmarks are not available for this indicator, the absence of increased cross-border M&A would be a negative indicator of financial market integration. On the other hand, since the macroeconomic indicators based on **household decisions** are rather volatile, the report suggests not to rely on them, except possibly for the Feldstein-Horioka correlation between national saving and investment.

The indicators analysed so far rely on existing data. New and more accurate indicators of financial market integration can be devised if the EU Commission were to collect **new data** via specifically designed **surveys**. The report contains detailed recommendations for data collection, particularly in two areas: (1) surveys intended to measure firms' access to foreign credit and security markets, and (2) surveys of financial product prices to assess the extent to which the law of one price holds in EU financial markets.

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1. Introduction

This report reviews, analyses and applies alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union.

More specifically, the report pursues three objectives. First, it provides a review of the different methodologies and indicators proposed in the economic literature on capital market integration. Second, it discusses the methodologies underlying the construction of such indicators and then computes the most suitable indicators, using recent data, to obtain measures of the degree of capital market integration in the European Union. Third, the report suggests methodological improvements to existing indicators and proposes a set of indicators to monitor future financial market integration in the European Union.

Section 2 of the report starts out by defining financial market integration. We then present a broad classification of indicators around which we organise the subsequent discussion of the indicators proposed in previous studies. A first class of indicators refers to specific markets such as bond markets, credit markets or equity markets. A second class of indicators is instead based on household and firm decisions that should reflect the risk-sharing opportunities provided by financial markets. A third class of indicators captures differences in the legal and institutional frameworks of the countries under consideration.

In Section 3 we discuss the relative merits of various types of indicators in terms of data availability and reliability. We also compare the merits of indicators based on prices and returns with those of indicators based on stock or flow data. Finally, we propose general convergence criteria that can be applied to estimate changes in the degree of financial market integration.

In Section 4 we outline the specific indicators of financial market integration that we analyse and apply in the remaining part of the report. These indicators are then evaluated and applied in the subsequent five sections of the report.

In Section 5 we evaluate and compute indicators of credit and bond market integration, some of which based on price and return data and others based on quantity data. In Section 6 we do the same for indicators of stock market integration, again presenting both price- and quantity-based indicators.

In Section 7 we turn to indicators that measure financial market integration based on the household decisions, while Section 8 considers indicators based on corporate decisions. Section 9 discusses the effects of different legal systems and presents a limited set of quantitative indicators.

Section 10 summarises the findings and makes recommendations about the indicators to be used to monitor future developments in the integration of European financial markets.

In Section 11 we indicate what kind of additional data could be collected through surveys conducted by the European Commission to shed light on aspects of financial market integration that could not be covered by relying on existing data sources.

2. A review of the main indicators

Financial markets are **integrated** when the law of one price holds. This states that assets generating identical cash flows command the same return, regardless of the domicile of the issuer and of the asset holder. Given this definition, financial market integration can be measured by comparing the returns of assets that are issued in different countries and generate identical cash flows. Identifying such assets is of course a difficult task, and this is at the root of much of the measurement issues addressed by this report.

When identical assets command different returns one would tend to conclude that financial markets are not integrated, for instance because legal barriers prevent capital from freely flowing between countries. Such barriers may reflect capital controls, tax codes, accounting and auditing differences, different bankruptcy law, different quality of judicial enforcement, etc. However, some caution is warranted. Countries may share a common legal and regulatory framework, but still identical assets may command different returns. Beyond legal barriers, there might be economic barriers, for instance situations of asymmetric information that induce investors to evaluate differently assets that are otherwise identical.

A pre-requisite for measuring financial market integration is the identification of assets generating identical cash flows. Lacking this, one might consider slightly different assets, provided it is possible to control for the differences in the risk associated with their cash flows. If one fails to identify identical assets, or does not correct appropriately for their risk differences, one will conclude that financial markets are segmented even when they are in fact integrated. This highlights the crucial role of measurement issues for the problem at hand.

Given the need to compare similar assets issued in different countries, any measure of financial market integration must refer to a specific asset and therefore to a specific market. We consider the credit market, the market for fixed-income securities and the stock market. For each of them, we discuss measures of financial integration that are based on **asset returns and prices**, and others that are based on **asset quantities**. The latter may be **flow** measures, such as international capital flows, or **stock** measures, such as the amount of cross-border holdings of debt and equity.

We should stress that we look at quantities despite the fact that the law of one price has nothing to say about them. Nevertheless, we feel that these measures are of interest. In a system with no financial barriers, the domicile of assets issuers and holders should play a decreasing role over time. Flow and stock measures may allow us to assess whether such a process is taking place or not.

Finally, the literature has considered also direct or indirect measures of financial integration. Several studies consider the effects of financial market integration on **households' choices**, for example the portfolio choice between home and foreign assets. Still others analyse its effects on **companies' choices**, such as mergers with foreign companies or acquisitions of foreign subsidiaries. Further measures of integration are based on **broad market characteristics,** e.g. the size of equity, bond and bank markets, or the cross-border penetration of commercial banks and other financial institutions.

Examples of all such measures are found scattered in the banking, asset pricing, and macroeconomics literature. The report starts by providing a comprehensive and systematic account of all these measures and approaches.

2.1 Credit and bond market indicators

Indicators of credit market integration can be classified into return-based (price-based) measures and quantity-based measures.

Interest rate differentials are the most common measure of credit market integration. In a common currency area there is no depreciation risk. In the absence of transaction costs or any other type of market segmentation, net-of-tax interest rates for assets of the same maturity and the same credit risk class should be identical.

Thus a simple measure of the degree of international segmentation of credit markets in the Euro area is the difference of interest rates charged in different countries to borrowers of the same risk class and for the same maturity. In principle, this measure may be computed for interest rates on public debt, on corporate debt, mortgage debt, and consumer credit.

A number of authors have used such measures to investigate the deregulation process of the US banking system and its effect on credit market integration. Stigler and Sherwin (1985) implement a test based on the nominal interest parity using data on mortgage loans. If markets are integrated, rates should move together. However, Bodehorn (1995) and Eichengreen (1984) have criticised this test, arguing that the declining interest rate spreads found by Stigler and Sherwin are due to increasingly homogeneous risk characteristics of regional credit markets. This argument is likely to be valid also for the Euro area, given the ongoing integration process in the goods and labour markets. Controlling for risk characteristics in such tests is, therefore, important. An additional problem of tests based on correlation coefficients is that they cannot distinguish stochastic trends from common shocks.

Lack of stationarity is less of a problem if one looks at first differences of interest rates rather than levels. Jackson (1992), for instance, studies the transmission of interest rate shocks in different U.S. regions, using a regression of the change in regional interest rates on the change in the national money market rate and a set of regional dummies. Significance of the regional dummies is taken as evidence for market segmentation. Using monthly survey data for 1983-85, Jackson finds segmented markets for Money Market Deposit Accounts and Super-NOW accounts but national markets for six-month certificates of deposits.

According to Heitfield (1999), one should analyse separately the deposit rate offered by small and large banks. The reason is that small banks operate in a more segmented credit market than large banks. While aggregate data supports the interest parity hypothesis and, thus, the idea that the national banking market is integrated, microeconomic data reject this hypothesis. Perhaps, this is because aggregate interest rates data refer to wholesale markets, such as the interbank market, while microeconomic data refer primarily to retail markets.

This finding is consistent with the evidence uncovered for Europe so far. Using interest parity tests, Centeno and Mello (1999) show that retail and wholesale markets differ in their degree of integration, with money markets being more integrated than retail banking markets. Kleimeier and Sander (2000) analyse if interest rate linkages in Europe have become stronger

over time by carrying out a cointegration test on monthly interest rate spreads of lending rates. They report that prime rates are not cointegrated and find a structural break in the early 1990s, which may be related to the implementation of the Second Banking Directive.

The adoption of the Second Banking Directive in 1989 was an important step in the removal of barriers to cross-border banking competition in Europe. The Directive is based on the principle of a single "passport" (mutual recognition of banking licenses and home-country control, allowing financial activity anywhere in the Community), aimed at ensuring the highest degree of cross-border competition subject to adequate supervisory oversight. It is often argued that the Directive's effects on cross-border banking competition have been (or will be) further compounded by the European Monetary Union (EMU).

Beside affecting the differentials between the interest rates charged by banks in different EU countries, the effect of these regulatory changes on banking competition should be reflected also in declining **price differentials for the same banking services** (European Commission, 1988). A study by Price Waterhouse (1988), quoted by both Blandon (2000) and White (1998), compares the prices of financial products in European countries with the prices charged by an average of four low-cost producers. The study finds that prices in countries like France, Germany and Spain are 25 to 34 percent too high. The presence of non-negligible international price differentials for similar banking services witnesses the presence of barriers to entry that isolate domestic banking sector from competition. A 1996 study by the European Commission shows that progress on this front is taking place, but so far it is slow and uneven. The costs of some services (credit cards, loan and deposit rates, corporate loan rates) are falling in all EU countries, but there is little narrowing of existing price differences for other services, such as current cheque accounts, personal equity transaction costs, or **cross-border transfers of fund.**

De Bandt and Davis (1999) assess the effects of EMU on market conditions for banks based in Euro-zone countries. They construct an indicator of market power, the H-statistic (Panzar and Rosse, 1987), by looking at the impact on revenues of a change in input prices. In particular, using a panel data set of banks over the period 1992-96, they estimate a reduced-form revenue equation and compute the sum of elasticities of gross revenues to the components of expenditure, labour cost, interest rate on liabilities and other costs. With perfect competition, a proportional rise in input prices induces an equiproportional rise in output price and revenues, and the index equals one. With monopolistic competition, because of the inelasticity of the demand for banking products facing individual banks, the rise in input prices will induce a less than proportional rise in revenues, and the index will be less than one. With monopoly, this effect is even stronger and the rise in input price might even lead to a fall in revenues, thus giving a negative index.

The index is computed using a sample of large and small banks of Germany, France and Italy (and the US for comparison). The study finds that, compared to the United States, the level of competition in the countries considered is quite low. In particular Germany and France tend to show monopolistic competition for large banks and monopoly for small banks, while Italy tends to show monopolistic competition both for small and large banks. Taken as a benchmark against the EU countries considered, the United States generally display a higher level of competition especially for large banks, although perfect competition is rejected also for the US, probably due to the restrictions on interstate banking and the separation of

investment from commercial banking.[1] Because of the short sample period considered (1992-96) and the substantial year-to-year variations of the indicator, the study fails to uncover any significant trend in banking competition.

Other possible ways to measure financial integration involve monitoring the degree of **cross-border banking activity**, which may be expected to increase under increased integration. The elimination of barriers to international capital flows, together with a general relaxation of barriers to entry, can induce increases in cross-border credit flows and in the share of loans extended by foreign (or out-of-state) banks. Several studies have used such indicators to investigate the reaction of credit markets to the lifting of regulations on segmentation such as the state-level branching restriction in the U.S. (Berger, Kashyap and Scalise, 1995; Boyd and Gertler, 1993; and Jayaratne and Strahan, 1996). In an important study, Berger, Kashyap and Scalise (1995) document that the share of financial assets controlled by out-of-state holding companies increased from 2.1 percent in 1979 to 27.9 percent in 1994 when the US branching restrictions were removed. Petersen and Rajan (2000) report similar results, showing that US firms are choosing to borrow from increasingly distant banks.

In the EU, the introduction of the Second Banking Directive does not seem to have fully worked in this direction.[2] A study by the ECB (1999), using the number of branches and subsidiaries of foreign institutions in each Member State and the market share of foreign branches and subsidiaries as a percentage of total domestic assets, concludes that financial integration in Europe is at a much earlier stage. Along a similar line, White (1998) reports that in 1996 cross-border offices within Europe represent less than 0.3 percent of total banking offices and that in 1997 cross-border banking penetration is still negligible, based on composition of the total banks' assets and liabilities.

2.2 Stock market indicators

As for credit markets indicators, the literature on equity market integration relies both on return-based and on quantity-based measures.

A number of studies have analysed how stock market integration affects **stock market returns**. It has been suggested that, similar to the case of interest rates, stock market returns should become more correlated once previously segmented markets start to integrate. Unfortunately, ex-post return data are not useful to assess this issue since market returns may covary simply because the markets are hit by the same shocks, for instance an oil shock or a monetary policy shock. This point is particularly relevant for the EU where the ongoing integration process of goods and labour markets is likely to speed up the transmission of shocks between countries, increasing their common component. Therefore, the literature has aimed at estimating and comparing the ex-ante returns in various markets. This requires the specification of an asset-pricing model.

[1] The mentioned regulatory barriers were lifted in the mid-late-90's. In 1994 the Riegle-Neal Act abolished the inter-state banking and branching restrictions. In 1999, the separation of commercial and investment banking activities was lifted, thus abolishing the 1930 Glass-Steagall Act.

[2] It ought to be mentioned though that the Directive has not become effective until 1993.

According to the capital asset pricing model (CAPM), in the presence of fully integrated stock markets, only covariance risk with the world portfolio is priced in ex ante returns and that diversifiable country-specific risk does not command any return. As pointed out by Stulz (1999), if the country-specific risk exceeds the covariance risk with the world portfolio, financial integration should be accompanied by a decrease in the risk premium required by investors in equilibrium, and therefore a reduction in expected returns on equity and the cost of capital.

Possible tests of capital market integration would then involve estimating if the evolution of the risk premium on domestic stocks is sensitive to the country-specific risk in relation to the covariance with an EU-wide portfolio. This is the strategy employed by earlier studies on financial market integration. These apply the international CAPM to assess the degree of market segmentation. Conditional on the CAPM being the right model to describe asset return, the model delivers three testable indicators of segmentation. First, a country's beta with the world market does not (fully) capture the risk premium that is observed on its equity market. Second, the real rate of return on the risk-free asset may differ across countries. Third, the component of country-specific risk that could be diversified internationally has explanatory power for expected returns.

The main shortcoming of these studies is that their methodology does not recognise the dynamic component of financial market integration but looks at comparative statics. Bekaert and Harvey (1995) attempt to remedy this problem by constructing a time-varying measure of financial market integration. Using data on equity returns, they find that a number of markets exhibit time-varying integration, thus allowing them to identify the reasons for rejecting the international CAPM, which instead assumes perfectly integrated markets.

In a related study, Hardouvelis, Malliaropoulos and Priestley (1999) examine if the convergence process of European economies towards the monetary union has led to increased integration of European stock markets. They estimate a conditional asset pricing model, allowing for a time-varying degree of integration that measures the importance of EU-wide risk relative to country-specific risk. The results indicate that the degree of integration is closely related to forward interest differentials vis-à-vis Germany, i.e. to the probability of a country joining the European Monetary Union (EMU). Integration increases substantially over time, especially since 1995, when these differentials began shrinking, and by mid-1998, six months before the official date for EMU launch, stock markets in EMU member states seem to have been almost fully integrated.

Sentana (2000) proposes a dynamic APT multi-factor model with time-varying volatility for currency, bond and stock returns for ten European countries over the period 1977-1997. The study focuses on the question whether the EMS has contributed to reduce the cost of capital. He finds that the EMS contribution is small, i.e. that a fall in the idiosyncratic exchange rate risk has a small impact on the cost of capital. More relevant for the issue of financial market integration, Sentana rejects the null hypothesis that country-specific risks are not priced, thus providing evidence against financial market integration.

An alternative approach to measuring the degree of stock market integration has been proposed by Chen and Knez (1995). It is based on the law of one price and on the absence of arbitrage opportunities. Refining these measures, Ayuso and Blanco (1999) find that financial market integration between stock markets has increased during the nineties.

Another kind of indicators of stock market integration is based on **quantities,** such as the size of capital **flows** or the composition of portfolios (**stock measures**).

Bekaert, Harvey and Lumsdaine (1998) search for the steps of world equity market integration, by identifying structural breaks in the size of international capital flows. Portes and Rey (2000) analyse the timing and geographical pattern of cross-border equity flows. The authors argue that in the absence of barriers to financial transactions these flows should be related to geographical distance, the size of the relevant markets, and to proxies for international information barriers (telephone traffic, etc.).

The share of domestic stocks in household portfolios compared to the share of these stocks in the world market portfolio is a widely studied indicator in the finance literature. There is abundant evidence, e.g. Tesar and Werner (1992) and Lewis (1999), that domestic residents do not diversify sufficiently into foreign stocks, a feature known as the "home equity bias". To the extent that households hold portfolios that are not well diversified internationally, their wealth and consumption growth will fail to depend only on world wealth and consumption growth.[3] In the same vein, Ayuso and Blanco (1999) study how direct and portfolio foreign investment has evolved over time in selected countries. They find that the fraction of wealth held by domestic households in foreign assets has increased significantly during the last few years.

2.3 Indicators based on household decisions

Some measures of financial integration are based on the effects of financial integration on the relationship between private saving and corporate investment and the relationship between private consumption and income.

When international capital markets are well functioning, then the saving decisions of domestic households should have (almost) no effect on the investment decisions of domestic firms, since firms could simply borrow on international debt markets. Similarly, shocks to domestic income should not affect domestic consumption, since these shocks can be diversified by borrowing abroad or holding foreign assets.

One of the classic tests on financial integration is based on the **saving-investment correlation**. Feldstein and Horioka (1980) first suggested that this correlation could measure the degree of regional capital segmentation. Under perfect capital mobility and unchanged investment opportunities, an increase in the saving rate in one region would cause an increase in investment in all regions. Large correlations between national saving and investment would indicate strong segmentation. However, this approach does not identify which of the financial markets are insufficiently integrated and cause these correlations to be high.

[3] Several possible explanations have been proposed to explain the puzzle, focusing on the role of market inefficiencies and non-traded goods (Lewis, 1994), investor behaviour (French and Poterba, 1991), or the role of human capital (Bottazzi, Pesenti and van Wincoop, 1996). However, even after considering these possibilities, the puzzle remains.

Armstrong, Balasubramanyam, and Salisu (1996) perform a study for Europe along these lines and find low correlations between savings and investment. Unfortunately, their data does not distinguish between capital flows within Europe and flows with the rest of the world. Interpreting their result as evidence of intra-EU integration is therefore premature.

A second indicator of financial integration that relies on consumer choices is based on the idea that integrated financial markets allow for **international risk sharing**. A whole line of research studies the covariance of consumption across different regions or countries to test if financial markets afford full risk sharing to consumers located in different jurisdictions. Conditional on consumers exploiting all risk-sharing opportunities, consumption growth of all regions or countries should be perfectly correlated when financial markets are integrated and depend only on the common (non-diversifiable) shocks. This simple but powerful point has been initially recognised and applied to microeconomic data by Cochrane (1991) and Mace (1991), and later brought to bear on macroeconomic data by Obstfeld (1994), van Wincoop (1994), and Townsend (1994), among others.

In contrast to the Feldstein-Horioka approach, the risk-sharing approach is capable of distinguishing the contribution of different financial markets and of public tax-transfer mechanisms, see Asdrubali, Sorensen and Yosha (1996) and Sorensen and Yosha (1997). Asdrubali et al. develop a simple accounting framework to decompose the cross-sectional variance in gross state product into several components. Sorensen and Yosha apply the same approach to the EU and the OECD for the time span 1966-90. They find that the "unsmoothed residual", estimated to be around 60 percent, is much larger than in the US. They also report that one half of the smoothed income risk is achieved by national government budget deficits and the other half by corporate savings.

2.4 Indicators based on corporate policy

One of the effects of increasing financial integration is the consolidation of banks and companies across geographic borders. This is one of the lessons that can be taken from the increasing integration of U.S. financial markets. Between 1988 and 1997 the number of U.S. banks fell by almost 30 percent, and the share of total U.S. assets held by the eight largest banking organisations rose from 22.3 percent to 35.5 percent. Several hundred **mergers and acquisitions** (M&A) occurred in each year, many involving institutions with assets exceeding $1 billion each. Most mergers involved institutions in different states (Berger, Demsetz and Strahan, 1999).

In Europe, M&A activities in the banking and securities industry have taken place mainly within national boundaries (US $ 89 billion and 19 billion respectively) rather than across them (US $ 15 billion and 6 billion respectively).[4] Within the insurance industry, M&A activity within national boundaries (US $ 46 billion) has been more similar to cross-border M&A activity (US $ 37 billion), see Berger et al. (1999). Similar indicators of foreign bank penetration can in principle be constructed by looking at the share of bank branches controlled

[4] This can be seen as an effort to increase market power at the domestic level, thus increasing its size from an EU perspective and creating the necessary preconditions for future cross-border expansions (ECB, 1999).

by foreign banks. A recent trend towards M&A involving domestic banks and non-bank providers of financial services, in particular insurance companies, has moreover been documented by White (1998). Such forms of M&A (bank-assurance) have just begun to appear, but the most recent ones are mainly concentrated within domestic boundaries [Table 12 in White, 1999].

To the extent that European markets become more integrated, one may also expect an increased number of cross-border M&A activities in the industrial and commercial sectors, not just in the financial sector. However, this indicator may reflect not only the integration of financial markets, but also that of good and service markets.

The integration of financial markets may also have an impact on the **corporate financing decisions of firms.** With financial market integration, companies previously restricted to domestic financing choices (e.g., domestic bank loans, domestic bonds) can issue a wider menu of instruments (e.g., international notes and bonds) at the same standard terms (interest rates, collateral requirements, and covenants) corresponding to their risk grade but irrespective of their nationality. It is reasonable to expect that at least some firms will exploit this wider menu, and therefore during the phase of integration one should observe a larger issuance of international instruments.

There is some preliminary evidence that this may have indeed happened in Europe since the launch of EMU. According to Danthine, Giavazzi and von Thadden (2000) and Galati and Tsatsaronis (2001), the elimination of currency risk entailed by EMU encouraged the standardisation of many fixed-income securities, and both factors led to the growth of continental interbank loan and corporate bond markets. This suggests that a possible indicator of financial market integration is the issuance of international notes and bonds by European companies relative to their investment or to their total debt issuance. A similar indicator can be constructed for equity finance, by taking the ratio of international equity issues to the total stock issued by the companies of a given country.

3. Assessing the relative merits of the various indicators

Based on the review of the literature in the previous section, we discuss the relative merits of different indicators of financial market integration. We start out by assessing the problems related to the quality and availability of data, which might be used to construct potential indicators. Next, we compare the relative merits of price-based and quantity-based indicators in measuring the degree of financial market integration. We also discuss further indicators, based on household and corporate decisions and on cross-country institutional differences. Finally, we propose statistical convergence criteria useful for measuring financial integration.

3.1 Assessing data quality and availability

Data availability and quality are crucial if the indicators are to be useful in monitoring an ongoing process of financial market integration. Availability is important to observe developments in a timely fashion, while quality is important to obtain reliable indicators.

On both accounts, price- and return-based indicators have clear advantages over quantity-based indicators. Security price and return data are available at higher-frequency and are more accurate than data on financial flows and stocks. The former are collected at a monthly or even daily frequency, and accurately reported by the financial press and by data vendors. In contrast, financial flow and stock statistics are at best collected on a quarterly basis, and are subject to considerable measurement error. However, it should also be noticed that quantity-based indicators may be subject to time-independent measurement error and therefore be of constant reliability, whereas heteroskedasticity may introduce time-varying 'measurement errors' in price-based indicators.

As for indicators based on household or firm decisions, the choice is between micro- and macro-economic data sources. Clearly, to design and compute these indicators microeconomic data would be a vastly superior option: their informational content is much higher, since most of the relevant predictions are at the microeconomic level. However, at present EU-wide standardised household and firm-level data are either unavailable or are available for an insufficient time span.

Concerning household decisions, for example, measurement of the 'home equity bias' based on micro-data would require detailed survey-based information on household portfolios, including direct holdings of domestic and foreign stocks as well as indirect holdings through mutual funds, pension funds, and other managed investment accounts. Such data do not exist in readily comparable format, not even for a single year (see Guiso, Haliassos and Jappelli, 2001). Therefore, we must rely either on macroeconomic data or on information concerning the policies of specific financial intermediaries (e.g., pension funds) to assess the degree of the home bias.

Comparable problems exist for potential indicators of corporate financial decisions, such as the recourse to foreign bank loans or foreign securities markets. Standardised microeconomic data about the composition of firms' balance sheets are sorely lacking in the EU, and so are comparable macroeconomic data on the same items. This may partly reflect

persistent differences in accounting definitions across Europe. However, the situation is brighter for mergers and acquisitions (M&A) because private companies (e.g. SDC Platinum – Thompson Corporation) have collected detailed data sets, though they make them available only with considerable delay.

Finally, data availability is an even bigger problem to devise the effects of legal institutions on financial markets. Most comparisons between legal systems are qualitative, rather than quantitative (quantitative indicators being at most used to summarise qualitative information, as done by La Porta *et al.*, 1997, 1998). Therefore, data availability must get priority relative to data reliability in this area.

3.2 Price versus quantity indicators

The absence of arbitrage opportunities implies strong restrictions on asset prices and returns. In the absence of financially integrated markets, unexploited arbitrage opportunities are likely to arise. Price and return data should allow us to spot them.

However, computing return-based indicators requires sophisticated estimation procedures. In Section 2, we discussed two relevant cases: When interest rates are non-stationary, for example, simple correlations may be inappropriate to measure credit market integration. Similarly, measures of stock market integration would require inference of *expected* returns, which in most instances is a non-trivial exercise.

Quantity-based indicators are generally less sophisticated and easier to implement when data are available with sufficient international comparability. Yet, they suffer from a considerable drawback: since the law of one price holds only in equilibrium, it does not describe a convergence process towards equilibrium and the corresponding asset flows. Therefore, arbitrage arguments remain silent about indicators based on flow measures.

Moreover, the presence of cross-border financial flows is neither a necessary nor a sufficient condition for financial market integration. It is not necessary because the law of one price may hold even in the absence of cross-border flows: according to the theory of contestable markets, potential competition arising from the threat of entry by foreign banks may be sufficient to enforce the same terms for borrowers in different countries. It is also not sufficient because credit markets may fail to be integrated despite high cross-border credit flows. Such flows might fail to equalise domestic and foreign interest rates, e.g. because banks' market power may vary across countries.

While flow data may be difficult to interpret, asset stocks data have a clear-cut interpretation. Portfolio theory, for example, suggests that optimal diversification implies that agents hold a portfolio on the efficient frontier. Stock data, which allow to infer the portfolio composition of investors, may then be confronted with the efficient benchmark portfolios and thereby yield a measure of the degree of financial market integration. Given that quantity data based on stocks of assets or credit can be given clear economic interpretations, they should be preferred to flow data when both kinds of data are available and are of comparable quality.

3.3 Indicators based on economic decisions and on legal institutions

This section briefly discusses the main advantages and disadvantages of indicators that are based neither on prices nor on quantities, i.e. those based on household decisions, on corporate decisions and on legal institutions.

Household and corporate decisions indicators share the same main advantage: they can easily be benchmarked. For instance, as discussed in Section 2, the lack of correlation between investment and saving signals that capital is perfectly mobile across countries.

These indicators, however, have several drawbacks. For instance, according to economic theory, absence of correlation between consumption and income growth implies full risk-sharing. However, this is not always a symptom of perfect financial integration, because risk-sharing can be achieved through other channels, both at the aggregate level (e.g., via public financial policies) and at the household level (e.g., via transfers among household members).

Differences in legal institutions have one characteristic that sets them apart from all other indicators examined so far. They do not tell us if financial markets are segmented or integrated. Rather, they point to reasons why they may be segmented. For instance, if we observe persistent interest rate differentials of identical financial instruments in two countries, institutional characteristics can help us understand if the reason for the segmentation lies in the different tax code of the two countries. It is difficult to measure all potentially relevant institutional differences between countries, and sometimes institutional indicators are highly collinear (for instance, countries with complicated legal systems may also feature poor judicial enforcement of contracts, although these are distinct institutional features).

3.4 Convergence criteria and measures of financial integration

To analyse the progress towards financial integration, we need indicators that can summarise the convergence or divergence over time of financial variables. This requires the use of **panel data**, i.e. data sampled at different points in time for each of the EU countries. This data can be used to produce two measures of convergence, which will be relied upon throughout this report.

Goods markets are said to be integrated if price differentials for homogeneous products are not *persistent*, i.e. if price deviations tend to return to the long run equilibrium value over time, and if price *dispersion* for these products is small or absent. We apply the same concepts to measure the degree of financial market integration taking into account the particular situation of financial market prices, e.g. the potential non-stationarity of the series.

One would like to answer three questions. Does integration occur? If it occurs, at which speed does it take place? How does the degree of financial integration change over time? To answer the first two questions, we propose to estimate the following equation:[5]

[5] See Goldberg and Verboven (2001) for details.

$$\Delta i_{ct} = \alpha_c + \beta i_{ct-1} + \sum_{l=1}^{L} \gamma_l \Delta i_{ct-l} + \varepsilon_{ct},$$

where *c* and *t* denote the country and time indices, Δi the change in the interest rate, and α_c the country dummies. The error term on the right-hand side of the equation denotes exogenous shocks that force interest rate differentials between the considered countries. A negative β signals convergence (if β=0 there is no convergence); furthermore, the magnitude of β denotes the speed of convergence.

This notion of convergence is closely related to the notion of **β-convergence** used in the growth literature. Typical convergence studies in the growth literature regress the *average* growth rate of GDP on its initial level and interpret a negative correlation as sign of convergence. The suggested methodology is an extension of the β-convergence concept in the growth literature to situations where the interest rate may be non-stationary. Moreover, the proposed method exploits both the cross-sectional and the time-series dimension of the data.

To measure the degree of financial convergence at each point in time, we also propose to use the notion of **σ-convergence**. In the empirical growth literature, σ convergence occurs if the cross-sectional distribution of a variable (typically income per capita) decreases over time. In the present context, the degree of financial integration increases when the cross-sectional standard deviation of a variable, such as interest rates, is trending downward.[6] If the cross-sectional distribution collapses to a single point, and the standard deviation converges to zero, full integration is achieved.

It is important to note that the two convergence indicators have different informational contents: β-convergence does not imply σ-convergence. The reason is that mean reversion does not imply that the cross sectional variance decreases over time (in fact, β-convergence could even be associated with σ-divergence).[7] Therefore, we propose both notions of convergence to assess financial integration.

[6] Typically one calculates the standard deviation of the log values of the variable of interest.
[7] See Quah (1993) for further details on this issue.

4 The indicators to be constructed and evaluated

This section provides an overview of the indicators of financial integration that we shall evaluate and construct in the rest of this report. Each indicator falls within a cell of Table 4.1. In Sections 5 to 9 we shall evaluate each of these indicators on the basis criteria of (1) data availability; (2) cross-country comparability, (3) reliability, (4) comparability with a theoretical benchmark, (5) computational complexity. We shall also analyse the empirical performance of each indicator. Details about the data sources used are provided in the Appendix.

4.1 Credit and bond market indicators

This section briefly describes the indicators that measure financial integration on credit and bond markets. We start with price indicators (based on interest rates/yields data), and then turn to indicators based on stock and flow data.

4.1.1 Price indicators

Interest rates

We shall analyse interest rate differentials for four markets: those for inter-bank loans, for government bonds, mortgage loans and for corporate loans. For each of these markets, we shall use interest rates/yields data to compute two indicators of financial integration of credit and bond markets. The indicators are based on the notions of β- and σ-convergence, discussed in Section 3. The β-convergence indicator tells us the **speed of financial integration**, while σ-convergence offers a direct measure of the **degree of financial integration**.

Bank charges

As explained in Section 2, the **price differentials for similar banking services** can be taken as a measure of the **degree of banking competition**. The corresponding σ-convergence indicator can then be interpreted as a measure of the **degree of credit market integration**.

To assess the performance of these indicators, we focus on the countries' standard deviation of the bank charges for a cross-border credit transfer and for a cross-border cash withdrawal. We also study the dispersion in the duration of a cross-border credit transfer. Average duration provides an indicator of the degree of banking competition, and the standard deviation a measure of the degree of financial integration.

4.1.2 Quantity indicators

Market penetration of foreign banks

Quantity-based indicators do not have strong theoretical basis. However, the US experience with the abolition of the interstate branching regulation (and particularly the evidence in Berger, Kashyap and Scalise, 1995) suggests that the **share of assets held by foreign banks** is an informative indicator. In the US this share has increased markedly after the removal of interstate banking restrictions. As a related indicator of openness of national credit markets, we also consider the **share of foreign banks** in the total number of banks operating in individual EU countries.

Home bias

The notion of home bias is related to the **degree financial integration**. As discussed in section 3, the home bias should disappear when financial markets are perfectly integrated. By the same token, the presence of home bias reveals lack of financial integration.

The first indicator that we propose is the **share of foreign assets held by the national banking sector** of each country. We construct a measure of the **home bias in the banking asset structure** by benchmarking these shares against those that banks would hold if they lent to all countries in proportion to the relative size of the corresponding credit market. We also construct an aggregate indicator based on the **aggregate foreign asset index** for the domestic banking sector of the whole Euro area, constructed by weighting the shares of foreign assets in each country's banking sector by the relative size of domestic credit markets.

We propose a symmetric indicator using the **share of foreign liabilities held by each national banking sector**. We construct a measure of the **home bias in the banking liability structure** by benchmarking these shares against those that banks would have if they relied on national financing sources in proportion to the size of the corresponding credit market. We also propose an **aggregate foreign liability index** for the domestic banking sector of the whole Euro area, by weighting the shares of foreign liabilities in the respective countries with the relative size of domestic markets for deposits, money market instruments and bonds.

International portfolio composition

With integrated financial markets, investors should take advantage of new or improved foreign investment opportunities by increasing the international diversification of their portfolio. To a certain extent, institutional investors can take this task upon themselves. Therefore, we analyse the evolution of the international portfolio composition of various kinds of institutional investors. To the extent that we are concerned with debt markets indicators, the indicator will be based upon the share of foreign assets held by **money market and bond market funds**. Symmetric indicators will be constructed for the equity market based on data for equity funds, pension funds and asset portfolios of insurance companies.

4.2 Stock market indicators

This section describes the indicators that measure financial integration on stock markets. As for credit and bond markets, we first discuss price and then quantity-based indicators.

4.2.1 Price indicators

As explained in Section 2, the most appropriate indicators of stock market integration based on stock returns require the specification and estimation of sophisticated asset pricing models, which make them inadequate for prompt policy analysis and evaluation. Such an indicator is not easy to compute and to update when new data become available.

Alternatively, we propose a simpler indicator based on the dynamics of the **correlation of stock market returns in EU countries.** While the correlations are easy to compute and to update, they have no necessary relation with the degree of financial integration, since they may reflect also changes in the correlation structure of real and policy shocks in the individual countries. This implies that it measures the **degree of financial integration** only if the stochastic process of common shocks is constant over time. This is an issue of serious concern, given that Europe is undergoing a process of real integration. As we shall see, these shortcomings cast serious doubts on the reliability of this indicator.

4.2.2 Quantity indicators

In section 4.1.2, we discussed indicators based on the **portfolio shares** of money and bond funds for both the Euro and non-Euro zone countries. A symmetric set of indicators can be computed for equity funds. Using the share of equities invested in internationally invested funds for Euro area countries and European countries outside the Euro area, we compute an **aggregate integration index**. The index has the advantage that it does not have to assume that national investment products are sold to national investors only.[8] Similar indicators are produced with reference to the portfolios of **pension funds and insurance companies**.

4.3 Indicators based on household decisions

Obtaining comparable microeconomic data across the whole of EU countries is at present virtually impossible. Thus, feasible indicators on household decisions must be based on national account data. The first set of indicators within this group is based on the study of the **saving-investment correlation**. Domestic saving and investment should be uncorrelated if capital is perfectly mobile. Following Feldstein and Horioka (1980), we regress the gross investment rate on the gross saving rate and interpret the slope coefficient of the regression as an **overall indicator of capital mobility**. The drawback of this indicator is that it does not

[8] It still assumes that the products of the area considered are predominantly sold to residents of that area, which is a less stringent assumption.

allow an evaluation of how financial integration evolves over time. This leads us to propose a **yearly indicator of capital mobility**, which is obtained running the Feldstein and Horioka regression year-by-year.

The second set of indicators is based on **the correlation of the growth rate of consumption**. We regress the growth rate of consumption on the growth rate of GDP as a proxy for country idiosyncratic risk as an **overall indicator of risk sharing.** Under full risk sharing, consumption should not react to idiosyncratic shocks. Thus, the slope coefficient can be interpreted as a risk sharing measure. Under full risk sharing, it should be equal to zero. Since this indicator does not track changes in the amount of risk sharing, we experiment with a **yearly indicator of risk sharing**, computed by estimating a separate cross-sectional regression of the growth rate of consumption on the growth rate of GDP for each year. The limitation of this approach is that the resulting sample size is small. As with saving-investment regressions, also these indicators have a clear benchmark, being zero under complete risk sharing.

4.4 Indicators based on corporate choices

As highlighted in Section 2, one would expect that as capital markets become more integrated, companies are able to carry out **mergers and acquisitions across national boundaries** more easily than before. Therefore, cross-border M&A activity (transactions involving domestic and foreign companies) should increase relative to domestic M&A activity (transactions involving only domestic companies). We construct an indicator of the magnitude of cross-border M&A activity relative to the domestic one based on the literature on mobility indices. The details about the construction of this index are deferred to Section 8.

4.5 Indicators measuring the efficiency of the legal system

To measure the heterogeneity of the EU legal systems and their relative efficiency, we have used the following indicators provided by Djankov, La Porta, Lopez-de-Silanes and Shleifer (2001) for a hypothetical controversy arising between two parties for the collection of a bounced check:

- the index of regulation of dispute resolution (RDR), which measures the extent to which legal procedures deviate from the hypothetical benchmark of a third party informally resolving a dispute between two other parties;
- the expected duration of the procedure.

Both indices are computed for the EU countries and for the United States, the latter taken as the benchmark because of its homogeneous and relatively efficient legal system.

5. Credit and bond market indicators

This section presents indicators of credit and bond market integration using both price and quantity indicators.

5.1 Interest rates

We analyse financial market convergence using data on four interest rates: the **inter-bank 3-months rate**, the **10-years government bond benchmark yield** (henceforth, 10-years benchmark yield), the **mortgage rate** and the **corporate loan rate**.

The four rates differ in the degree of homogeneity and comparability across countries and in the nature (domestic versus international) of the market in which the corresponding financial products are traded. The inter-bank 3-months rate and the 10-years benchmark refer to standardised instruments, traded in the international market. In contrast, the mortgage rate and the corporate loan rate are national averages and are likely to be affected by specific features of national markets and by the risk characteristics of the relevant loan portfolio. Each rate therefore provides a different angle on the overall performance of European capital markets.

Indicators based on interest rate differentials have several advantages. They are based on readily available data that - at least for some assets - are comparable across EU countries. They are reliable, being constructed using sound statistical tools. They are informative: as we shall see, they can be used to test a number of hypotheses relating the speed and the degree of financial integration across EU member countries. In addition, they are easily benchmarked to a theoretical value: β-convergence is zero in the absence of financial integration; σ-convergence is zero if perfect financial integration is achieved. Finally, the indicators are easy to compute.

In what follows, we provide descriptive and graphical evidence on interest rate convergence in these four markets. Then we exemplify the proposed indicators of β- and σ-convergence discussed in Section 3, using the above-listed four interest rates.

5.1.1 Descriptive analysis

Table 5.1 reports the average spread for the four interest rates before and after 1999. Spreads are measured in basis points and in each case the corresponding German rate is used as a benchmark. Figures 5.1 and 5.2 plot the level of the inter-bank rate from January 1995 to September 2001 in all EU member countries. Before 1999, the highest spreads exist in Greece, Italy and Portugal. After the launch of the Euro, the 11 Euro-zone inter-bank rates (excluding Greece) converge to the common Euribor rate (and therefore the spread is zero). In 1999 the spread for Greece is still positive, because this country joined the EMU only in January 2000.

The interest rates of Belgium, Germany and the Netherlands are strongly correlated, reflecting that these countries formed a “de facto” common currency area. In Ireland the

interest rate falls sharply in 1998, one year before the introduction of the common currency. In Denmark and Sweden the inter-bank rate decreases mostly before 1997 and after 1999 it floats around the common rate, while in the UK it is flat up until 1998 and then decreases. Overall, Table 5.1 and Figures 5.1 and 5.2 indicate strong convergence to a common rate. The spreads of the countries not included in the Euro-zone decreases after the launch of the Euro in 1999, reflecting that the Euro rate has acted as a powerful attractor even for the inter-bank rates of countries that have not yet joined the EMU.

The second interest rate reported in Table 5.1 is the spread on the **10-years benchmark bond yield**.[9] Figures 5.3 and 5.4 provide greater detail plotting the level of this rate for each country. Contrary to the inter-bank rate, the 10-years benchmark bond yield spreads do not fall in each country (it actually increases in Austria, Luxembourg and the Netherlands). Overall, the data indicate that convergence has taken place in this market as well, but to a smaller extent than in the inter-bank market.

One cannot easily detect common patterns for the spread of the housing **mortgage rate**[10] and of the **corporate loans rate**.[11] As shown in Table 5.1 and in Figures 5.5 and 5.6, the mortgage spread falls in Austria, Spain, France, Ireland, Portugal, Sweden and the UK, while increases in the other countries. The spread of the corporate loans rate falls in Greece only, while in the other countries it either increases in absolute value, or stays roughly constant.

The pattern is similar to that uncovered for the 10-years benchmark bond yields and calls for a similar interpretation: household mortgage rates are long-term rates reflecting inflation expectations. Furthermore, interest rates in countries with high beginning-of-period rates (as Italy, Portugal and Spain) decrease faster, because inflation decreased more in these countries.

Figures 5.7 and 5.8 refer to the interest rate on corporate loans. In Belgium, Finland and the Netherlands the rates increase after 1999 and decrease in the last part of the sample, while in France, Italy, Portugal, Spain and Greece they decrease steadily throughout the sample and (with the exception of Greece) increase slightly only in 2000. Even though the corporate loans rates are considerably less volatile than other interest rates, the broad picture is similar to that of the 10-years benchmark and mortgage rates.

The graphical analysis reveals three interesting features of the data: (1) over the sample period European interest rates have converged; (2) such convergence has increased after the launch of the Euro, and (3) convergence has taken place in different degrees across the different markets. The statistical analysis below aims at sharpening these conclusions, and at providing appropriate tools to measure the degree of convergence.

5.1.2 β-convergence

We propose to assess interest rate convergence by estimating the following regression with panel data:

[9] This is the on-the-run benchmark.
[10] These are national averages of fixed rate standard mortgage contracts, collected from Datastream.
[11] These are national averages of short-term rates, up to 1 year, classified by Datastream as prime rate.

$$\Delta i_{ct} = \alpha_c + \beta_{pre-emu} D_{pre-emu} i_{ct-1} + \beta_{post-emu} D_{post-emu} i_{ct-1} + \gamma_1 \Delta i_{ct-l} + \gamma_2 \Delta i_{ct-l} + \varepsilon_{ct}$$

where *c* and *t* denote the country and time indices, α_c is a country dummy, $D_{pre-emu}$ and $D_{post-emu}$ are dummy variables that take value 1 respectively before and starting in January 1999 (and zero otherwise), and Δi the change in the spread of the relevant interest rate. The spread is computed as deviations from the relevant German rate; thus, Germany is omitted from the regressions.

While a negative β coefficient indicates that convergence is taking place, the size of β is a direct measure of the **speed of convergence**. β-convergence provides measures of financial integration that can be easily compared across sample periods and different financial markets. The coefficients of the lagged interest rate measure the speed of convergence before ($\beta_{pre\text{-}emu}$) and after ($\beta_{post\text{-}emu}$) the EMU.

Each of the regressions presented in Table 5.2 signals β-convergence because the coefficient of the lagged spread is always negatively correlated with its level. However, the speed of convergence is not the same across markets and sample periods. It is highest for the inter-bank rate and for the benchmark 10-years yield, intermediate for the mortgage rate and lowest for the firm loan rates.

Comparison of convergence across markets and periods is therefore useful and informative. In general, convergence accelerates after the adoption of the Euro in 1999. In the inter-bank loan rate, the speed of convergence increases from 3% before 1999 to almost 8%, from 4 to 7.9% for the benchmark 10-year yields, and from 1.3 to 7.2% for the mortgage market interest rate from 1.3% to 7.2%. However, for the loans to enterprises rate, the regression signals very slow convergence both before 1999 (0.4%) and after the EMU (around 2%), implying that the degree of integration is considerably lower in this market.

5.1.3 σ-convergence

A further indicator of financial integration is based on the cross-sectional dispersion of interest rates, i.e. the σ-convergence indicator described in Section 4. While β-convergence measures if the various interest rates converge to the same, steady state value, σ-convergence measures the degree of financial integration at any point in time.

Figure 5.9 presents the standard deviation of the logarithm of the four interest rates for the sub-set of the Euro-zone countries and for the entire sample. Clearly, σ-convergence has taken place in each of the four markets considered, but to a different extent. The standard deviation of the inter-bank rate falls from 20% to zero after 1999. In the long-term government bond market the standard deviation in 1995 is about four times as high as in January 1999, while the standard deviation of the mortgage rate falls from 20 to about 6%. There is less evidence of convergence in the corporate loan rate, as the standard deviation falls by a factor of 2 over the sample period. In short, convergence is stronger in the inter-bank and benchmark 10-year bond market than in the mortgage and corporate loan market.

Table 5.3 summarises the patterns arising in Figure 5.9 by regression analysis. For each interest rate, we estimate the following regression:

$$sd(i)_t = (\alpha_{pre-emu} + \sigma_{pre-emu}t)D_{pre-emu} + (\alpha_{post-emu} + \sigma_{post-emu}t)D_{post-emu} + \varepsilon_t$$

where *sd(i)* is the cross-sectional standard deviation of each of the four interest rates in period *t*. Separate regressions for the Euro-zone and for all EU countries allow us to test if the convergence within the Euro-zone countries has been faster. A negative time-trend signals σ-convergence. Perfect convergence is achieved when the slope and the intercept coefficients are both zero. Furthermore, we can test if convergence varies over time: $\sigma_{pre\text{-}emu}$ and $\sigma_{post\text{-}emu}$ measure σ-convergence before and after the adoption of the Euro.

In the inter-bank 3-months rates the negative trend is more pronounced after 1999 for both groups of countries. The coefficients before and after 1999 are statistically different from each other, as indicated by the *F*-test. Across the Euro-zone, perfect convergence is achieved after 1999. Most of convergence in the 10-years government bond market occurs before 1999 and among Euro-zone countries (also in this case the F-test rejects the hypothesis that the slope coefficients are equal). Table 5.3 indicates convergence also in the mortgage and corporate loan market. However, in the Euro-zone the F-test does not reject the hypothesis that the time-trend coefficients are different before and after 1999.

Overall, the regressions in Table 5.3 indicate that σ-convergence has taken place in all four markets: the time trend coefficient is negative and statistically different from zero before and after the launch of the Euro. Results indicate again faster convergence for the inter-bank and government bond rates. So, the evidence on σ-convergence is consistent with that on β-convergence.

5.1.4 Assessment

This section has applied two indicators of financial integration (based on the notion of β and σ-convergence) to the interest rate dynamics of the short-term inter-bank rate, the long-term government bond rate, the household mortgage rate and the short-term corporate loans markets. The β-convergence indicator measures the **speed** at which financial integration takes place, while σ-convergence measures the **degree** of financial integration at each point in time.

Both indicators reveal that European financial integration has increased,[12] particularly after 1999. However, there are important differences in the speed and degree of convergence of the four interest rates. While the inter-bank rate in the Euro-zone has effectively collapsed to a single market after 1999, and the long-term bond market is highly integrated, the speed of convergence in the mortgage market and especially in the corporate bond market has been considerably slower.

The results in this section support existing evidence on European financial market integration. Integration of the short-term inter-bank market is widely documented in the literature. For instance, Santillàn, Bayle and Thygesen (2000) argue that integration has been

[12] Calcagnini, Farabullini and Hester (2000) also find strong evidence of convergence occurring using β- and σ-convergence to nominal short-term money market interest rates and government bond yields.

fostered by the widespread use of Euro-area indices, such as the EONIA (Euro overnight index average) and the EURIBOR, and by the improvement in the working of the cross-border settlement system, especially through the so-called TARGET payment system.[13] The literature also suggests that the long-term government bond markets has not yet achieved full integration. Favero, Missale and Piga (2001) explain this lack of complete convergence noting that the yields spreads are driven not only by liquidity, but also by different degrees of credit risks; these risks are still persistent among EU members.

Institutional differences and local market conditions are likely to affect housing mortgage markets. Chiuri and Jappelli (2001) argue that some of these differences arise from different down payment requirements and regulation across Europe. Furthermore, in a recent study, the European Mortgage Federation reports that few mortgage institutions exploit the opportunities provided by Second Banking Directive and relates this to the persistent heterogeneity of legal frameworks and to the cross-country differences in mortgage contracts.[14]

The lack of integration on the short-term corporate loans market is likely to depend from difference in legal frameworks and tax incentives (documented in Section 8 of the report) as well as from the nature of the credit market relation. By its very nature, the corporate loan market is less standardised, and more likely to reflect local factors. Finally, as documented by Corvoiseir and Gropp (2001), bank concentration differs considerably across EU countries: in the Netherlands the Herfindal index is 80%, while in Germany it is 20%, implying that the degree of competition in the banking industry still varies considerably within EU countries.

The fact that the proposed indicators of financial market convergence are consistent with what we know about financial markets in Europe shows that these indicators are able to summarise in an efficient, fast and systematic way a vast body of evidence. The advantage of monitoring financial market integration through β- and σ-convergence is that the two indicators can be updated at monthly frequency, are easy to compute, are based on sound statistical tools, and can be easily compared across different markets and time periods.

5.2 Bank charges

From the consumers' viewpoint an important aspect of financial market integration are the costs associated with cross-border payments. These costs represent impediments to the free flow of goods and services across national borders, which are solely generated by the financial system.

[13] Convergence has been less complete, instead, in the secured segment of the short-term interbank market, i.e. the repo market. Due to persistent differences in the regulatory, legal and tax framework and in market practices (such as short-selling restrictions), "repo markets have remained largely national and unevenly developed throughout the single currency area" (Galati and Tsatsaronis, 2001, p. 4). Several Euro-system Central Banks surveys identify the main reasons for the lower integration of the secured segment of the market: differences in the yield of the underlying bonds, lack of harmonisation of repo agreements and heterogeneity of collateral requirements (Santillàn, Bayle and Thygesen, 2000).

[14] The terms of mortgage contracts vary considerably between countries. For instance, in the UK the typical contract is a 25 years mortgage with flexible rate, in France it is a 15 years mortgage with variable rate.

While the introduction of the Euro will eliminate costs for cash cross-border transactions, the costs for cross border credit transfers, cash-withdrawals abroad, and cross border credit card payments will continue to matter. Monitoring these costs is of interest because they provide a relevant and easy-to-interpret measure of financial market integration. Moreover, as argued in section 2, they also provide some indications regarding the degree of banking market competition.

The data used to construct the indicators in this section are not continuously available for a long time span. However, being based on industry surveys, they are comparable across EU member countries. In addition, the indicators based on these data are easy to compute and reliable, being based on simple, but sound, statistical tools. Finally, they have a clear benchmark: full competition obtains when bank charges differentials are zero, and full integration in the market for banking services requires no dispersion in such differentials.

5.2.1 Basic indicators based on differentials of cross-border bank transfer charges

Comparing the cost of a cross-border transfer with the cost of a domestic transfer is one way to assess if the law of one price holds, and thus if prices for the same type of transaction are the same, regardless of transfer origin. The European Commission Reports on Bank Charges in Europe (2000, 2001) present valuable evidence on the costs involved by cross-border payments, on which we draw to gather evidence of financial market integration. Columns 2 and 3 of Table 5.4 report, by country of transfer origin, the average costs for a 100 Euro cross-border credit transfer in 1999 and 2001, respectively. The average costs of a cross border transfer are rather high when compared to the costs of a within-country bank transfer.[15] This is particularly important in light of the December 2001 regulation requiring that bank charges for cross border payments in Euros be the same as for similar transactions within a single member state.[16]

Average costs even increased in the period from 1999 to 2001. Moreover, large differences exist between the countries under consideration with the highest average costs (Portugal with 31.04 Euro in 2001) being more than three times the lowest costs reported (Luxembourg with 9.58 Euro in 2001). With the standard deviation of the average costs decreasing only slightly from 6.67 Euro in 1999 to 6.53 Euro in 2001, there are at most minimal signs of a convergence process.

Columns 8 and 9 of Table 5.4 report the average duration of cross-country credit transfers. In the whole sample there is only a slight convergence in the average duration, as measured by the cross-country standard deviation of the average delay (the standard deviation actually increased in 2000-01). However, these trends are driven by the special developments in Ireland where the average duration almost doubled from 1999 until 2001. Excluding Ireland, one can spot signs of convergence among the remaining countries, where the standard deviation of the average duration of a cross-border credit transfer decreased by one third. Also the average duration of the transfer shows a small downward trend for these countries.

[15] Unfortunately, no comparison to the costs of within-country bank transfer has been made. Indeed, no comprehensive data are available to date on charges for domestic transfers. However, casual observation suggests that the costs of a within country bank transfer are at most one tenth of the costs reported in the table.
[16] See http://www.europa.eu.int/comm/internal_market/en/finances/payment/area/01-1827.htm.

These results cannot be taken as strong evidence of convergence. The picture does not look much brighter when considering the evolution of the costs associated with a cash withdrawal in a foreign Euro zone country. Here the studies report an increase in the average costs associated with a 100 Euro cash withdrawal from 3.84 Euro in 1999 to 4.14 Euro in 2001.[17] The reduction in the standard deviation of the cross-country average costs from 1.25 Euros to 1.04 Euros suggests that some convergence is taking place, although at a higher average cost level.

5.2.2 Benchmarked indicators based on differentials of cross-border bank transfer charges

Overall, the Euro appears not to have had a large impact on the costs of cross-border bank transfers and cash withdrawals. However, for a meaningful comparison we need to evaluate the cross-country payment costs with respect to a benchmark. Benchmarks such as the domestic transfer costs are flawed because the banks' costs for a domestic transfer differ considerably from the costs for a cross-country transaction. For this reason we suggest to construct convergence measures which are not affected by differences in underlying operating fees. In particular, we suggest to construct measures based on the:

- fee dispersion for transfers from the considered country to a given foreign country;
- difference and dispersion of fees for transfers from a given bank in one country to a given bank in another country versus the same operation in the opposite direction.

Accordingly, we construct measures of both kinds using data reported by the two European Commission Reports. Columns 5 and 6 of Table 5.4 list the price dispersion of fees within a given country for bank transfers to a given foreign country.[18] The mean dispersion of fees has decreased considerably during the two years considered. In addition, countries with a particularly high fee dispersion in 1999, such as Italy, France and Portugal, display a substantially lower dispersion by 2001.

Although consideration of the within country price dispersion is informative, statistics based on a single country alone cannot be informative about whether the absolute level of banking fees charged in the country under consideration are too high. To this end, we constructed measures that compare the costs involved for transfers in opposite directions between two given countries and two given banks in the considered countries.

In columns 2 and 3 of Table 5.5 we consider pairs of countries and compare the average costs of a transfer from the first country to the second to the average costs into the opposite direction.[19] Except for Italy and Austria, the absolute value of the price difference increased considerably. As a result, the average absolute price difference increased from 5.97 Euros in 1997 to 6.51 Euro in 2001. Thus, regarding the level of cross-country bank transfer fees, there is no sign of convergence.

[17] Clearly, a benchmark value for the costs of a within country cash withdrawal would be helpful here.
[18] The foreign countries come in the following pairs: Germany-Belgium, Italy-Austria, France-Netherlands, Ireland-Finland, Spain-Portugal.
[19] The transferred amount was 100 Euro.

Columns 4 and 5 of Table 5.5 report the standard deviation of the differences in fees when inverting the direction of the transfer between two given banks in the considered countries.[20] Although the average standard deviation decreased, it is still above 6 Euros for all country pairs, except Germany and Belgium. Thus, despite some signs of convergence, there seems to be plenty of room for improvement left.

5.2.3 Assessment

Indicators based on the costs associated with cross-border payments show weak evidence of convergence of bank charges across Europe. On the one hand, the within country price dispersion for foreign bank transfers falls (columns 5-7 of Table 5.4), and there is also some evidence on the reduction of the average duration for such transfers (columns 8-10 of Table 5.4). However, the average cost of cross-country transfers has not converged (columns 2-4 of Table 5.4 and columns 2-3 of Table 5.5). Moreover, the transfer's direction matters (columns 4-5 of Table 5.5), suggesting room for substantial improvements. The performance of these indicators should not be too surprising, given the evidence surveyed in section 2 on the low degree of competition characterising the EU banking sector.

The evidence in this section draws on data collected in the two European Commission Reports considering bank charges in Europe. Particularly promising is the evidence based on the fee dispersion for inverted bank transfers. An extension of the number of country pairs would allow identifying more reliably the countries in which bank charges tend to be too high. Also comparing the average duration of inverted cross-country transfers would allow identifying the scope for improvements along this dimension. Therefore, we recommend that the European Commission collects additional data to monitor the degree of financial market integration related to bank transfer charges along the lines suggested in the previous sections.

5.3 Market penetration of foreign banks

Foreign banks can serve domestic customers by acquiring domestic banks or creating domestic branches from within the country. Such kind of cross-border banking activities are likely to be important in retail banking. Foreign banks could also serve domestic customers directly by cross-border lending or borrowing without establishing branches in the foreign country. This type of activity might be more relevant for the business sector.

We propose indicators to monitor the degree of market penetration of foreign banks along both dimensions. Section 5.3.1 presents indicators measuring the importance of the presence of foreign banks, and Section 5.3.2 indicators of the degree of cross-border lending and borrowing activities of the banking sectors.

[20] The transferred amount was again 100 Euro.

5.3.1 Indicators based on the presence of foreign banks

Indicators of the level of activity of foreign banks in the EU member countries can be computed as (1) share of total assets held by foreign banks and (2) as the ratio of foreign banks to the total number of banks in the country. Both measures require data that are not readily available for all EU countries, and both of them are controversial on theoretical grounds, because, as suggested by the contestability argument presented in Section 3: potential competition does not require actual market presence by foreign banks.

Table 5.6 reports the asset share and the fraction of foreign banks in 1990 and in 1997 in all EU countries except Finland. The asset share varies considerably across the EU, with foreign banks holding no significant share of assets in Italy but large shares in Luxembourg, Ireland and the United Kingdom. Figure 5.10 plots the same data for the individual countries.[21] Except for Spain, the share is less than 5% in all of the countries depicted in the figure. The striking fact documented by Table 5.6 and Figure 5.10 is that in all countries, except Ireland and Greece, the asset share of foreign banks falls in the 1990s, the decrease being especially large in the Netherlands and France.

The number of foreign banks operating in a country divided by the total number of banks active in the respective country is reported in the fourth and fifth columns of Table 5.6. In 1990 the ratio ranges from just over 10 percent in Greece and Portugal to over 80 percent in Luxembourg and remains stable during the 1990s.

Overall, these indicators provide little evidence for credit market integration. Cross-border penetration of banks is limited and even decreasing in most countries if one looks at asset shares, and roughly constant in terms of the proportion of foreign banks

5.3.2 Indicators based on cross-border lending and borrowing

In this section we construct indicators based on the share of foreign assets held by the national banking sectors. The indicators are based on monthly IMF data, available with a lag of three months from Datastream. The data do not specify the country in which the foreign assets of banks are domiciled, and therefore we cannot distinguish between European and non-European assets. Detailed definitions are reported in the Appendix.

The indicators are easy to compute, can be regularly updated, and benchmarked using the market portfolio, weighting each country by the relative size of its credit market.[22] The difference between the share of foreign assets held by national banks and the benchmark measures the **home bias in the banking asset structure**. A symmetric procedure can be used to obtain a measure of the **home bias in the banking liability structure**.

We classify banks according to the country in which they are located. The branch of a Dutch bank in Germany, for example, is considered part of the German banking system. Given the results from the previous section, which indicate that the market penetration of foreign banks is unimportant for most countries, this assumption seems justified.

[21] Luxembourg, Ireland, and the United Kingdom are excluded from the figure because their share is at a very different scale.

[22] The shortcomings of this formulation are discussed below.

The banking sectors' asset structure

Figure 5.11 displays the share of foreign assets in the national banking sectors from January 1999 until September 2001.[23] Overall, the picture has not changed much during the last two and a half years. In September 2001 the banking sectors of the four Southern member states (Italy, Spain, Greece, and Portugal) have the lowest share of foreign assets in their portfolio. Except for Spain, all Southern countries display a reduction of their shares over the considered time period (see Figure 5.13). Significant increases in the share of foreign assets can be reported only for Ireland and Finland and to, some extent, for Germany and Austria.

Looking directly at the share of foreign assets can be misleading because of differences in the relative size of domestic credit markets. Therefore, we construct a benchmark portfolio, which allows assessing the degree of over-representation of national credit on banks' balance sheets in the Euro zone. As a benchmark portfolio we select the market portfolio, weighting each Euro-zone country by the relative size of its credit market. In an economy with a given asset endowment and homogeneous agents equilibrium asset prices must be such that optimal diversification by these agents implies that they all wish to hold the market portfolio.[24]

As of September 2001, the European market portfolio implies that the German banking sector should hold 64% of foreign assets on its balance sheets. For the other countries the share is even higher, with France at 81%, Italy at 86%, Spain at 91% and the Netherlands at 92%. In the remaining Euro zone countries the share of foreign assets should be larger than 96% of total assets.

Clearly, using the European market portfolio as a benchmark underestimates the optimal share of foreign assets in the market portfolio because it only considers Euro-zone credit markets and ignores other potentially important credit markets, notably the U.K., the U.S. and Japan.[25] Using a world market portfolio would provide even larger measures of home bias.

In Figure 5.12 we report an indicator of the home bias by subtracting from the benchmark value the share of foreign assets held by the national banking sectors. According to this indicator, Luxembourg's banking sector is "over invested" in the national credit market by only 10%. Other countries have rates well above 40% (90% in Greece).

Figure 5.13 reports the change in home bias from January 1999 to September 2001. Except for Ireland and Finland, the asset structure does not move towards the benchmark (some countries, notably Italy and Portugal, even move away from the benchmark value).

Since the relative size of the local credit markets is rather stable over time, the indicator of home bias is almost identical to the change in foreign assets (as opposed to the change in the home bias), see Figure 5.13. Therefore, to monitor *changes* in the home bias it is sufficient to

[23] The figure for the UK might be somewhat overstated because data on the amount of government assets in the banking sectors' portfolio were not available. Extrapolation of the importance of government debt for France's and Germany's banking sectors to the U.K. suggests that the U.K. value is over-estimated by 10-15 percentage points, which still leaves the figure still well above the values of most Euroland members.

[24] This holds also for agents with different degrees of risk aversion where optimal portfolios are different convex combinations between the market portfolio of risky assets and the risk free asset.

[25] Data on the size of the UK credit market is not available from Datastream.

track simply the change in the shares of foreign assets. This procedure has the advantage that one does not have to construct a benchmark, which might be open to criticisms.[26]

In Table 5.7 we report the share of foreign assets in the national banking sectors for the Euro-zone as a whole. The indicator is computed weighting the shares of foreign assets in the respective countries with the relative size of the domestic credit markets. Foreign assets, therefore, include the assets of other Euro-countries. As argued in section 4.2, the integration index of Table 5.7 is an aggregate index that does not rely on a benchmark measure. Nevertheless, as long as the benchmark portfolio is sufficiently stable, a change in the index measures financial market integration in the banking sector. Currently, the index shows only minor signs of credit market integration in the Euro area.

The banking sectors' liability structure

Figure 5.14 reports the share of foreign liabilities of the Euro area's national banking sectors from January 1999 until September 2001. The indicator measures the degree of foreign borrowing by the national banking sectors. The figure highlights the relative stability of the degree of foreign indebtedness of the national banking systems. As shown in Figure 5.16, only Finland (and to some extent Germany) experiences a clear increase in their use of foreign financing sources.[27]

Looking directly at the share of foreign liabilities might again be misleading because of differences in the relative size of national markets. Therefore, we construct a benchmark measure, choosing as the benchmark liability portfolio a portfolio that weights all national financing sources according to their relative size. As of September 2001 the benchmark portfolio suggests that the optimal share of foreign liabilities for the German banking sector should be at 65%. The corresponding values for France and Italy are 75% and 87%, respectively, with all other Euro zone countries having values at or above 95%.

This benchmark is more difficult to justify in terms of an optimal equilibrium portfolio than the benchmark asset portfolio. Borrowers, unlike lenders, do not face different return risks when using different financing sources. Yet, since local forms of finance include also bank deposits, which are subject to a withdrawal risk, optimal diversification of this risk should push banks into the direction suggested by the benchmark.

Figure 5.15 plots the home bias of the national banking sectors' liabilities, defined as the benchmark value less the actual share of foreign liabilities. Over-reliance on local financing sources is substantial, ranging from 30% to 70%. With the exception of Finland, the bias is remarkably stable over time.[28] Since the benchmark itself is stable, minor differences arise relying simply on the change of foreign liabilities, as opposed to the change in the home bias indicator (see Figure 5.16). Therefore, to monitor *changes* in the home bias it is sufficient to

[26] However, one still has to argue for the stability of the non-specified benchmark over time.
[27] The large decrease observed for Greece is due to a high volatility in the Greek share of foreign indebtedness and most likely not very informative.
[28] The data for Greece is not very informative because of the relative short time period for which data is available and due to the high volatility of the data.

calculate the change of the shares of foreign liabilities on banks' balance sheets. In this way, we can avoid the use of benchmark values, which can easily be criticised.[29]

In Table 5.7 we report the share of foreign liabilities in the national banking sectors for the Euro area as a whole, weighting the shares of foreign liabilities in the respective countries with the relative size of the domestic markets for deposits, money market instruments and bonds. As with the asset integration index, the liability index in Table 5.7 is an aggregate integration index that does not rely on a benchmark measure. As long as the benchmark portfolio is sufficiently stable, a change in this index measures financial market integration on the liability side of the banking sector. As the asset integration index, the aggregate liability index shows only minor signs of credit market integration.[30]

Assessment

The analysis of the banking sectors' asset and liability structure yields similar patterns. In most European countries banks did not increase cross-border lending and borrowing activities. Finland and Ireland are the only notable exceptions. Given the extent of the home bias in lending and borrowing, the indicators highlight that there is considerable room for further integration in the banking sector.

5.4 Money market and bond market funds

The dynamics of the international portfolio composition of institutional investors provides a useful indicator on the degree of financial market integration. With integrated financial markets, investors should take advantage of improved foreign investment opportunities and react with an increased international diversification of their investments. We thus propose to monitor the degree of international diversification of investment portfolios.

Taking advantage of new investment opportunities does not require that each single institutional investor in a given country becomes more diversified. Indeed, it is conceivable that each fund in a given country remains fully invested in a single other country, i.e. is not internationally diversified, while individual investors in the considered country take advantage of the new opportunities by rebalancing the weights of the respective funds in their private portfolios. To take account of such kind of adjustment processes on the side of individual investors we consider the portfolio shares of national investment fund industries.

Even when considering national industries, some problems of interpretation remain. In particular, even if all investment funds in a given country completely specialise on investments in the same country, individual investors could in principle diversify internationally by holding a mix of funds offered by other national industries, if they have access to the investment products of other countries.

[29] However, one still has to argue for the stability of the non-specified benchmark over time.
[30] Some part of the reported increase is even due to the inclusion of Greece, Ireland, and Portugal into the average value reported for September 2001.

For the portfolios of national investment fund industries to be representative of the portfolio of individual investors, one must assume that national investment funds are sold predominantly to national investors. Given that barriers to acquire funds managed by foreign intermediaries have decreased and are likely to decrease further in the future, indicators based on national investment fund industries are likely to become gradually less informative.

Nevertheless, indicators based on the portfolio shares of national investment industries can be useful because increased international diversification of individual portfolios is likely to occur along both margins: through increased diversification by the funds and through increased holdings of foreign funds by private investors. Moreover, these quantity-based indicators are reliable and easy to compute. Their main limitation is that, for the reasons just explained, they hardly possess a benchmark value. If adjustment of individual investment portfolios occurs along both dimensions while data is available only on one of these dimensions, one cannot construct benchmark measures that permit to evaluate whether convergence has been achieved or not.

The data we rely upon are collected by the Fédération Européenne des Fonds et Sociétés d'Investissement (FEFSI).[31] This source classifies investment funds according to their international investment strategy, for each EU member country. The classification distinguishes between funds that invest only domestically, funds that invest in the European market, and funds that invest globally. Funds are further classified according to whether they invest in equities, bonds, or money market instruments.[32] The time span covered by the data is rather short: series are typically compiled every six months and are available from December 1997 to June 2001.

We consider the portfolio shares of money and bond funds for EU countries. We want to assess whether the share of assets managed by funds that invest in European assets has increased or decreased over the period considered.[33] To this purpose, we compute the ratio between assets invested by the funds with a European focus and the assets of all money and bond funds. The analysis of equity funds, insurance companies and pension funds is deferred to Section 6.2.

5.4.1 Money market funds

Figure 5.17 plots the percentage of assets invested in money market funds that are managed by funds with a Europe-wide investment strategy.[34] In most countries January 1999 marks a dramatic shift from nationally investing money market funds towards internationally investing funds. Some countries even move fully towards internationally investing funds. The Netherlands and Spain seem to be exceptions at first sight. However, we think that this is an

[31] This is a European umbrella organisation of the investment fund industry, which collects and processes data from the national associations of the investment fund industry.

[32] However, the classification of funds across countries according to their investment strategy and their type seems not to be entirely consistent because classification is based on the national schemes.

[33] We exclude funds that are classified as globally or internationally investing although such funds may also invest in European assets. Considering also these funds as part of the diversified portfolios does not change the picture much.

[34] More precisely, the asset values of funds with the FEFSI classification European or Euroland divided by the asset values of funds with the FEFSI classification Domestic, European, or Euroland.

artefact of the classification of funds in the FEFSI data set where Euro area assets seem to have been classified as domestic assets in these countries.

Figure 5.17 provides evidence of a strong Euro effect, confirming our earlier findings from the analysis of the inter-bank rate: in the money market financial integration has been achieved. Given these results, tracking this indicator in the future is less interesting for the Euro-zone. However, comparing Euro-zone developments with those outside the Euro-zone is still of interest. Unfortunately, the FEFSI data have too many missing data points to construct indicators for European countries outside the Euro area.

5.4.2 Bond market funds

Figure 5.18 plots the percentage of assets invested in bond funds that are managed by funds with a Europe-wide investment strategy. The adoption of the Euro is associated with a large increase in the asset share of internationally investing bond funds in Austria, Finland, and France, and Germany. Overall Figure 5.18 suggests that bond market integration has taken place. Again, the Netherlands and Spain seem not to follow the pattern of the other countries. As with case of money market funds, the data suggest that this is due to a different classification of funds in these countries and not due to differences in investment strategies.

To compare the development in Euro zone countries with those in other European countries, Figure 5.19 plots the share of bond funds with a European-wide investment strategy in Denmark, Sweden and the United Kingdom. The asset shares of these bond funds remained low and rather stable throughout the considered time period. Also January 1999 is not associated with a change in the investment strategies in these countries.

5.4.3. Assessment

Data on money market and bond market funds indicate that, on average, the share of assets managed by European-wide investing funds increased significantly between December 1997 and June 2001. There is also evidence that the increase is associated with the adoption of the Euro, and that it has been larger for money market funds and for Euro-zone countries.

Although the increase in the share of assets managed by these funds is a sign of financial integration, substantial differences between the countries persist. Within the Euro-zone, Greece and Spain did not follow the developments of the other countries along all dimensions. Outside the Euro-zone, Sweden and the United Kingdom followed a rather different pattern compared to countries in the Euro area.

To exclude potential bias caused by the choice of the investment portfolio, in Section 6 we further consider data on the portfolios of equity funds, pension funds and insurance companies. These will deliver additional information to evaluate whether international diversification has taken place along a different dimension.

6. Stock market indicators

This section studies the process of stock market integration using both price and quantity indicators. We look at the correlation of stock market returns in the 15 EU member countries and at the evolution of the international portfolio composition. The idea underlying the first indicator is that stock market returns should become more correlated as markets become more integrated. The second relies on portfolio theory, which suggests that the optimal portfolio should be on the efficient frontier.

6.1 Return correlation

Following the discussion in Section 3, we compute the correlation of stock market returns in the 15 EU member countries. The interpretation of these correlations for financial market integration is subject to the caveats discussed in that section.

We calculate the correlation coefficient of monthly returns (in Euro) of the major stock market indices with the monthly return of the German DAX for a moving 12-months time window between January 1994 and May 2001,[35] and then we average cross-sectionally the 15 countries' correlations. Figure 6.1 shows the unweighted average of the correlations, while Figure 6.2 shows the average obtained by weighting each country' correlation according to the corresponding stock market capitalisation. Each point in the two graphs corresponds to the average correlation of the previous twelve months. In each of the two panels, we report the correlation between own-currency returns and that between returns expressed in Deutsche Marks. The correlation between exchange-rate adjusted returns is computed to investigate the role of the decreasing exchange rate volatility during the 1990s.

The qualitative pattern is the same across the two figures. In the figure 6.1, the correlation starts at 40% in 1995, increases to almost 90% in 1999, and then declines again to about 40% in 2001. Only a small fraction of the increase in the correlation before 1999 appears to be related to the decrease in exchange rate risk, since the correlation between exchange-rate-adjusted returns is almost identical to the correlation between unadjusted returns.

The increase in return correlation between 1997 and 1999 shown in Figures 6.1 and 6.2 is consistent with the findings reported in other two recent studies. Adjaouté and Danthine (2000) estimate the variance-covariance matrices of weekly returns from September 1990 to April 1999 and find that there has been a considerable increase in the correlation of stock returns, whether computed on the basis of market indices or sector indices. Fratszcher (2001) estimates a GARCH model with time-varying coefficients using data on daily returns from January 1986 to June 2000, and finds that there has been an increased correlation between stock returns within the Euro area since the announcement of Euro members in May 1998.

[35] The list of stock market indices used is in the Appendix. The correlations for the months from June 2000 to March 2001 are computed for a progressively shrinking time window, since we have less than 12 monthly observations left in the sample.

However, the authors of these two studies differ both in their economic interpretation of the evidence and in the identification of the causes of the increased correlation. Adjaouté and Danthine interpret the increase in correlation simply as a decrease in diversification opportunities, and not as a symptom of greater stock market integration. They argue that the cause of this increased correlation has been "less the disappearance of currency risk than the convergence of economic structures and /or the homogenisation of economic shocks (across the Euro-15 member states)" (p. 1). This is because the increase in stock return correlations is as evident when one filters out currency fluctuations from stock returns than when correlations are estimated using actual monetary returns, in line with our graphs in Figures 6.1 and 6.2. On the contrary, Fratszcher interprets the increased correlation as a symptom of greater integration. He claims that according to his evidence "it was in particular the reduction and elimination of exchange rate volatility, and to some extent also monetary policy convergence, that has played a central role in explaining the increased financial integration among EMU members" (p. 7).

Moreover, the average stock return correlation appears to be quite unstable over time, as apparent also in Figure 6.1. From early 2000 the correlation starts declining and at the beginning of 2001 it reaches the lowest value over the whole 1995-2001 interval. This is consistent with a later study by Adjaouté and Danthine (2001), based on an updated data set. Using weekly returns from October 7, 1988 to March 30, 2001, they conclude that the message conveyed by the data is quite different from that indicated in their previous study. The post-Euro sample (two and half-years of data) features lower return correlations than those obtained from the immediately preceding period of the same length, whether they are computed at the country or at the sector level. A peak in correlation in the early nineties has apparently been driving the earlier results.

This underscores the need to treat this indicator with extreme caution. Not only stock return correlations cannot be treated as an unambiguous indicator of financial integration for theoretical reasons, but also their movements may be cyclical phenomena that have little to do with the advent of the Euro. At a minimum, we shall need to wait for several years of return data to accumulate before a reliable verdict can be issued.

6.2 International portfolio diversification

In section 5.4, we discussed indicators based on the portfolio shares of money and bond funds for both the Euro-zone and non Euro-zone countries. There we pointed out the potential measurement bias caused by the choice of this particular investment portfolio. In order to deliver supplementary information about the composition of private investor's portfolio, this section considers equity funds, pension funds and insurance companies portfolios.

6.2.1 Investment funds

The evidence presented in this section is drawn from data collected by FEFSI. For each member country, FEFSI classified investment funds according to their international investment strategy and reported the assets under management of each strategy. The classification allows to distinguish between funds that invest domestically, Europe-wide, and

worldwide. Funds are further classified according to whether they invest in equities, bonds, or money market instruments.

Figure 6.3 presents evidence on the portfolio shares of equity funds for the Euro-zone countries. It plots the percentage of assets invested in equity funds that are managed according to a Europe-wide investment strategy.[36]

In all countries, except Spain and Greece, the percentage of equities managed by such funds increased from December 1997 to June 2001. By June 2001 all countries except for France, Spain, and Greece had more than half of their equities in European-wide investing funds, while in December 1997 eight countries fell below this threshold. This is strong evidence in favour of increased international diversification of equity investments.

As the figure reveals, there exist marked differences between countries. While Portugal's share of assets in internationally investing funds increased tremendously, progress in France and Spain seems comparatively slow. Also no signs of change can be spotted in Greece. Yet, it would be premature to conclude that Greece lacks international diversification. For such a conclusion to be valid one would have to verify that private investors in Greece did not increase their portfolio shares of foreign investment fund products during the period. Unfortunately, this is not possible because data on the composition of individual investors' portfolios are not available.

This hints at an asymmetry of the indicators used in this section. While an increase in the share of assets in funds with a European investment strategy can be interpreted as a sign of increased financial integration, its absence does not necessarily imply lack of integration.

We also compared the developments of the Euro zone countries with those in European countries not belonging to the Euro area, in particular Denmark, Sweden, and the United Kingdom.[37] In Denmark and Sweden, where the shares of equities invested in European-wide investing funds were already high in 1997, these shares decreased somewhat but remained above 50% in June 2001. In the United Kingdom the shares remained largely stable at around 20%. Countries outside the Euro area, thus, seem to have been affected differently by the introduction of the Euro than countries inside the Euro area.

Figure 6.4 plots a useful **aggregate integration index,** i.e. the share of equities invested in Europe-wide investing funds, separately for Euro-zone countries and for Denmark, Sweden and the United Kingdom. The series for the Euro area is calculated using a weighted average of the series in Figure 6.3. The weights are the relative size of the country's equity fund portfolio.[38]

The aggregate integration index does not assume that national investment products are sold to national investors only.[39] Clearly, this comes at the cost that the aggregate index does not allow assessing the developments for individual countries. We suggest that analogous

[36] More precisely the figure reports the asset values in funds categorized as European or Euroland divided by the asset values in Funds categorized as Domestic, European or Euroland. Including the asset values of worldwide investing funds, which could also invest in European markets, generally increases the percentage of assets in internationally managed funds but does not change the picture much.
[37] For brevity the graph for these countries is not shown.
[38] The series for Denmark, Sweden and the United Kingdom has been computed correspondingly.
[39] It still assumes that the products of the area considered are predominantly sold to residents of that area, which is a less stringent assumption.

aggregate integration indicators are computed and followed for the bond and money market funds inside and outside the Euro area.

6.2.2 Pension funds

The indicators for pension fund diversification rely on a data set provided by InterSec Research Corporation, a consultancy advising pension funds and insurance companies. The data set reports the share of foreign equities as a percentage of total equity investment of the pension funds for a number of European countries.[40] Data are reported for pension funds and insurance companies. For both series, data are reliable and available at a yearly frequency from 1992 until 1999. Moreover, the indicators are easy to compute. The data are plotted in Figure 6.5.

In most countries the share of foreign assets has been remarkably constant from 1992 until 1998. Exceptions are Austria, which seems to have experienced considerable fluctuations, and Spain where the share increased from the mid-nineties onwards.

For all countries, except Austria, the share increases in 1999. This suggests that the introduction of the Euro had a strong impact on the investment strategies of the national pension funds shifting their asset allocation towards an increased international diversification. Unfortunately the data set ends in 1999.

Pension funds are more likely to be tailored to the needs of national investors than investment funds. Therefore, they might deliver a more reliable picture of the national asset portfolios. Collecting data for the subsequent years to monitor the developments in the pension funds sector is therefore of high priority.

While the indicator based on the asset share of internationally invested equity funds in Spain considered in Section 6.2.1 suggests that the degree of international diversification did not follow the developments of the other Euro area countries, the current indicator based on pension funds shows that Spain's private investors increased their international diversification in equities far more than this occurred in other Euro area countries. Increased foreign equity holdings of pension funds in Spain may thus partly, fully, or even more than fully compensate the lacking developments in the equity fund sector.

This highlights the importance of considering the full menu of investment opportunities open to individual investors and to avoid analysing the various investment instruments in isolation. At the same time it highlights that it is difficult to construct meaningful benchmark measures for the sectoral data analysed in this section.

6.2.3 Insurance companies

Data on insurance companies are available from the same source as the one on pension funds. The data set reports for each national insurance industry the share of equities invested into foreign assets as a percentage of the total assets invested in equities.

[40] It also reports data for Canada, the US, Japan, Honk Kong and Australia.

Figure 6.6 plots the share of foreign equities in insurance companies' equity portfolio. In most countries the share has increased considerably from 1997 until 1999. However, marked differences exist between countries. Italy's share of foreign equities, for instance, dropped in 1999 to less than half the share reported for 1997. There is no further sign of increased international diversification of Spanish investors.

Outside the Euro area, Figure 6.7 reveals that Denmark again closely followed the average development in the Euro area. In the United Kingdom and Sweden the share remained rather stable during the considered time period, consistent with what found for the equity fund industries.

Assessment

Data on the shares of assets invested in investment funds with an international investment strategy suggest that financial integration has made considerable progress after 1999, regardless from the type of investment fund considered.

Considerable differences within the Euro area persist. Yet, as the Spanish case shows, to draw valid conclusions for individual countries, it is important to analyse a wide array of investment instruments, including pension funds and insurance companies. We also point out that the presence of cross-border selling of investment products prohibits the construction of meaningful benchmark measures.

There are marked differences between European countries outside the Euro area. While Denmark largely follows the average developments within the Euro area, Sweden and the United Kingdom did not show any signs of increased international diversification in their equity investments.

Overall, we suggest that financial market integration should be monitored based on aggregate indicators such as that presented in Figure 6.4. These indicators are not based on the assumption that national investment fund industries predominantly sell to national investors, an assumption that will be increasingly difficult to justify in the presence of financial market integration.

7 Indicators based on household choices

This section presents two indicators of financial convergence based on household choices. The first is based on the idea that under perfect capital markets national investment should not depend on national saving. The second is based on the observation that under complete capital markets consumption is detached from income.

The indicators are based on national account data, which are available at yearly frequency on a continuous basis for a long time span, and are produced by Eurostat with a delay of one year.[41] The indicators presented here are implemented using simple but sound panel data regression methods, and can be easily updated when a new yearly observation becomes available. Both indicators measure how financial markets depart from an ideal situation where they are perfect (the first indicator) and complete (the second indicator).

7.1 Saving-investment correlations

Indicators of financial integration based on **capital mobility** were popularised by Feldstein and Horioka (1980). They argue that with perfect capital mobility there should be no relation between domestic saving and domestic investment: saving should be allocated across the world independently of its source. This implies that if EU members are financially integrated savings should be allocated only according to the marginal product of capital, which is uncorrelated with saving.

We regress the ratio of gross capital formation to GDP on the ratio of gross saving to GDP and on a full set of country dummies.[42] The estimation delivers the following equation:

$$\underset{}{\text{Gross Investment Rate}} = \underset{(0.0118)}{0.11355^{**}} + \underset{(0.0517)}{0.30811^{**}} \times \text{Gross Saving Rate},$$

with adjusted $R^2 = 0.5182$. The two stars mean that the associated coefficient is statistically different from zero at the 1 % level. The country dummies are jointly significant and are not reported.

Since national saving and investment are positively correlated, the regression implies that capital is not perfectly mobile among EU member countries.[43] The slope coefficient is an **overall indicator of capital mobility.** The higher the slope, the lower the degree of capital mobility. The indicator can be updated every year, when new data become available.

[41] Alternative sources are OECD and Datastream. The indexes presented in this section can be computed using quarterly data. However, their quality is inferior to that of yearly data.

[42] We use gross saving and investment rates rather than net measures because depreciation is a likely source of measurement error.

[43] These estimates do not control for time-varying factors that may drive both investment and saving over time, such as policy shocks, changes in incentives to invest and to save, or changes in the pension system. The correlation between saving and investment may capture not just capital mobility, but also reflect the endogeneity of the saving rate with respect to the investment rate induced by such time-varying factors.

The indicator has a simple benchmark: the value of the indicator is zero when capital mobility is perfect. The indicator, however, does not allow to see how capital mobility changes over time. This can be done by estimating the regression year by year, that is by estimating a **yearly indicator of capital mobility.** We thus run 21 regressions, one for each sample year (1980-2000). The results are reported in Table 7.1. The correlation is statistically different from zero in all years except the last six.[44] Notice also that in the last six years the R^2 of the regression is rather low. According to the interpretation proposed by Feldstein and Horioka, the estimates reveal increasing financial integration of European capital markets.

Assessment

The overall saving-investment correlation indicates that EU-member countries are not perfectly financially integrated. The overall correlation hides interesting patterns, which are brought out by the yearly indicator. The latter suggests that the degree of financial integration increases over time, starting from 1995.

7.2 Consumption growth correlations

Indicators of financial integration indicators based on **risk-sharing** are based on Cochrane (1991) and Mace (1991). The risk sharing indicator aims at estimating risk-sharing within EU member countries. Under full risk sharing, consumption should not depend on idiosyncratic shocks and should be perfectly correlated with aggregate shocks.[45]

We regress the growth rate of consumption of each country on the growth rate of GDP, as a proxy of the idiosyncratic shock, and on a full set of country-dummies. We obtain the following results:

$$\underset{\quad\quad\quad(0.0041)\quad\quad(0\ .0519)}{\text{Growth rate of consumption} = 0.00867\ ^{**}\ + 0.8446^{**}\text{Growth rate of GDP},}$$

with adjusted $R^2 = 0.3839$. Two stars indicate that the associated coefficient is statistically different from zero at the 1 percent level.

The coefficient of the growth rate of GDP is positive and significant, which implies that there is not full risk-sharing, i.e. that consumption responds to idiosyncratic risk. The slope coefficient of GDP is an **overall indicator of risk-sharing**. The higher the value of the slope, the lower is the degree of risk sharing. The indicator can be updated every year, when new data are available.

[44] Greece, the Netherlands, Portugal and Spain enter the sample only in 1995-98. Excluding these countries does not change the picture, however.
[45] Contrary to the aggregate shock, the idiosyncratic shock is diversifiable.

As with capital mobility, the overall indicator of risk sharing does not allow to track changes in risk-sharing over time. This can be done by estimating year-by-year regressions, i.e. a **yearly indicator of risk sharing.**

For each year between 1980 to 2000 we regress the growth rate of consumption of each EU member country on the growth rate of GDP. The regression results are reported in Table 7.2. Under the null of perfect risk sharing, the coefficient of the growth rate of GDP should be zero. The hypothesis is rejected in all years except for 1982, 1988, 1993. Thus, according to this indicator, complete risk sharing was not achieved for most of our sample. Contrary to the saving-investment correlations, the data do not show any clear pattern.

Assessment

The two indicators based on consumption-GDP correlations reject the hypothesis of risk sharing among EU-member-countries. Furthermore, the yearly indicator does not detect any clear pattern in the data.

8 Indicators based on corporate choices

As explained in Section 3, as capital markets become more integrated, companies are able to carry out **mergers and acquisitions across national boundaries** more easily, so that cross-border M&A activity intensifies relative to domestic M&A activity.

We have obtained yearly data about national and cross-border M&A activity from SDC Platinum - Thompson Corporation. The data refer to M&A for both financial and non-financial companies between 1990 and 1999. For each year, we build a matrix where each cell contains the value (or the number) of acquisitions that companies from a given EU country effected in any of the 15 EU member countries, including itself. Acquiring countries are along rows, and target countries along columns. Off-diagonal elements capture the intensity of the cross-border M&A activity, while diagonal elements capture the intensity of domestic M&A activity. To purge the data from changes in the overall M&A activity within each of the target countries, we express the value (number) of the acquisitions in each cell as a percent of the total value (number) of acquisitions occurring in the target country in that year. As a result, the values of the elements in each column (the cells referring to the same target country) sum to 1.

A summary measure of the relative magnitude of cross-border M&A activity can be obtained using a mobility index similar to that proposed by Shorrocks (1978). In the present context the index measures the overall proportion of M&A activity and is defined as:

$$S(\mathbf{P}) = \frac{q - trace(\mathbf{P})}{q - 1},$$

where **P** is a $q \times q$ matrix whose rows sum to 1, a requirement satisfied in our case. The index measures the relative magnitude of the off-diagonal elements of the matrix. It ranges between zero and one: when no cross-border M&A take place, **P** is the identity matrix and the $S(\mathbf{P})=0$; as the number of cross-border M&A increases, the index increases towards 1, which is then taken as a benchmark. Shorrocks (1978) shows how to use the index in standard testing procedures, for instance to test if mobility differs across time periods.

In the present study, we calculate this index for the **value and number of acquisitions** within the EU. The data for the number of acquisitions are more reliable than those for their values, since for a number of acquisitions the value is not reported while their occurrence is.

We also build indicators of outward and inward mobility for each country. **Outward mobility** is measured by the acquisitions made by foreign companies in a given country, as a fraction of the total value (number) of acquisitions in that country. For country *i*, this is given by:

$$\text{outward mobility index} = 1 - \left(MA_{ii} \,/\, \sum_{i=1}^{15} MA_{ij} \right),$$

where MA_{ij} is the value (number) of acquisitions effected in country *j* by firms in country *i*.

Inward mobility is measured by the foreign acquisitions made by the companies of a given country, as a fraction of the total value (number) of acquisitions made by companies of that country. For country *i*, this is given by:

$$\text{inward mobility index} = 1 - \left(MA_{ii} \,/\, \sum_{j=1}^{15} MA_{ij} \right)$$

The indices proposed are quite easy to compute and hence in principle their performance could be monitored on a regular basis. However, the data used to construct these indices are collected by a private corporation and as such not readily available. Moreover the time span they cover is limited and the series ends in 1999**.**

We compute the **Shorrocks mobility index** for the value and number[46] of acquisitions within the EU and the respective 5 percent confidence bounds. Figures 8.1 and 8.2 display the corresponding results. Both panels show that the index is bounded away from both 0 and 1 throughout the 1990-1999 interval.

The index based on the relative value of cross-border M&A in Figure 8.1 features no trend, as confirmed by a regression on a linear time trend. The index based on the relative number of cross-border M&A in Figure 8.2 displays, if anything, a negative trend, although the relationship is not statistically significant at the 5 percent level. Based on these synthetic indicators, therefore, one concludes that M&A cross-border activity have not surged during the 1990s.

A more complex picture is obtained by looking at country-level mobility indices in Figures 8.3, 8.4, 8.5 and 8.6. The pattern varies considerably from country to country, and it also varies depending on whether one looks at inward or outward mobility. For instance, the index for inward mobility increase over time for Germany, Greece and the UK, while it has a U-shape for Austria and Finland. Conversely, the outward mobility index has a declining pattern over time for Austria, Belgium, Germany, Greece and Spain. These differences in national histories confirm that it is hard to draw general conclusions about the overall pattern of cross-border M&A activity in the 1990s.

Assessment

Although the process of financial integration may be expected to stimulate a surge in cross-border M&A activity, the data for Europe do not reveal overall that this activity has been more intense than domestic M&A activity.

[46] The data for the number of acquisitions are more reliable than those for their values, since for a number of acquisitions the value is not reported while their occurrence is.

9 The role of institutions

For many of the indicators provided, we have seen that the symptoms of a process of integration are at best weak. This raises the question what might be the remaining obstacles preventing financial market integration. Factors like the legal system, the tax system, the corporate governance arrangements, might each work in the direction of favouring or hindering this process.

This section briefly revises the "importance" of the fiscal and legal framework in explaining at least partly the performance of the proposed indicators and attempts to assess the likely impact of a process of harmonisation in these areas which has been asked from many parts.

9.1 The tax system

It is often argued that further integration of financial markets must proceed broadly in parallel with an adequate process of tax co-ordination. However, the taxation of income and capital is one of the areas in which, in spite of the existence of a Single Market, large differences still exist across the 15 EU Member States, mainly because 15 different company tax systems apply in the area.

The two key steps in the liberalisation of EU financial markets were the free movement of capital and payments directive in 1988 and the adoption of specific sectoral financial services directives (the Second Banking Directive, the Second and Third Life and Non-life Insurance Directives, and the Investment Services Directive).[47] These were to be accompanied by parallel measures in the area of taxation in order to eliminate or reduce the risks of distortion, tax evasion and/or tax avoidance, but the process of tax co-ordination has progressed very gradually and is currently still under way.

A recent study by the EU Commission (2001) on company taxation provides a thorough analysis of the tax obstacles in the Internal Market and shows the existence of substantial differences in corporate tax regimes across EU countries, which can distort the international allocation of investment. The study develops a method to compute effective tax rates, based on the King and Fullerton (1984) approach, as modified by Devereux and Griffith (1998). The method defines a hypothetical investment, identical in all countries, carried out in the manufacturing sector, using specific sources of financing. The different national tax codes are then applied to this hypothetical investment and the effective tax burdens are calculated[48] considering both domestic and cross-border investments.

[47] The aforementioned financial services provide directive, in substance, that a financial institution incorporated in one Member State has a Single Passport recognised throughout the Community. Under that Passport, the relevant EEC financial institution can operate in all Member States either by way of establishment (branches) or by way of cross-border provision of services, subject only, as a rule, to the supervision of its Home Member State regulators.

[48] Two measures are derived: the Effective Marginal Tax Rate (EMTR), which focuses on the impact of tax on the marginal investment (the minimum rate which is required to undertake the investment, calculated as the ratio of the difference between the pre-tax and post-tax of return over pre-tax return), and the Effective Average Tax Rate (EATR), which focuses on the impact of tax on the infra-marginal investment (i.e. firms facing discrete investment choices having positive profitability).

Some findings of this study may be used to explain, at least partly, the performance of some indicators used in the present report. In particular, the study documents that EU countries tax systems tends to favour domestic investments as opposed to foreign investments.[49] This might help explaining the **home bias** observed in portfolio choice.[50]

Take for example the case of dividends subject to double taxation. The dividends are paid out of profits that have usually already been subject to corporation tax. At the shareholder level, be it individual or legal, the dividends are then liable respectively for income and corporation tax. Unless some form of relief applies, this means that the profits are taxed twice: at company and at shareholder level.

A number of Member States grants a tax credit to resident shareholders for the tax paid at company level, but usually this tax credit is not available for non-resident shareholders. As recently confirmed by the ruling of the European Court of Justice (as quoted in EC, 2001), these preferential tax arrangements are not compatible with the free movement of capital.

The Parent-Subsidiary Directive (1990) has attempted to mitigate the effects of double taxation on cross-border dividend payments between parent and subsidiary company by either exempting the dividends or by granting a tax credit equivalent to the tax already paid on distributed profits. It has nonetheless various limitations, which greatly reduce its effectiveness: it applies only to dividend payments between companies – dividends paid to individuals are completely outside the Directive – and to companies which take one of the legal forms set out in the Directive. In addition, its application is compulsory for Member States only if the recipient company has at least a 25-percent holding in the company paying out the dividends.

When considering cross-border investments, considerable differences in the effective tax burden exist across EU countries. The range of variations of the effective tax burdens of a subsidiary of a parent company can reach more than 30 percentage points, according to the location of the parent company and the location of the foreign subsidiary. Among the EU countries, Ireland, Finland, Sweden and UK belong to the low-tax segment and France, Greece, Belgium, Italy and Germany to the high-tax segment. The absence of capital export neutrality[51] may thus lead to distortions in the international allocation of investment as, *coeteris paribus*, investments may take place not in the lowest cost locations but in the lowest tax locations.

Although referred to manufacturing sector (there are no analogous studies for firms operating in the financial services sector), these findings may be used to partly explain the lack of "convergence" observed in our study. For example, fiscal factors might drive our results on the **asset share of foreign banks**. The role of Ireland as international banking centre might be ascribed to the particularly favourable tax system in place in that country, which favours cross-border investments. Also the UK tax system, although not as favourable as the Irish, might encourage cross-border investments, while this is not the case for France and Germany, which feature effective tax rates among the highest in EU and a decrease in the asset share of foreign banks.

[49] However, from a comparison with a previous study (the Ruding Report, 1992), it is found that the reforms undertaken during the last decade seem to have mitigated this bias.

[50] For the literature linking the home bias with taxes on international investments, see Stulz (1981, 1981, 1995), Black (1974), Gordon and Varian (1989).

[51] Under "capital export neutrality" a tax system does not affect the decision by any specific company as to in which country to invest.

A further effect of company tax arrangements is that they might hamper cross-border business restructuring operations. As argued in sections 2 and 4, one of the effects of increasing financial integration is the consolidation of banks and companies across geographic borders. Thus, as markets become more integrated, one might expect an increase in **cross-border M&A activity** relative to domestic M&A activity. However, the data show that in Europe the process of cross-border consolidation and reorganisation is not even barely comparable to that recently observed in US (see Berger *et al.*, 1999). Why, in spite of the parallel lifting of restrictions occurred during the 1990s, the cross-border M&A process in the EU did not follow a pattern similar to that of the US?

The more homogeneous US institutional structure has certainly favoured the better performance of the integration process in the US relative to an international setting like the EU. One aspect of this, in light of the cited findings of the study on Company Taxation, is the lack of tax co-ordination across the EU countries. This suggests that the low performance of cross-border M&A in the EU countries might be partly ascribed to fiscal reasons. In fact, the tax cost of cross-border M&A is often prohibitively high and forces companies to choose economically sub-optimal structures. This matter should be regulated at Community level by the Merger Directive (1990), that creates a common system of taxation applicable to mergers, divisions, transfers of assets and exchanges of shares for companies of different Member States. However, several problems still remain. The Directive is limited in its application[52] and the restructuring operations involve significant tax costs.

However, it must also be said that country-level data do not provide clear evidence that M&A activity is affected by tax concerns. Countries like Ireland, Sweden and Finland, with a tax system potentially favourable to acquisitions by foreign companies, have an outward mobility index (by number) which displays no trend. As for the inward mobility index, there is in general no clear correlation between tax treatment and foreign acquisitions of domestic companies.

Although it does not provide a synthetic indicator of the likely impact of the tax system (effective tax rates for domestic and trans-national investments were computed for the manufacturing sector only), the recent EU study on company taxation highlights important obstacles to financial integration coming from different tax legislation. In-built bias towards domestic investment, different tax treatments on cross-border investments and high cost of restructuring and reorganisation are but few examples of barriers to an increased integration.

9.2 The legal system

The laws of many countries originate from those of England and France. Legal systems based on English laws are typically described as belonging to the common law tradition, while those based on French laws as belonging to the civil, or Roman, law tradition.[53] While common law constitutes a common playing field for the US, this is not so for the EU, where countries have different legal origins and thus different legal systems.

[52] It does not include all companies subject to corporate tax; it does not cover all types of tax charge that can arise upon a restructuring; it does not cover all types of operation that may be involved in a restructuring.

[53] Structurally, the two legal systems operate in very different ways: civil law relies on professional judges, legal codes, and written records, while common law on lay judges, broader legal principles, and oral arguments.

According to some recent studies (La Porta *et al*. 1999), the different origin of the legal system might account for the differences in judicial efficiency observed across countries. Countries belonging to the common law tradition are found to have a more efficient judicial system as compared with those belonging to the civil law tradition. Since higher judicial efficiency can be expected to translate in lower enforcement costs, it may affect the cost of financial intermediation, and therefore the availability and terms of funding to firms and households. For instance, in the credit market one may expect higher judicial efficiency to entail greater availability of credit, lower collateral requirements and in some cases also lower interest rates, as shown by Bianco, Jappelli and Pagano (2001). If so, then the existence of different legal systems across EU countries might erect a further barrier to the integration process in this area as compared to the United States.

Djankov, La Porta, Lopez-de-Silanes and Shleifer (2001) provide an example of the importance of the legal system in shaping the efficiency of the judicial system. Their study presents an analysis of legal procedures triggered by resolving two specific disputes in 105 countries: the collection of a bounced check and the eviction of a non-paying tenant. The data are obtained from Lex Mundi and Lex Africa[54] member firms, which have been asked to fill a questionnaire covering the step-by-step evolution of the procedure before the court. The survey focuses on the complexity of litigation, i.e. on how difficult is for a layperson to pursue a legal procedure in defence of his interests.[55] The analysis leads to an **index of regulation of dispute resolution** (RDR) for each country, a measure of the extent to which legal procedures deviate from the hypothetical benchmark of a third party informally resolving a dispute between two other parties. The index takes values between 0 and 7, with higher values corresponding to a more regulated dispute. The index varies systematically across legal origins: dispute resolution is more heavily regulated in civil law countries than in common law countries, and as a result the expected duration of the dispute is also higher. The authors take this as a possible measure of judicial inefficiency.

Table 9.1 reports the index of Regulation of Dispute Resolution and the **expected duration of the procedure** of collection of a bounced check for the EU countries and for the United States. EU countries are pooled according to their legal origin, and those with a civil law origin are further broken down in three subclasses: French, German and Scandinavian legal origin.

The results for the EU sub-sample confirm those found for the whole sample. The RDR index is higher in the EU than in the United States and is higher for countries with a civil law tradition (all EU countries but Ireland and UK) as compared with those with a common law (IE and UK) tradition. A similar pattern is observed for the expected duration of the procedure of collection of a bounced check (54 days for the US vs. 227 for the EU). Among the EU civil law sub-sample, the Scandinavian countries (Sweden and Finland) have lower RDR index and lower expected duration.

These results show that the expected duration as a measure of judicial efficiency is shaped by the legal structure. The homogeneous legal system of the United States, coupled with the common law tradition, translates into higher judicial efficiency compared with EU countries, especially those of the Euro area. The extent of creditor protection and enforcement of their

[54] Lex Mundi and Lex Africa are international associations of law firms, which include as their members law firms in 115 with offices in countries.

[55] Elements investigated include the various steps in the litigation process: among others, the difficulty in notification procedures, the complexity of the complaint, the possibility of suspension of enforcement because of appeal.

rights should in turn affect the conditions under which European firms are able to borrow. For example, the relative efficiency of courts might affect lending conditions on credit markets and ultimately the rate of return on capital.[56]

Bankruptcy law, and debtor-creditor law more generally, is one of the expressions of a country's legal system and as such it varies considerably across countries. Observers and policy makers have raised concerns about the obstacles that can derive for the process of integration from the dispersed bankruptcy codes that characterise European countries.

Not only there is considerable heterogeneity in the formal structure of bankruptcy codes across European countries but also the actual effectiveness of bankruptcy procedures, their length and practical operation differ greatly across countries. This implies that harmonisation of legal codes in Europe is not enough to guarantee effective harmonisation of bankruptcy procedures. A deeper administrative reform may be needed at least in those countries that suffer lengthy bankruptcy proceedings, and that are the most disadvantaged. Banks may be less eager to extend credit because they receive less formal protection; lack of formal protection implies that intermediaries need to develop informal ways of recovering loans. This is likely not only to be costly but also to require developing specific skills and knowledge. This, in turn, may be reflected in the degree of competition in the financial industry in so far as it discourages entry. Finally, even foreign firms may be discouraged from locating in a country with a poor bankruptcy code for at least two reasons. First, they will anticipate obstacles in raising funds. Second, a lengthy bankruptcy process may seriously damage the firm as it can reduce its value as a going concern.

9.3 Corporate governance arrangements

Extensive research from the United States, Japan, Europe and transition economies suggests that corporate governance strongly affects the behaviour and performance of corporations.

Their role is increasingly important in shaping the process of integration in the EU countries. As pointed out by OECD (1999), international flows of capital enable companies to access financing from a much larger pool of investors. Credible and well understood corporate governance arrangements, which allow investors to identify - with certainty and ease - the ownership and control structure of European corporations, are important as they can help improving the confidence of investors, reduce the cost of capital, and ultimately induce more stable sources of financing.

However, recent discussions of the role of the market for corporate control, the increasing influence of institutional investors, and attempts to harmonise corporate law in Europe have revealed large variations in corporate governance patterns across EU countries (ECGN (1997), Franks and Mayer (1998), Barca and Becht (1999)).

[56] The importance of these factors is witnessed by a recent work by Fabbri (2001), which has studied in a two-country model the role of judicial efficiency in determining the cost of capital and the aggregate activity. Under the assumption that the behaviour of courts affects indirectly the liquidation value of the assets pledged as collateral in a credit contract relationship, the study shows that the cost of capital is lower the higher the country's judicial efficiency. To corroborate the theoretical predictions, the study provides empirical evidence using data sets at firm level for Italy and Spain.

These variations may impose unnecessary uncertainty on investors operating in the Single Market as the lack of adequate disclosure standards may seriously undermine their ability to compete for globally mobile capital, and constitute a further obstacle to the completion of an integrated EU financial market. As reported by ECGN, "international fund managers, deplore obscurity. When disclosure standards are low they demand a high-risk premium. When they are very low they do not invest at all" (ECGN, 1997).

More transparent corporate governance arrangements are thus a necessary prerequisite for countries wanting to exploit all the benefits of the global capital market and promote increased integration. In response to the many pressures in this direction coming from the European Commission (1999) and the scientific community, many European countries are currently undertaking, or at least considering, reform of their corporate law.

An assessment of the relative efficiency of the existing corporate laws and possible directions for their reforms would require a study that goes beyond the scope of this report. It suffices here to stress once more that the existence of these heterogeneous institutional structures gives rise to legal or administrative barriers that frustrate the development of an integrated EU financial market.

9.4 Assessment

From the above discussion, we can conclude that institutional factors, such as the legal structures, the tax systems and the corporate governance arrangements, can play a substantial role in shaping the EU process of integration. By increasing uncertainty for investors operating in the Single Market, the diversity of codes and procedures across the EU countries may constitute a further obstacle to the completion of an integrated financial market

Concerning the legal system, the two quantitative indicators we describe corroborate the existence of strong differences between legal systems. Although limited in scope, the indicator provides reliable and comparable analysis of the degree of complexity of legal procedures. Thus, it can be used to draw a broad picture of the "state" of the legal system at a single point in time.

As for the tax system, it was not possible to construct a synthetic indicator: effective tax rates for domestic and cross-border investments are available for the manufacturing sector only. However, the recent EU study on company taxation has highlighted important obstacles to financial integration coming from different tax legislation. In-built bias towards domestic investment, different tax treatments on cross-border investments and high cost of restructuring and reorganisation are but few examples of barriers to an increased integration.

10. Summary of results and recommendations

The indicators of financial market integration examined in Sections 5 to 9 produce a number of interesting results. In this section we summarise them and draw recommendations concerning the future monitoring of EU financial integration.

The analysis of indicators of **credit and bond market** integration indicates that considerable differences in the degree of integration exist between standardised bond and money markets and the less standardised credit markets.

Evidence based on interest rate differentials in the money and bond markets and evidence from the international portfolio composition of money market and bond market funds reveal that integration is either complete or almost complete in these markets. The impressive reduction of nominal interest rate differentials in the recent years, however, may also be attributed to a reduction in cross-country inflation differentials instead of being due to financial market integration. Nevertheless, the absence of such differentials today implies that these markets are integrated. Given the degree of integration that has been achieved in the money and government bond markets we do not deem it worthwhile to follow integration indicators for these markets in the future.

The picture looks quite different when considering credit markets. Interest rate differentials for mortgages and short-term corporate loans indicate that these markets are far from being integrated. While an acceleration of convergence can be observed for the mortgage markets, only weak signs of convergence can be spotted for the corporate loans market. This evidence is confirmed by an analysis of the presence of foreign banks and the share of assets held by these banks. With the exception of Ireland, Luxembourg, and the United Kingdom the role of foreign banks is marginal with their importance either being stable or even decreasing. Further evidence in this vein comes from an analysis of the asset and liability structure of the national banking systems. The degree of the home bias in these countries is large and, with the exception of Finland, rather stable. Furthermore, an analysis of bank charges for cross-country credit transfers shows that frictions induced by the financial system are still considerable.

Given the incompleteness of the degree of credit market integration in the European Union, we strongly recommend monitoring the future developments in these markets, and particularly the evolution of the interest rate differentials for mortgages and corporate loans. These indicators are easy to construct and can provide a timely picture of the developments. In addition, we suggest monitoring the degree of the home bias in the asset structure of the national banking systems. This indicator is superior to the liability-based indicator since its benchmark has a sounder theoretical underpinning. We do not recommend monitoring the indicators based on the presence of foreign banks. A main problem of these indicators is the lack of meaningful benchmark values. Similarly, we think that indicators based on credit transfer fees should not be followed. Although being an interesting indicator collecting the underlying data seems to bee too costly to allow a regular monitoring activity.

Indicators of European **stock market** integration generally suggest an increasing degree of stock market integration for the Euro area. The correlation of European stock market returns appears rather unstable. Moreover, given the weak theoretical underpinnings and the lack of

meaningful benchmark values, we recommend not to draw conclusions based on simple correlation-based indicators. From a consideration of indicators based on the international portfolio composition of institutional investors emerged that Euro area equity funds moved towards more internationally oriented investment strategies. On average no such trends can be spotted for European Union countries outside the Euro area. An analysis of the portfolio composition of pension funds and insurance companies confirmed this trend. However data was only available until 1999 for these indicators.

We therefore suggest to follow the international investment orientation of equity funds as an indicator of European stock market integration, i.e. the only indicator which is available with a relatively short time lag and which displays a sufficient degree of reliability. Yet, we recommend not to try to draw conclusions concerning the degree of integration of individual EU countries based on this indicator. As the Spanish case shows, poor international diversification in equity funds can be offset by increased international orientation along other dimensions such as pension funds. Instead of considering single countries, we recommend to compute aggregate indices, e.g. for the Euro area or the European Union as a whole.

Indicators based on the **economic decisions of households** suggest that integration has increased, but that risk sharing is still far less than complete in the European Union. The saving-investment correlations have decreased after 1995, which according to Feldstein and Horioka (1980) indicates increased integration of European capital markets. The correlations of consumption growth rates with GDP indicate that consumption in all countries reacts strongly to each country's GDP, suggesting only partial risk sharing in the European Union.

Since the saving-investment correlation are potentially affected by the endogeneity of the saving rate with respect to the investment rate, Feldstein-Horioka regressions should be interpreted with caution. Furthermore, year-by-year regressions are rather unstable for both indicators, due to limited sample size. This limits the usefulness of these indicators. On these grounds, we recommend to place limited reliance on the indicators based on households' decisions. Of the two indicators examined here, saving-investment correlations appear to produce more sensible results.

The analysis of **economic decisions of firms** is based on the cross-border versus within-border merger and acquisition activities. The analysis reveals that cross-border activities did not surge relative to domestic activities in the recent years. This points towards a potentially insufficient degree of financial market integration. This indicator is useful and should be followed, since it allows to track the developments in the individual countries. Clearly, the absence of a relative increase in cross-border mergers and acquisitions in the future would be a negative indicator of financial market integration.

The analysis of the differences in the **legal and institutional frameworks** reveals large and persistent differences between the legal and tax systems in EU countries. These differences may represent a considerable obstacle to future financial market integration.

The indicators of the regulation of dispute resolution and of the collection procedure for a bounced check highlights that civil law countries are more heavily regulated than countries with common law tradition (Ireland and the United Kingdom). In addition, large differences exist even between civil law countries, depending on their legal traditions (French, German, or Scandinavian). Given the difficulties of collecting such indicators, and given that legal systems tend to change only slowly, quantitative indicators appear of limited use.

11. Suggestions for further data collection

The indicators presented and analysed in this report are chosen on the basis of available data. As of today, this represents a binding constraint on the kind of indicators that could be analysed. Based on the previous analysis, here we suggest additional data that could be collected to improve the set of indicators.

In principle, one could collect three types of survey data that would potentially improve indicators of financial market integration, though we argue that not all of them would be equally informative and useful:

- surveys of household portfolios that aim at measuring portfolio biases;
- surveys of firms intended to measure firms' access to foreign credit and security markets;
- surveys of financial product prices to assess the extent to which the law of one price holds.

11.1 Household surveys

In principle, household portfolio surveys should be the ideal data source to obtain precise measures of the "home bias". The analysis of portfolio data in the preceding sections (bank assets, investment funds, pension funds, and insurance companies) has shown that sectoral asset data generally suffer from problems of interpretation when used to assess the degree of potential investment biases. This is because private investors could undo eventual biases in the institutional portfolios via their private portfolio choices. A natural reaction to this problem consists in collecting a pan-European household data set providing comprehensive information on each household's portfolio, including the nationality of the issuers of each asset owned by the household.

However, we strongly advise *against* a survey of this type. Households often have only a vague idea of the degree of international diversification of the investment and pension funds that they hold. This is especially true if one is interested in finer distinctions such as Euro area versus non-Euro area assets. Moreover, it would be difficult to even define what foreign assets are. For instance, if an Italian household buys a Dutch-based equity fund, should this fund by definition count as a foreign asset, irrespective of its portfolio strategy? Presumably, if the fund invests in Italian shares, it should be defined as a domestic asset. It seems unrealistic to explain such arguments to unsophisticated respondents. Moreover, in household surveys financial data are typically subject to large biases and measurement errors due to under-reporting of financial assets and non-responses. In our view, despite their potential ability to yield direct estimates of the "home bias", household surveys are rather unpromising for the purpose at hand, due to implementation problems.

11.2 Firm surveys

In contrast, a **firm survey** collecting information about the access of firms to foreign credit and security markets seem much easier to carry out. Firms typically know what share of their debt has been borrowed from foreign banks, or may give reasons for why they preferred to stay with domestic creditors. They may also know if the holders of their securities are domestic or foreign. This would overcome the problem that prevented us from constructing aggregate indicators based on foreign bond issues scaled by total bond issues (i.e. the lack of information on the nationality of the bond bearer).

Such a survey could also inquire about the interest rates, fees and collateral requirements charged by domestic and foreign banks to each firm. One might ask why one needs to collect survey data on interest rates, considering that one has access to those produced by financial markets. The answer is that, in testing for financial market integration, the data produced by financial markets are reliable only insofar as they relate to well-identified issuers, such as governments, because this allows us (at least in principle) to control for default risk. When instead we try to compare the loan rates charged by banks in different countries, we typically rely on the average rate charged on a loan portfolio whose composition and risk is not precisely known, and may possibly change over time. In other words, we cannot seriously adjust for risk differences and for their changes over time, and this may vitiate the results obtained relying on interest rate differentials.

Clearly, a prerequisite for carrying out such a survey is the non-trivial task to draw a representative firm sample for the whole of Europe, accurately stratified by country, sector and firm size. Also, it is important to check whether the questionnaire is equally understandable to firms in different countries, in the light of the different practices and financial instruments they may be acquainted with.

The survey should be tightly focused on a narrow set of questions, such as (i) the international diversification of firms' capital structure and (ii) the terms at which they can borrow. The number of questions should be kept at a minimum. This requirement is not only instrumental to making it cost-effective, but also to obtain a high response rate also from smaller firms (which may not have the human resources readily available to respond to a comprehensive questionnaire) and to induce firms to respond on a regular basis. It is advisable to include both quantitative and qualitative questions to probe the reasons for a possible absence of international diversification.

11.3 Surveys of financial product prices

As we have already explained, price and return data are of great interest in testing for international market integration, because their results can be easily compared against the benchmark of the law of one price. Such surveys could potentially cover a wide array of standardised financial products including household mortgage loans, car loans, life insurance policies, commercial papers, corporate loans with standard collateral or line of credit, the purchase (or sale) of an investment fund share or a stock transaction, etc.

Financial product price comparisons based on survey data have a considerable advantage compared to the price differentials analysed in Section 5, namely they allow to compare more

carefully identical assets with each other. The interest rate differentials for the mortgage loan rates analysed in Section 5.1, for example, are likely to differ partly because of different collateral requirements or different maturities for which we have not been able to account for.

A further advantage of such surveys is that they are akin to surveys that the European Commission is already carrying out for the product market (collecting and analysing supermarket data). As is the case for product market surveys, the essential prerequisite for such surveys to produce useful results is a precise characterisation of the product. This is obviously more difficult for financial markets where simple 'bar coding' is not available.

A difficult preliminary step, therefore, consists of a tight legal characterisation of each contract and a previous check that these contracts are actually 'on sale' in all or most European Union countries. An equally important step consists of identifying the possible respondents, which presumably should be different types of financial intermediaries for each of the considered contracts. We recommend that the surveys start with a modest scope to obtain data for three or four standard financial contracts. As experience accumulates, the scope of the surveys may then be gradually broadened.

References

Adjaoute, Kpate, and Jean-Pierre Danthine (2000), "EMU and Portfolio Diversification Opportunities," FAME Research Paper no. 31, April.

Adjaoute, Kpate, and Jean-Pierre Danthine (2001), " Portfolio Diversification: Alive and Well in Euroland!" Working Paper, Université de Lausanne, July.

Armstrong, Harvey W., V.N. Balasubramanyam, and Mohammed A. Salisu (1996), "Domestic Savings, Intra-national and Intra-European Union Capital Flows, 1971-1991," *European Economic Review* 40 (6), June, 1229-1235.

Asdrubali, Pierfederico, Bent E. Sørensen and Oved Yosha (1996), "Channels of Interstate Risk-Sharing," *Quarterly Journal of Economics* 111 (4), November, 1081-1110.

Ayuso, Juan and Roberto Blanco (1999), "Has Financial Market Integration Increased during the Nineties?," Banco de España, Servicio de Estudios, Documento de Trabajo n. 9923, December.

Barca, Fabrizio and Marco Becht (eds.) 1999, *Ownership and Control in Europe*, Oxford University Press.

Bekaert, Geert and Campbell R. Harvey (1995), "Time-Varying World Market Integration," *Journal of Finance* 50(2), June, 403-444.

Bekaert, Geert, Campbell R. Harvey and Robin L. Lumsdaine (1998), "Dating the Integration of World Equity Markets," NBER Working Paper no. 6724, September, Cambridge MA.

Berger, Allen N., Anil K. Kashyap, and Joseph Scalise (1995), "The Transformation of the U.S. Banking Industry: What a Long, Strange Trip It's Been," *Brookings Papers on Economic Activity* 2, 55-218.

Berger, Allen N., Rebecca S. Demsetz, and Philip E. Strahan (1999), "The Consolidation of the Financial Service Industry: Causes, Consequences, and Implications for the Future," *Journal of Banking and Finance* 23 (2-4), February, 135-194.

Bianco, Magda, Tullio Jappelli and Marco Pagano (2001), "Courts and Banks: Effects of Judicial Enforcement on Credit Markets," CSEF Working Paper 58, http://www.dise.unisa.it/WP/wp58.pdf, June 2001.

Black, Fisher (1974), "International Capital Market Equilibrium with Investment Barriers", *Journal of Financial Economics*, 337-352.

Blandón, Josep García (2000), "Cross-border Banking in Europe: An Empirical Investigation", Universitat Pompeu Fabra.

Bodenhorn, Howard (1995), "A More Perfect Union: Regional Interest Rates in the United States, 1880-1960" *Anglo-American Financial Systems- Institutions and Markets in the Twentieth Century*, edited by M.D. Bordo and R.Sylla, New York University Salomon Center, New York NY, 415-454.

Boleat, Mark (1987), *National Housing Systems: A Comparative Study*. London: Croom Helm.

Bottazzi, Laura, Paolo Pesenti and Eric van Wincoop (1996), "Wages, Profits and the International Portfolio Puzzle", *European Economic Review* 40, 219-254.

Boyd, John H., and Mark Gertler (1993), "U.S. Commercial Banking: Trends, Cycles, and Policy," *NBER Macroeconomics Annual*, 319-368.

Buch, Claudia M. (2000), "Financial Market Integration in the U.S.: Lessons for Europe?", Kiel Working Paper No. 1004, September.

Calcagnini, Giorgio, Fabio Farabullini and Donald D. Hester (2000), " Financial convergence in the European Monetary Union?", University of Wisconsin - Madison, mimeo, November.

Cecchini, Paolo, (1988), "The European Challenge", Commission of the European Communities, Gower Press, Brookfield.

Centeno, Mário and Antonio S. Mello (1999), "How Integrated are the Money Market and Bank Loans Market within the European Union?", *Journal of International Money and Finance* 18 (1), February, 75-106.

Chen, Zhiwu and Peter J. Knez (1995), "Measurement of Market Integration and Arbitrage," *Review of Financial Studies* 8 (2), Summer, 287-325.

Chiuri, Maria Concetta and Tullio Jappelli (2001), Financial Market Imperfections and Home Ownership: A Comparative Study, CEPR Discussion Paper n. 2717, March.

Cochrane, John H. (1991), "A Simple Test of Consumption Insurance," *Journal of Political Economy* 99(5), October, 957-76.

Corvoisier, Sandrine and Reint Gropp (2001), "Bank concentration and retail interest rates," European Central Bank, Working Paper no. 72.

Danthine, Jean-Pierre, Francesco Giavazzi and Ernst-Ludwig von Thadden (2000), "European Financial Markets After EMU: A First Assessment," CEPR Discussion Paper no. 2413, April.

De Bandt, Oliver and Philip Davis (1999), "A Cross-country Comparison of Market Structures in European banking", ECB WP n. 7, September.

Devereux, Michael P. and R. Griffith (1998), "The Taxation of Discrete Investment Choices", The Institute for Fiscal Studies, Working Paper N° W98/16, London.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2001) "Legal Structure and Judicial Efficiency: the Lex Mundi project", World Bank, mimeo, October.

Economic Research Europe Ltd. (1996), "Impact & Effectiveness of The Single Market: Credit Institutions and Banking", September.

Eichengreen, Barry (1984), "Mortgage Interest Rates in the Populist Era," *American Economic Review* 74(5), December, 995-1015.

European Central Bank (ECB) (1999), *Possible Effects of EMU on the EU Banking Systems in the Medium to Long Term*, Frankfurt am Main.

European Commission (1992), "Communication to the Council and to Parliament subsequent to the conclusions of the Ruding Committee indicating guidelines on company taxation linked to the further development of the internal market" [Sec(92)1118], Brussels.

European Commission (1999), "Financial Services: Implementing the framework for financial markets: Action Plan," COM(1999)232, Brussels.

European Commission (2001), "Company Taxation in the Internal Market", Brussels, October.

European Corporate Governance Network (1997), *The Separation of Ownership and Control: A Survey of 7 European Countries*. Preliminary Report to the European Commission. Brussels: European Corporate Governance Network.

European Mortgage Federation (1990), *Mortgage Credit in the European Community*. Brussels: EC Mortgage Federation.

European Mortgage Federation (1996), *Comparative Study on Real Estate Enforcement Procedure in the EC Countries*. Brussels: EC Mortgage Federation.

European Mortgage Federation (1997), *Hypostat 1986-1996*. Brussels: EC Mortgage Federation.

Fabbri, Daniela (2001), "Legal Institutions, Corporate Governance and Aggregate Activity: Theory and Evidence", CSEF Working Paper 72, October.

Favero, Carlo, Alessandro Missale and Gustavo Piga (2000), "EMU and public debt management: One money, one debt?", *CEPR Policy Paper*, No. 3, January 2000.

Feldstein, Martin and Charles Horioka (1980), "Domestic Savings and International Capital Flows," *The Economic Journal* 90 (358), June, 314-329.

Franks, Julian and Colin Mayer (1998), "Ownership and Control in Europe" in the *Palgrave Dictionary of Law and Economics*.

Fratszcher, Marcel (2001), "Financial Market Integration in Europe: on the Effects of EMU on Stock Markets," European Central Bank Working Paper Series n. 48.

French, Kenneth R. and James M. Poterba (1991), "International diversification and international equity markets," *American Economic Review* 81(2), May, 222-226.

Galati, Gabriele, and Kostas Tsatsaronis (2001), "The Impact of the Euro on Europe's Financial Markets," BIS Working Paper No. 100, July.

Golberg Koujianou, Pinelopi and Frank Verboven (2001) "Market Integration and convergence to the law of one price: evidence from the European car market", NBER working paper no. 8402.

Gordon, Roger H. and Hal R. Varian, (1989), "Taxation of Asset Income in the Presence of a World Securities Market", *Journal of International Economics,* **26**, 205-226.

Guiso, Luigi, Michalis Haliassos and Tullio Jappelli (2001), *Household Portfolios*, MIT Press.

Hardouvelis, Gikas A., Dimitrios Malliaropoulos and Richard Priestley (1999), "EMU and European Stock Market Integration," CEPR Discusssion Paper no. 2124, April.

Heitfield, Erik A. (1999), "What do Interest Rate Data Say About the Geography of Retail Banking Markets?" *Antitrust Bulletin* 44 (2), Summer, 333-347.

International Monetary Fund (1999), International Financial Statistics Yearbook.

Jackson , William E. III (1992), "Is the Market Well Defined in Bank Merger and Acquisition Analysis?", *Review of Economics and Statistics* 74 (4), November, 655-661.

Jappelli, Tullio and Marco Pagano (1994), "Saving, growth and liquidity constraints", *Quarterly Journal of Economics* 109 (1), February, 83-109.

Jayaratne, Jith, and Philip Strahan (1996), "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation", *Quarterly Journal of Economics* 111 (4), August, 639-670.

King, Mervyn A. and Don Fullerton (1984), "*The Taxation of Income from Capital*," NBER University of Chicago Press, Chicago.

Kleimeier, Stefanie and Harald Sander (2000), "Regionalisation versus Globalisation in European Financial Market Integration: Evidence from Co-integration Analyses", *Journal of Banking and Finance* 24 (6), June, 1005-1043.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1997), "Legal Determinants of External Finance," *Journal of Finance* **52**(3), 1131-1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1998), "Law and Finance," *Journal of Political Economy* **107** (6), 1113-1155.

Lea Michael J. and Douglas B. Diamond (1992), "The decline of special circuits in developed country housing finance", *Housing Policy Debate*, 3, 143-53.

Lea Michael J., R. Welter and A. Dubel (1997), "Study on mortgage credit in the European economic area structure of the sector and application of the rules in the Directives 87/102 and 90/88," Final Report Commission of the European Union, DGXXIV, Project 96098.

Lea, Michael J. and Douglas B. Diamond (1991), "Housing finance arrangements in the European Community: a Comparative Analysis", Office for Housing Policy Research Working Paper, Fannie Mae, Washington DC, July.

Lewis, Karen K. (1994), "Puzzles in International Financial Markets," NBER Working Paper n. 4951, Cambridge MA, December.

Lewis, Karen K. (1999), "Trying to Explain the Home Bias in Equities and Consumption," *Journal of Economic Literature*, 37 (2), June, 571-608.

Mace, Barbara J. (1991), "Full Insurance in the Presence of Aggregate Uncertainty," *Journal of Political Economy* 99(5), October, 928-956.

Maclennan, Duncan, John Muellbauer and Mark Stephens (1999), "Asymmetries in housing and financial market institutions and EMU," CEPR Discussion Paper n. 2062, January.

McCrone, Gavin and Stephens Mark (1995), "*Housing Policy in Britain and in Europe*", London: UCL Press.

Obstfeld, Maurice (1994), "Are Industrial-Country Consumption Risks Globally Diversified?" in Leonardo Leiderman and Assaf Razin, eds., *Capital Mobility: The Impact on Consumption, Investment and Growth* (Cambridge University Press, New York).

OECD (1999), "OECD Principles on Corporate Governance", April.

Petersen, Mitch, and Raghuram Rajan (2000), "Does Distance Still Matter? The Information Revolution in Small Business Lending", NBER Working Paper no. 7685, May, Cambridge MA.

Portes, Richard and Hélène Rey (1999), "The Determinants of Cross-Border Equity Flows," CEPR Discussion Paper no. 2225, September.

Quah, Danny (1993), "Galton's Fallacy and Tests of the Convergence Hypothesis", *Sandinavian Journal of Economics,* 95 (4), 427-43.

Santillàn Javier, Marc Bayle and Christian Thygsen (2000), "The Impact of the Euro on money and bond markets", European Central Bank, Occasional Paper Series no.1.

Sentana, Enrique (2000), "Did the EMS Reduce the Cost of Capital?", CEPR Discussion Paper no. 2640, December.

Shorrocks, Anthony F. (1978), "The Measurement of Mobility," *Econometrica* 46, 1013-1024.

Sørensen, Bent E. and Oved Yosha (1997), "International Risk Sharing and European Monetary Unification", mimeo.

Stigler, George J. and Robert A. Sherwin (1985), "The Extent of the Market," *Journal of Law and Economics*, **28** (3), October, 555-585.

Stulz, René M. (1981), "A Model of International Asset Pricing," *Journal of Financial Economics*, **9**, 383-406.

Stulz, René M. (1981), "On the Effects of Barriers to International Investment," *Journal of Finance*, **36**, 923-934.

Stulz, René M. (1995), "International Portfolio Choice and Asset Pricing: An Integrative Survey," working paper, Ohio State University.

Stulz, René M., 1999. "Globalization of Equity Markets and the Cost of Capital," NBER working paper no. 7021, March, Cambridge MA.

Tesar, Linda L. and Ingrid M. Werner (1995), "Home Bias and High Turnover," *Journal of International Money and Finance* **14** (4), August, 467-92.

Townsend, Robert (1994), "Risk and Insurance in Village India," *Econometrica*, **62** (3), May, 539-591.

van Wincoop, Eric (1994), "Welfare Gains from International Risk Sharing," *Journal of Monetary Economics*, 34 (2), October, 75-200.

White, William R. (1998), "The Coming Transformation of Continental European Banking?", Bank for International Settlements, Working Paper n. 54, June.

World Bank (2001), *World Bank Development Report 2002*, Chapter 6: The Judicial System.

Table 4.1: Set of potential indicators of financial market integration

<table>
<tr><th>The indicator measures the effect of financial integration on:</th><th>Price-based indicators</th><th>Quantity-based indicators</th></tr>
<tr><td rowspan="3">Credit and bond markets</td><td rowspan="2">Interest rate differentials in the money market, bond market, mortgage market, and corporate loan market</td><td>Importance of foreign banks (asset shares and number)</td></tr>
<tr><td>Foreign assets and liabilities held by national banking sectors</td></tr>
<tr><td>Cross-border banking fees</td><td>International Diversification of Bond and Money Market Funds</td></tr>
<tr><td>Stock markets</td><td>Correlation of national stock market returns</td><td>International Diversification of Equity Funds, Pension Funds, and Insurance Companies</td></tr>
<tr><td rowspan="2">Household decisions</td><td colspan="2">Saving-investment correlations</td></tr>
<tr><td colspan="2">Consumption correlation across countries</td></tr>
<tr><td>Corporate decisions</td><td colspan="2">Cross-border M&A activity</td></tr>
<tr><td>Legal Institutions</td><td colspan="2">Dispute Resolution Index, Dispute Duration Index</td></tr>
</table>

Table 5.1: Average Spreads Before and After 1999

The spreads are computed as difference between the rate reported in the first row of the table and the German counterpart. The first and the second column display the spread of the interbank 3-months rate before and after 1999. The third and the fourth the spread of the 10-years benchmark bond yields before and after 1999. The fifth and sixth the spread of the mortgage rates. The seventh and the eight the spread of the loans to enterprises rates.

	Interbank 3-months rates		Benchmark 10-years yields		Mortgage rates		Corporate loans rates	
	Before '99	After '99	Before '99	After '99	Before '99	After '99	Before '99	After '99
Austria	9.729168	0	15.05063	25.01576	46.97778	0.121213	-89.06667	-199.303
Belgium	7.437499	0	31.84375	31.01848	-7.833329	34.57576	-332.0417	-342.6364
Denmark	79.85417	53.03571	85.45625	37.29969	n.a.	n.a.	-166.8462	-245.875
Finland	40.22917	0	84.14375	22.36242	19.33333	-40.81818	-249.4583	-350.8788
France	74.25	0	20.82916	12.61211	183.3125	72.54546	-142.1667	-307.5455
Greece	1059.188	380.0909	n.a.	n.a.	n.a.	187.7273	1234.063	413.4242
Ireland	216.4792	0	84.56041	14.3294	87.1875	-49.12121	201.8542	86.85543
Italy	403.5833	0	261.925	32.21788	488.125	43.12121	250.9375	-207.4849
Luxembourg	n.a.	n.a.	-11.90833	18.92212	n.a.	n.a.	n.a.	n.a.
Netherlands	-11.625	0	-0.5895856	14.18515	12.79167	16.09091	-435.3125	-376.1515
Portugal	315.7708	0	203.6956	32.72121	376.0833	-3.121212	245.3125	-248.3939
Spain	298.6458	0	207.6242	27.65091	212.625	-27.54545	-53.9375	-335
Sweden	223.6875	-7.249999	171.3021	26.65121	185.6667	92.75	-45.37501	-304
UK	307.8125	179.6509	130.4375	19.40091	165.5417	140.8182	n.a.	n.a.

Table 5.2: Beta Convergence

The dependent variable in the first column is the change of the spread of interbank 3-months rates; in the second in the change of the spread of the 10-years benchmark yields; in the third the mortgage rates and in the fourth the rates on loans to enterprises up to 1 year. The specification includes a full set of country dummies, one lag of the level and lags 1 and 2 of the dependent variable. One-starred coefficient estimates are significant at the 5% level; two-starred are significant at the 1% level. The F-statistics tests the equality of the speed of convergence before and after the 1999. The associated p-values are shown in parentheses.

Estimation interval:	Interbank 3-months rates	Benchmark 10-years yields	Mortgage rates	Corporate loans rates
$\beta_{pre\text{-}emu}$	-0.0302**	-0.0407**	-0.0135**	-0.0004
	(0.0093)	(0.0053)	(0.0045)	(0.0052)
$\beta_{post\text{-}emu}$	-0.0764**	-0.0791*	-0.0724**	-0.0203**
	(0.0216)	(0.0360)	(0.0125)	(0.0075)
Austria	-0.0935	-0.0039	-0.0177	0.1415
	(0.0830)	(0.0212)	(0.0253)	(0.0726)
Belgium	-0.1077	-0.0062	-0.0042	0.1383
	(0.0831)	(0.0211)	(0.0252)	(0.0806)
Denmark	-0.0924	0.0003	n.a.	n.a.
	(0.0819)	(0.0209)		
Finland	-0.1083	-0.0232	-0.0364	0.1306
	(0.0825)	(0.0209)	(0.0244)	(0.0787)
France	-0.1267	-0.0134	n.a.	0.1463
	(0.0820)	(0.0215)		(0.0754)
Greece	-0.0149	n.a.	-0.0373	n.a
	(0.0953)		(0.0255)	
Ireland	-0.0891	-0.0072	n.a.	n.a.
	(0.0801)	(0.0210)		
Italy	-0.1205	-0.0150	0,120833	0.1052
	(0.0790)	(0.0213)	(0.0241)	(0.0648)
Luxembourg	n.a.	-0.0033	n.a.	n.a.
		(0.0215)		
Netherlands	-0.1007	-0.0113	0,157639	0.1614
	(0.0834)	(0.0216)	(0.0411)	(0.0840)
Portugal	-0.1439	-0.0088	-0.0298	0.0641
	(0.0795)	(0.0210)	(0.0251)	(0.0653)
Spain	-0.1194	-0.0151	n.a.	0.0985
	(0.0795)	(0.0209)		(0.0737)
Δi_{t-1}	-0.3886**	-0.0158	0.3136**	-0.0833*
	(0.0315)	(0.0306)	(0.0340)	(0.0380)
Δi_{t-2}	-0.0054	-0.0349	0.0350	-0.0126
	(0.0310)	(0.0301)	(0.0330)	(0.0378)
Constant	0.0970	0.0153	0.0195	-0.1900**
	(0.0625)	(0.0140)	(0.0134)	(0.0588)
Observation	1004	1014	807	699
R-squared	0.1877	0.0766	0.1687	0.0621
F-test	6.42	1.28	21.90	9.63
	(0.0114)	(0.2582)	(0.0001)	(0.0020)

Table 5.3: Sigma convergence

In the first two columns, the dependent variable is the cross-country standard deviation of the 3-months interbank rate within the relevant month for the non-Euro zone and for the Euro zone respectively; in the third and fourth column, the change of the spread of the 10 years benchmark; in the fifth and sixth column, the mortgage rate and in the seventh and eight column the rate on loan to enterprises up to 1 year. The explanatory variable is a linear time trend. The regressions are estimated with OLS. Standard errors are shown in parentheses. One-starred coefficient estimates are significant at the 5% level; two-starred are significant at the 1% level. The null H_{0A} is that the trend before and after the emu is equal. The null H_{0b} is that the trend across the two groups of countries is equal.

	Interbank 3-months rates		Benchmark 10-years yields		Mortgage rates		Corporate loans rates	
	Euro and non Euro-zone	Euro-zone	Euro and non Euro-zone	Euro-zone	Euro and non Euro-zone	Euro-zone	Euro and non Euro-zone	Euro-zone
$\sigma_{pre\text{-}emu}$	-0.0021	-0.0182**	-0.0150**	-0.0185**	-0.0060**	-0.0094**	-0.0036**	-0.0107**
	(0.0013)	(0.0019)	(0.0005)	(0.0006)	(0.0009)	(0.0012)	(0.0013)	(0.0016)
$\sigma_{post\text{-}emu}$	-0.0429**	Convergence achieved	-0.0012**	0.0005	-0.0176**	-0.0058**	-0.0344**	-0.0131**
	(0.0022)		(0.0009)	(0.0011)	(0.0016)	(0.0021)	(0.0022)	(0.0028)
$\alpha_{pre\text{-}emu}$	69.2651**	276.7812**	214.6554**	261.9454**	102.0929**	147.8907**	97.9599**	180.5029**
	(17.2878)	(25.0592)	(7.1433)	(8.6341)	(12.2355)	(16.0733)	(17.2419)	(21.6647)
$\alpha_{post\text{-}emu}$	652.3706**	Convergence achieved	20.6913	-5.3027	271.4765**	94.2660**	539.3032**	213.6257**
	(33.0800)		(13.6687)	(16.5214)	(23.4126)	(30.7561)	(32.9922)	(41.4553)
Observations	81	81	81	81	81	81	81	81
R-squared	0.9895	0.9548	0.9812	0.9748	0.9814	0.9647	0.9931	0.9785
F-test	249.16		166.49	216.81	40.01	2.19	143.02	0.55
H_{0A}	(0.00001)		(0.00001)	(0.00001)	(0.00001)	(0.1431)	(0.00001)	(0.4598)
F-test	125.46		233.45	18.20	60.03	234.97	80.65	235.87
H_{0B}	(0.00001)		(0.00001)	(0.0001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)

Table 5.4: Cross-border bank credit transfers

The table reports by country of transfer origin the average costs (columns 2-4), the standard deviation of costs (columns 5-7), and the average duration (columns 8-10) of a 100 Euro cross-border bank credit transfer.

	Average costs (Euro)			Standard deviation of costs (Euro)			Average delay (days)		
	1999	**2001**	**Change**	**1999**	**2001**	**Change**	**1999**	**2001**	**change**
Austria	10.61	17.40	+6.79	-	-	-	3.62	2.97	-0.65
Belgium	13.37	11.87	-1.50	4.05	1.25	+2.80	2.19	3.30	+1.11
France	16.88	18.06	+1.18	10.64	6.27	-4.40	2.09	2.06	-0.03
Germany	13.78	11.93	-1.85	3.36	3.69	+0.33	4.19	3.31	-0.88
Ireland	25.98	25.04	-0.94	3.67	6.68	+3.01	3.24	5.91	+2.67
Italy	18.28	19.74	+1.46	12.09	6.04	-6.05	3.63	2.88	-0.75
Luxembourg	8.91	9.58	+0.67	-	-	-	3.65	3.38	-0.27
Netherlands	10.00	11.45	+1.45	6.83	8.41	+1.58	3.03	3.78	0.75
Portugal	29.68	31.04	+1.36	9.98	4.53	-5.45	3.97	2.84	-1.13
Spain	20.5	20.56	+0.06	3.61	6.69	+3.08	3.81	2.55	-1.26
Mean	17.10	17.37	+0.27	6.51	5.45	-1.06	3.41 (3.42)*	3.31 (3.05)*	-0.10 (-0.37)*
Std.Deviation	6.66	6.53	-0.13	-	-	-	0.72 (0.75)*	0.98 (0.50)*	+0.26 (-0.25)*

*values when excluding Ireland from the sample

Table 5.5: Cross-border bank credit transfers – Country pairs

In columns 2 and 3 the table reports for the country pairs indicated in columns 1 (country1-country2) the difference between the average costs of a transfer from country 1 to country 2 minus the average costs of a transfer from country 2 to country 1. In columns 4 and 5 the table reports the standard deviation of the cost difference between a transfer from bank A in country 1 to bank B in country 2 and the costs of same transfer in the opposite direction.

	Average cost differences between countries depending on direction of transfer (Euro)		Standard deviation of price differences for inverted transfers between given banks (Euro)	
	1999	**2001**	**1999**	**2001**
Belgium - Germany	-1.71	-2.91	5.83	3.89
Italy - Austria	7.35	0.93	11.65	11.84
France - Netherlands	3.15	6.52	12.94	8.81
Ireland - Finland	11.88	13.89	9.07	6.96
Spain - Portugal	-5.77	-8.29	8.08	6.80
Mean*	**5.97**	**6.51**	**9.51**	**7.66**

- For the average price differences the table reports the mean of the absolute values.

Table 5.6: Share of foreign banks

The table reports the share of foreign banks in 1990 and 1997 or the closest year for which data was available. The 1990 value for Ireland and Sweden refers to 1991, the one for Denmark to 1992. The 1997 value reported for Sweden refers to 1996.

	Asset share of foreign banks		Number of foreign banks as a fraction of total banks	
	1990	**1997**	**1990**	**1997**
Austria	0.0272	0.0142	0.2800	0.2258
Belgium	0.0271	0.0155	0.2666	0.3889
Denmark	0.0022	0.0018	0.0541	0.0577
France	0.1524	0.0239	0.2500	0.1739
Germany	0.0322	0.0256	0.2558	0.2517
Greece	0.0067	0.0329	0.0909	0.2307
Ireland	0.1236	0.6585	0.3333	0.6470
Italy	0.0008	0.0005	0.0370	0.0526
Luxembourg	0.6566	0.5809	0.8688	0.8830
Netherlands	0.1806	0.0178	0.4000	0.3214
Portugal	0.0307	0.0327	0.1111	0.2143
Spain	0.1382	0.1003	0.2253	0.2737
Sweden	0.0502	0.0112	0.3333	0.1818
UK	0.2809	0.2167	0.4722	0.4848
Sample moments (all countries)				
Mean	0.1221	0.1238	0.2842	0.3138
Std.Deviation	0.1749	0.2180	0.2117	0.2272
Sample moments excluding Ireland and Luxembourg				
Mean	0.0774	0.0411	0.2314	0.2381
Std.Deviation	0.0894	0.0611	0.1365	0.1232

Table 5.7: Share of foreign assets and liabilities

The table reports the share of foreign assets and liabilities of the national banking sectors in the Euro area for January 1999 and September 2001. Foreign assets and liabilities include assets of other Euroland members. Greece is not included in the asset figure of January 1999. Greece, Portugal, and Ireland are not included in the liability figure of January 1999.

	Share of foreign assets		Share of foreign liabilities	
	Jan. 1999	**Sept. 2001**	**Jan. 1999**	**Sept. 2001**
Euro area	17.2 %	18.9%	33,3%	36,8%

Table 7.1: Capital mobility regressions

The table reports the slope coefficients of cross-country OLS regressions of the gross investment rate on the gross saving rate. One star indicates 5% significance level; two stars 1% level.

Year	Coefficient	Standard Error	R-squared
1980	1.0819*	0.2402	0.84
1981	0.9642*	0.2596	0.78
1982	0.8906*	0.2606	0.74
1983	0.9558*	0.2288	0.81
1984	0.8014**	0.1728	0.84
1985	0.8181*	0.2865	0.67
1986	0.7014	0.4465	0.38
1987	0.9392*	0.3038	0.70
1988	0.7374*	0.2210	0.69
1989	0.9120*	0.3092	0.63
1990	0.7745*	0.2550	0.61
1991	0.6395*	0.2004	0.59
1992	0.6289**	0.1554	0.70
1993	0.6912**	0.1627	0.69
1994	0.8145*	0.2434	0.58
1995	-0.0218	0.2424	0.00
1996	-0.0366	0.2370	0.00
1997	-0.1293	0.2448	0.02
1998	-0.2920	0.2548	0.10
1999	-0.3992	0.2644	0.16
2000	-0.4858	0.2470	0.24

Table 7.2: Risk-sharing regressions

The table reports the slope coefficients of cross-country OLS regressions of the growth rate of consumption on the growth rate of GDP. One star indicates 5% significance level; two stars 1% level.

Year	Coefficient	Standard Error	R-squared
1980	0.7169*	0.2709	0.3500
1981	0.7469*	0.3096	0.3092
1982	0.5588	0.6162	0.0595
1983	1.0526**	0.3399	0.4245
1984	0.7062**	0.1818	0.5372
1985	1.6267*	0.7086	0.2884
1986	1.0930**	0.2562	0.5834
1987	0.6437**	0.1512	0.5823
1988	0.0875	0.7416	0.0011
1989	0.8892**	0.2500	0.4931
1990	0.4437*	0.1928	0.2894
1991	1.0887**	0.1053	0.8917
1992	1.0302**	0.1713	0.7355
1993	0.4209	0.2658	0.1617
1994	0.9500**	0.1561	0.7402
1995	0.2443*	0.1087	0.2798
1996	0.6216**	0.0700	0.8586
1997	0.5438**	0.1121	0.6443
1998	0.6297**	0.0957	0.7689
1999	0.6297**	0.0957	0.7689
2000	0.6708**	0.0860	0.8238

Table 9.1: Regulation of Dispute Resolution index and expected duration of the procedure of collection of a bounced check

Collection of a bounced check		RDR	Duration
Austria		4,23	434
Belgium		2,54	120
Denmark		2,42	83
France		3,21	181
Finland		3,88	240
Germany		3,38	154
Greece		3,83	315
Ireland		3,36	130
Italy		3,86	645
Luxembourg		4,21	210
Netherlands		3,75	39
Portugal		4,58	420
Spain		5,96	147
Sweden		3,67	190
UK		2,51	101
EU15 mean		3,69	227
US		2,54	54
EU legal origin	Common law	2,93	115,5
	Civil law	3,81	244,5
	French German Scandinavian	3,99 3,80 3,32	259,5 294 115,5

Source: Djankov *et al.* (2001)

Figure 5.1: Interbank 3-months rate, January 1995 – September 2001

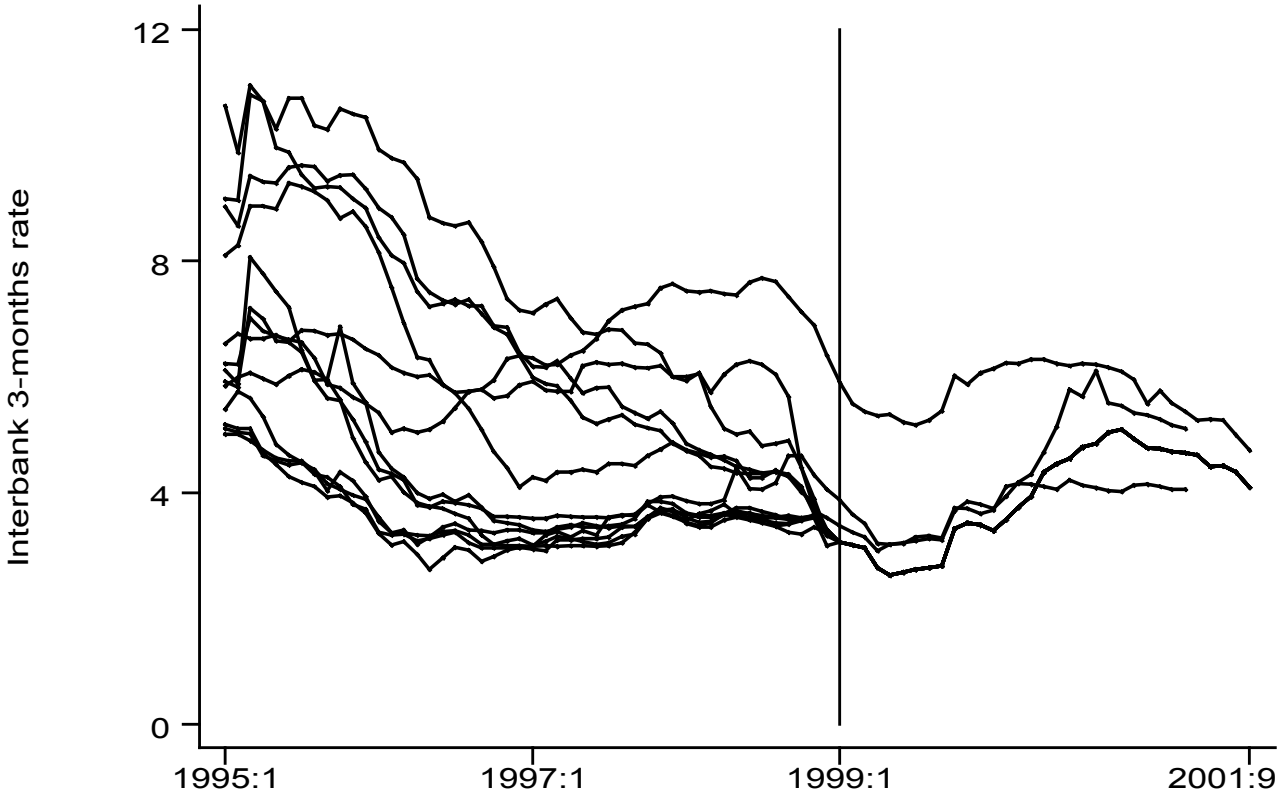


Figure 5.2: Interbank 3-months rate, January 1995 – September 2001, by countries

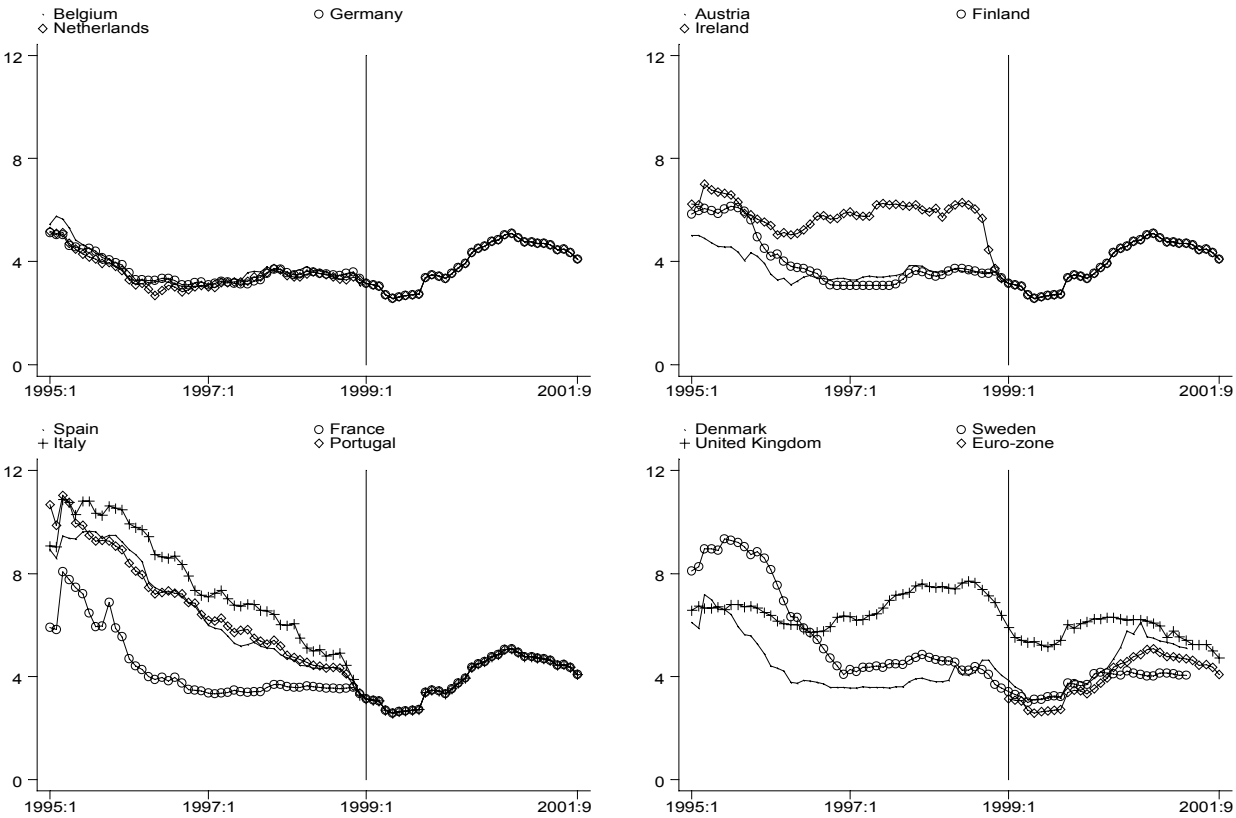


Figure 5.3: 10-years benchmark yields, January 1995 – September 2001

Figure 5.4: 10-years benchmark yields, January 1995 – September 2001, by countries

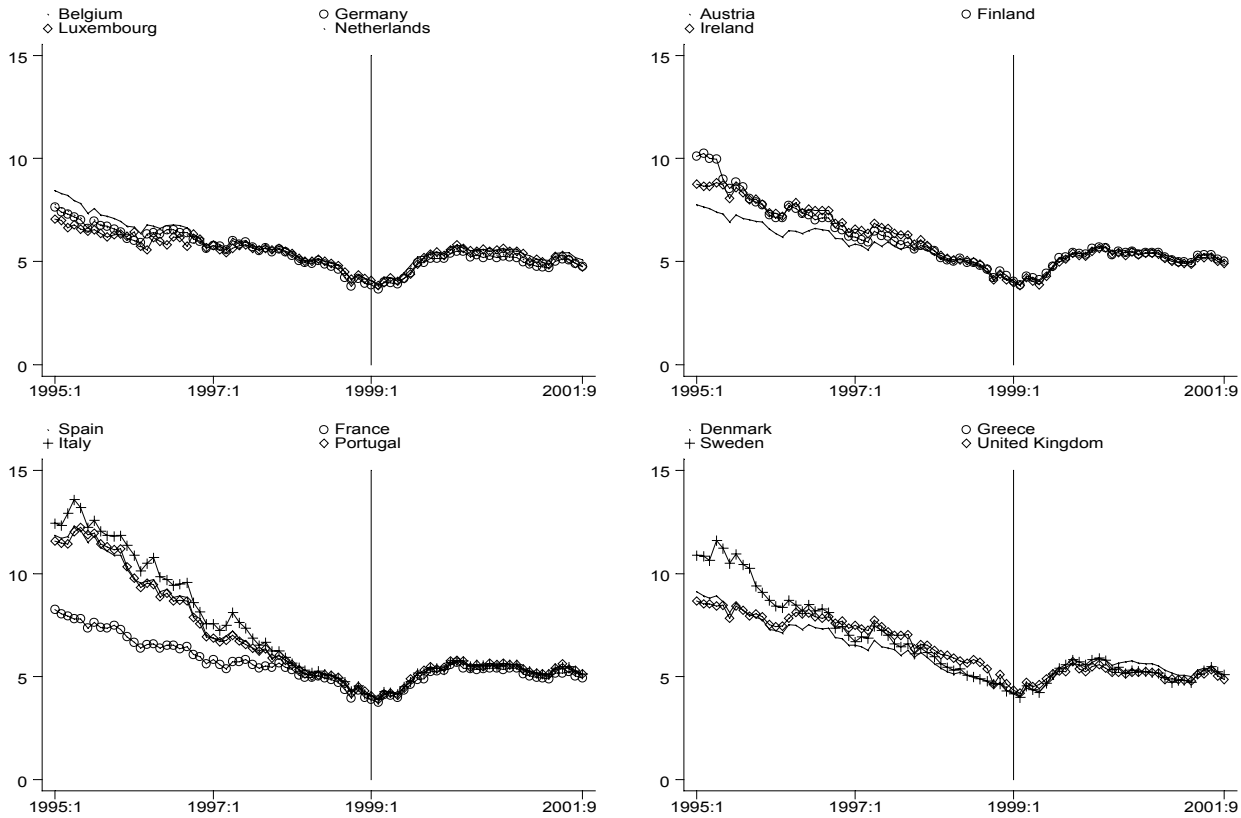


Figure 5.5: Mortgage rates, January 1995 – September 2001

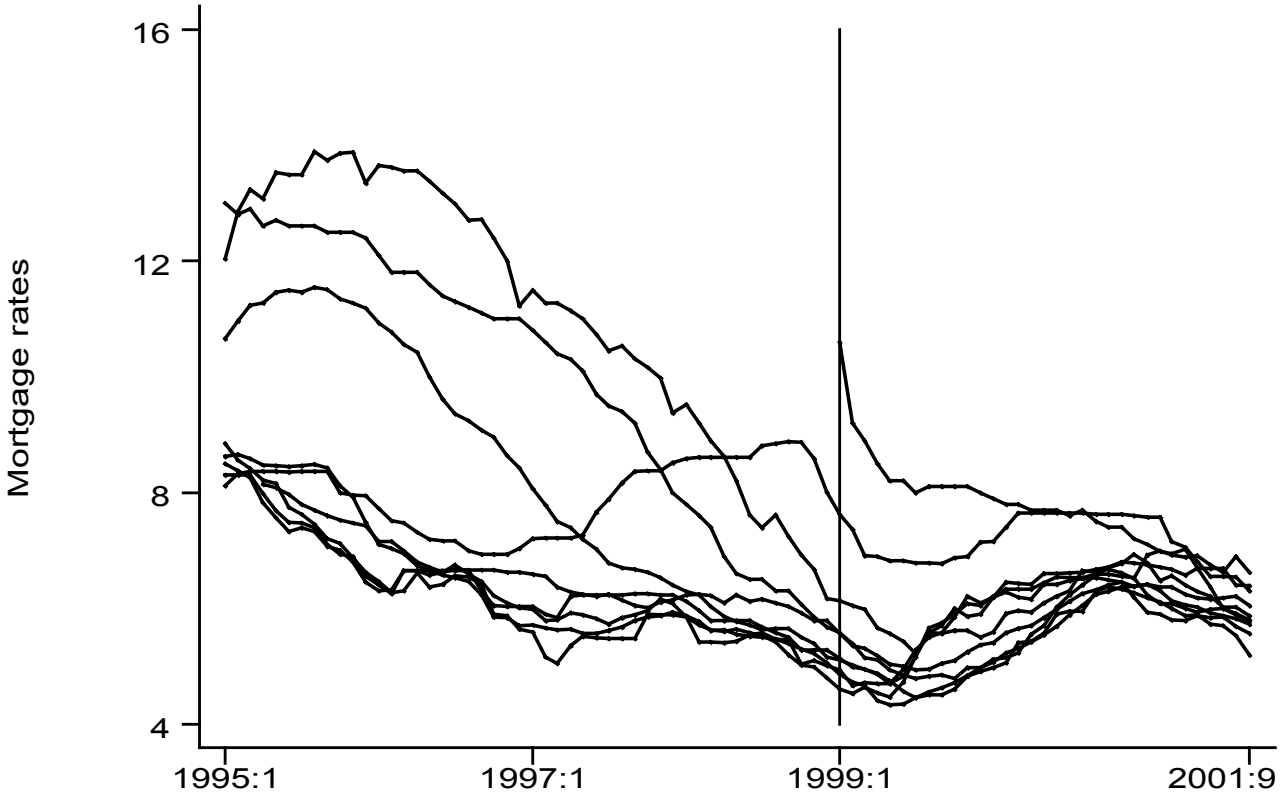


Figure 5.6: Mortgage rates, January 1995 – September 2001, by countries

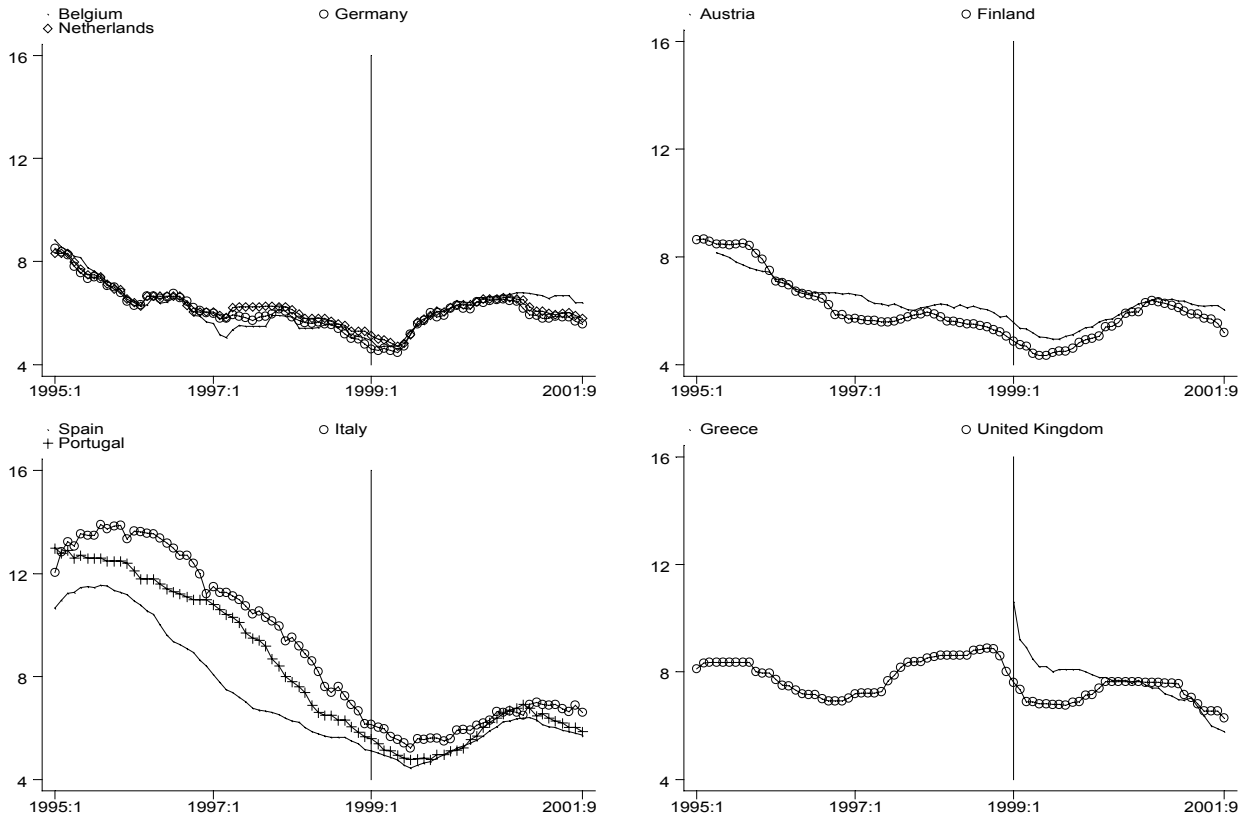


Figure 5.7: Loan to enterprises rates, January 1995 – September 2001

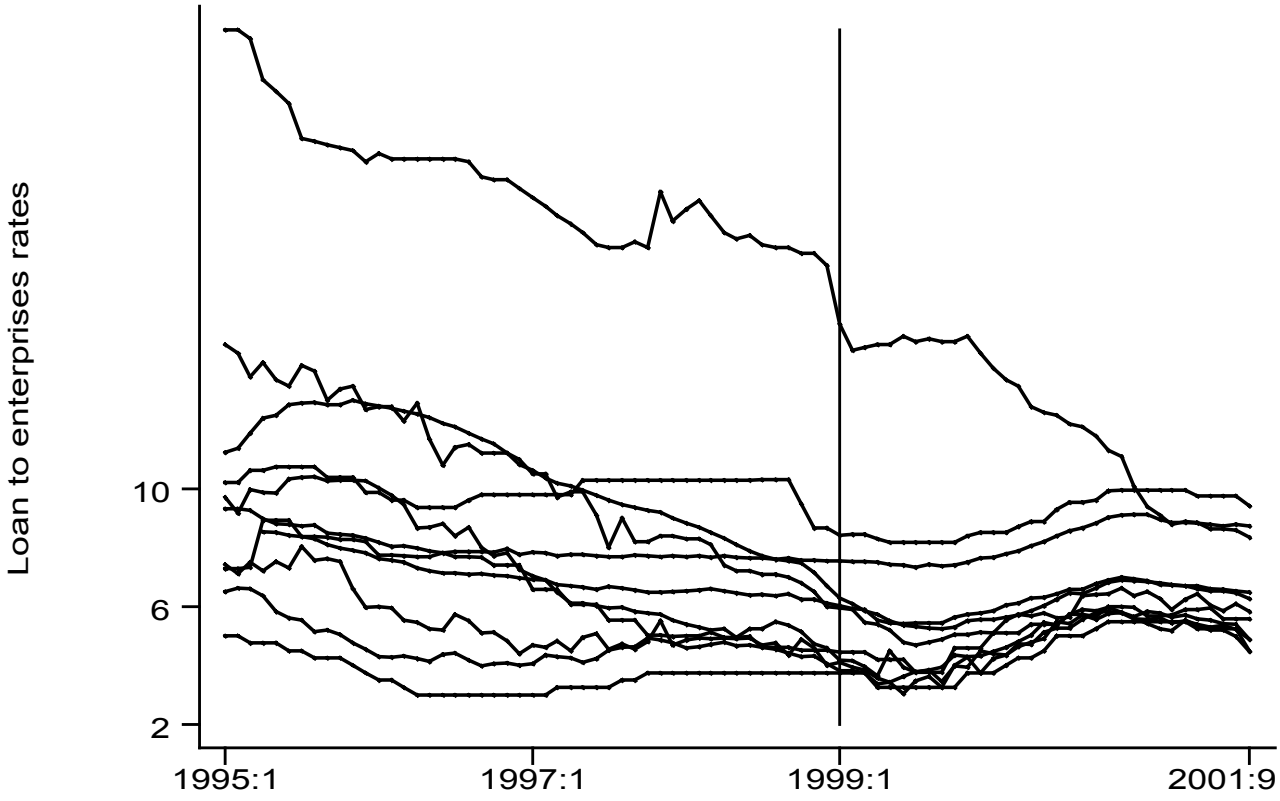


Figure 5.8: Loan to enterprises rates, January 1995 – September 2001, by countries

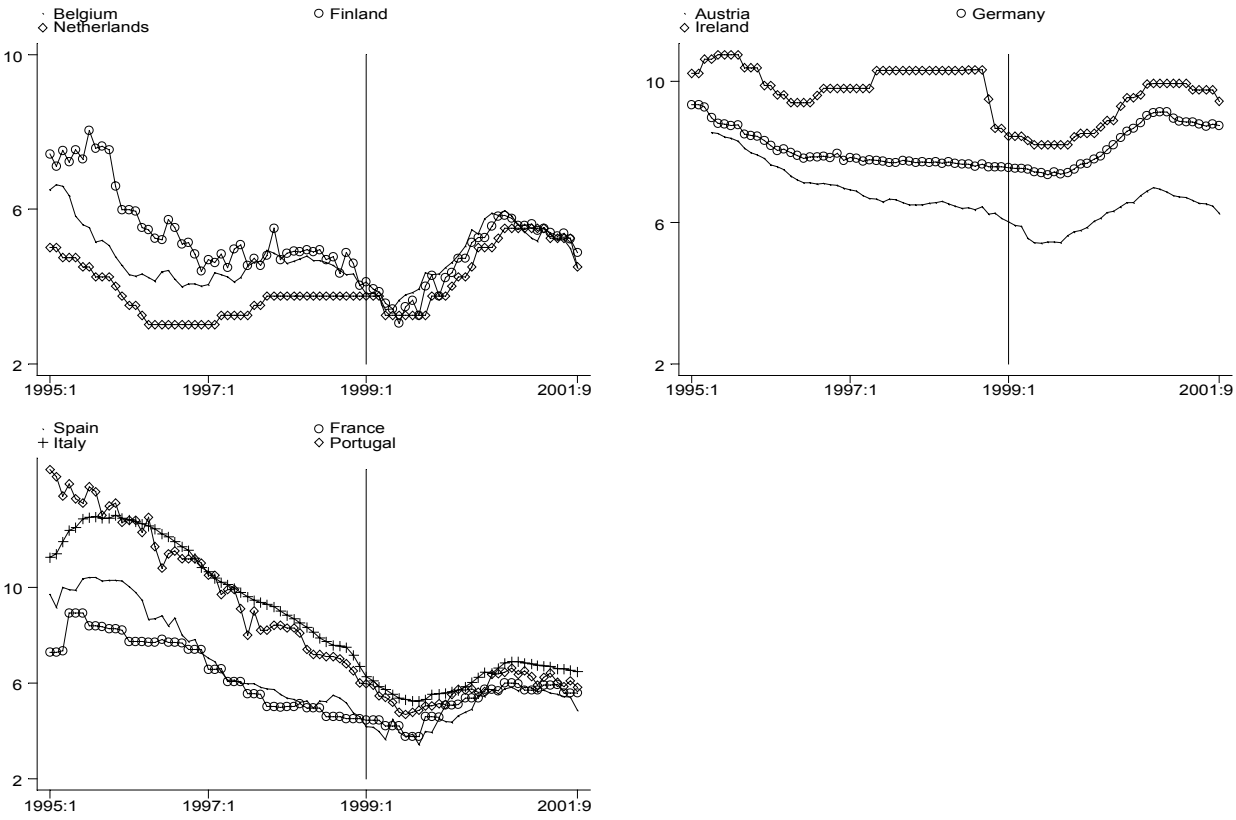


Figure 5.9: σ-convergence, January 1995 – September 2001

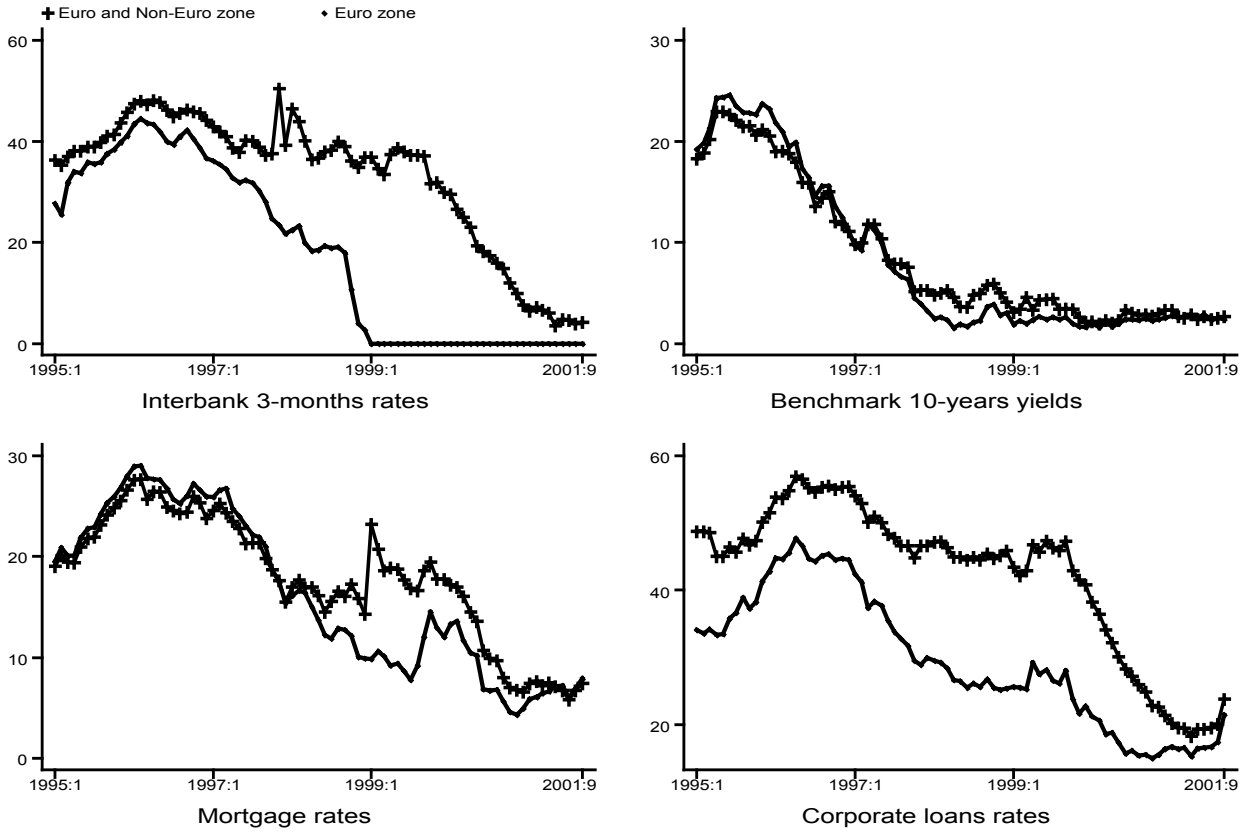


Figure 5.10: Foreign banks' share of total assets (1990-1997)

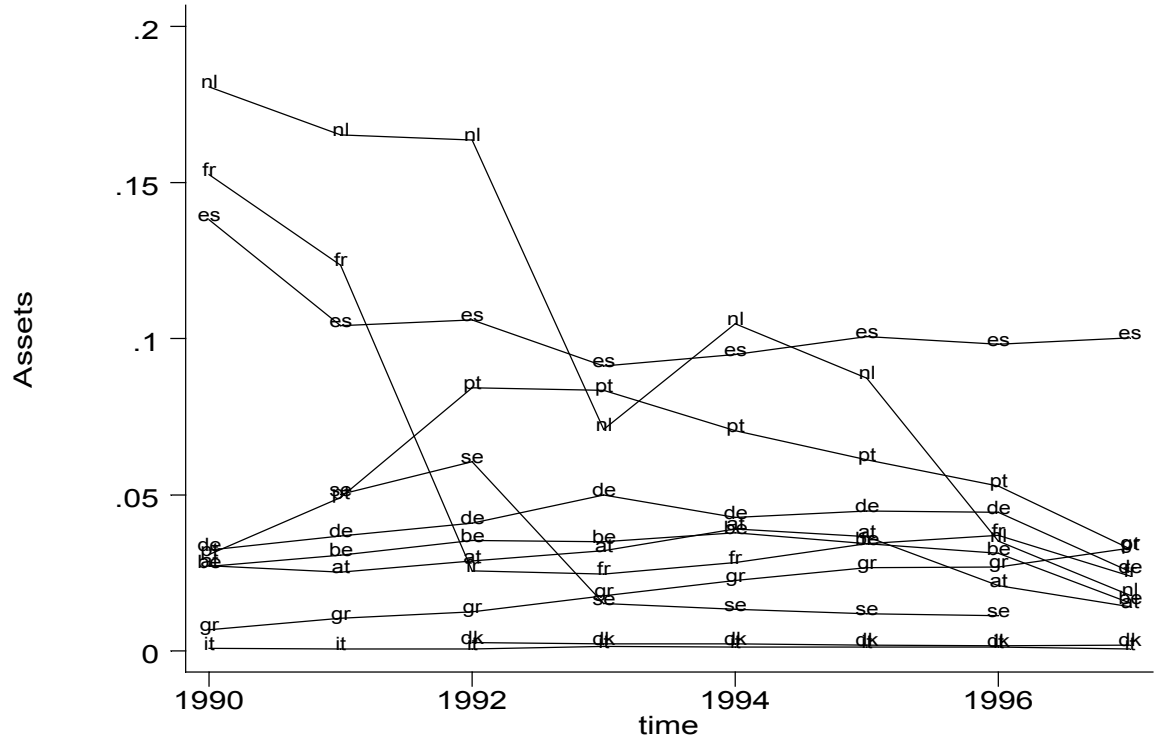


Figure 5.11: Share of Foreign Assets held by the Banking Sector (Jan. 1999 - Sept. 2001)

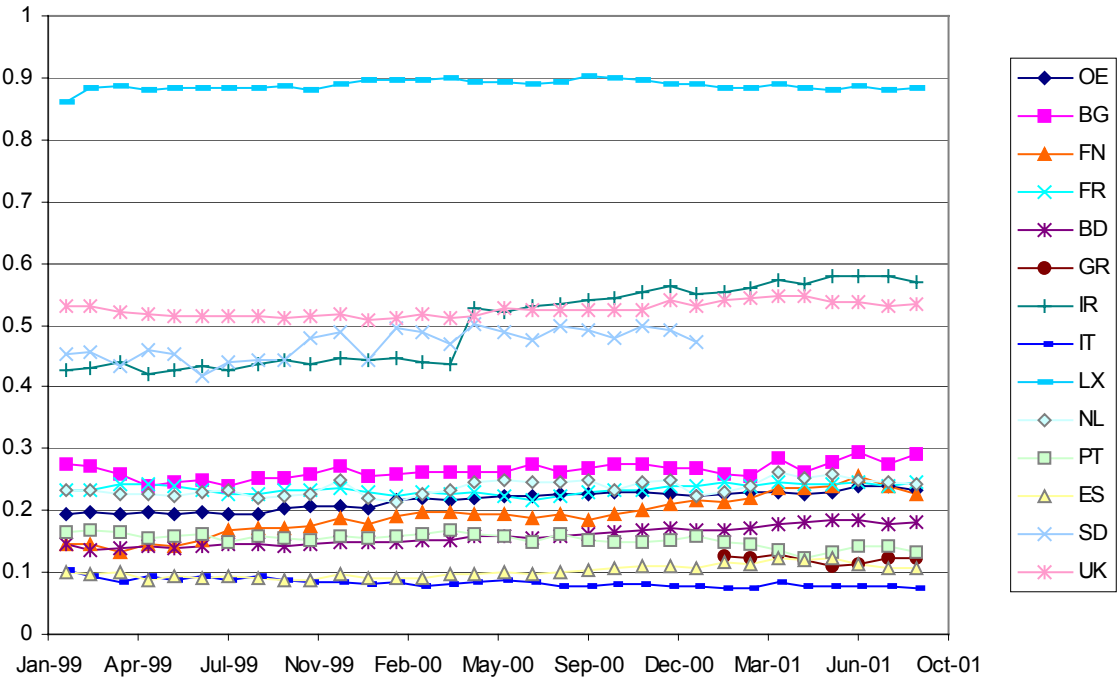


Figure 5.12: Home Bias in the Banking Sector's Asset Structure (Jan. 1999 - Sept. 2001)

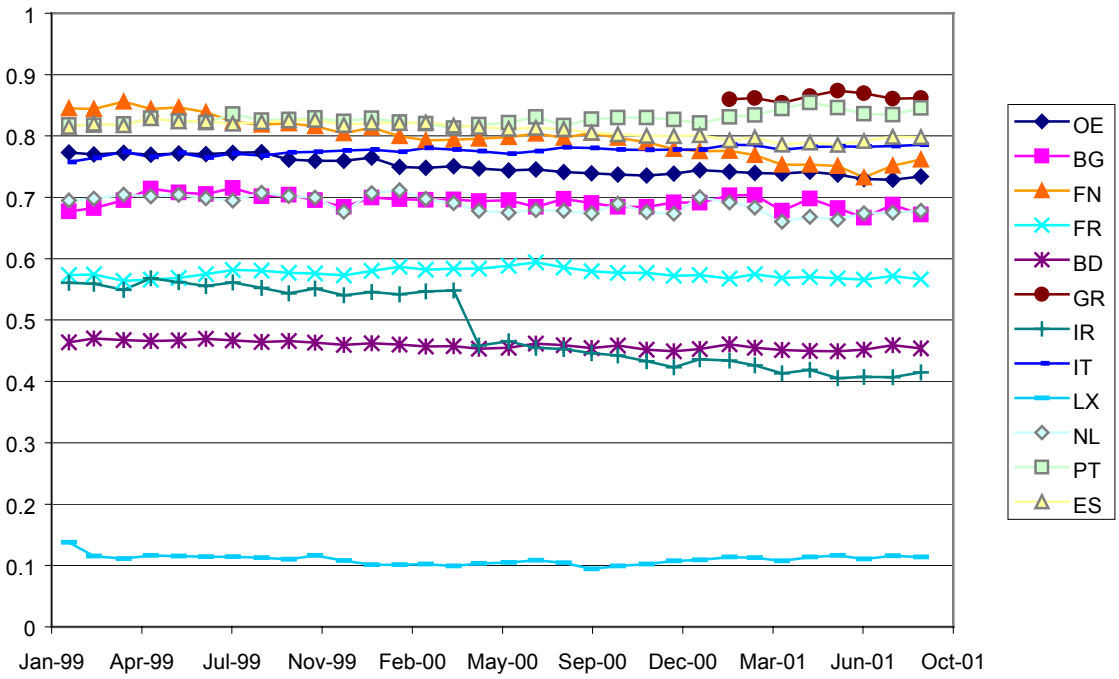


Figure 5.13: Foreign Assets held by the Banking Sector (Jan. 1999 - Sept. 2001)

The changes reported for Greece regard the period Jan.2001-Sept.2001.

Figure 5.14: Share of Foreign Liabilities held by the Banking Sector

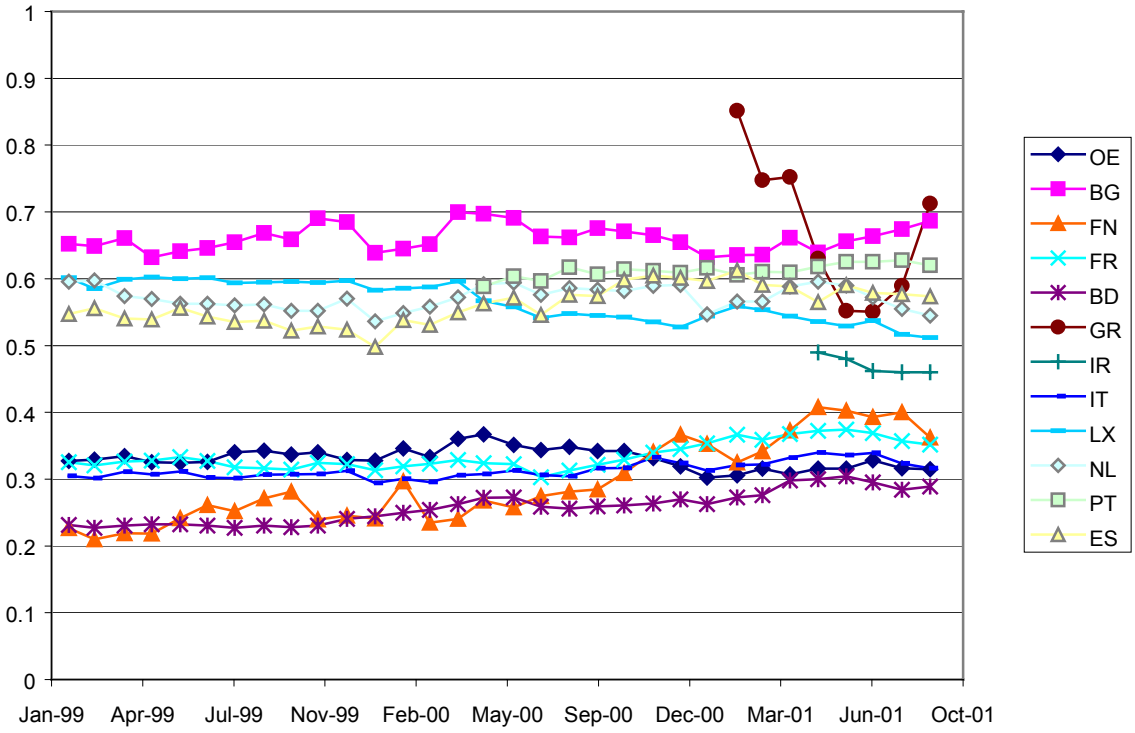


Figure 5.15: Home Bias of the Banking Sectors' Liability Structure (Jan. 1999 - Sept. 2001)

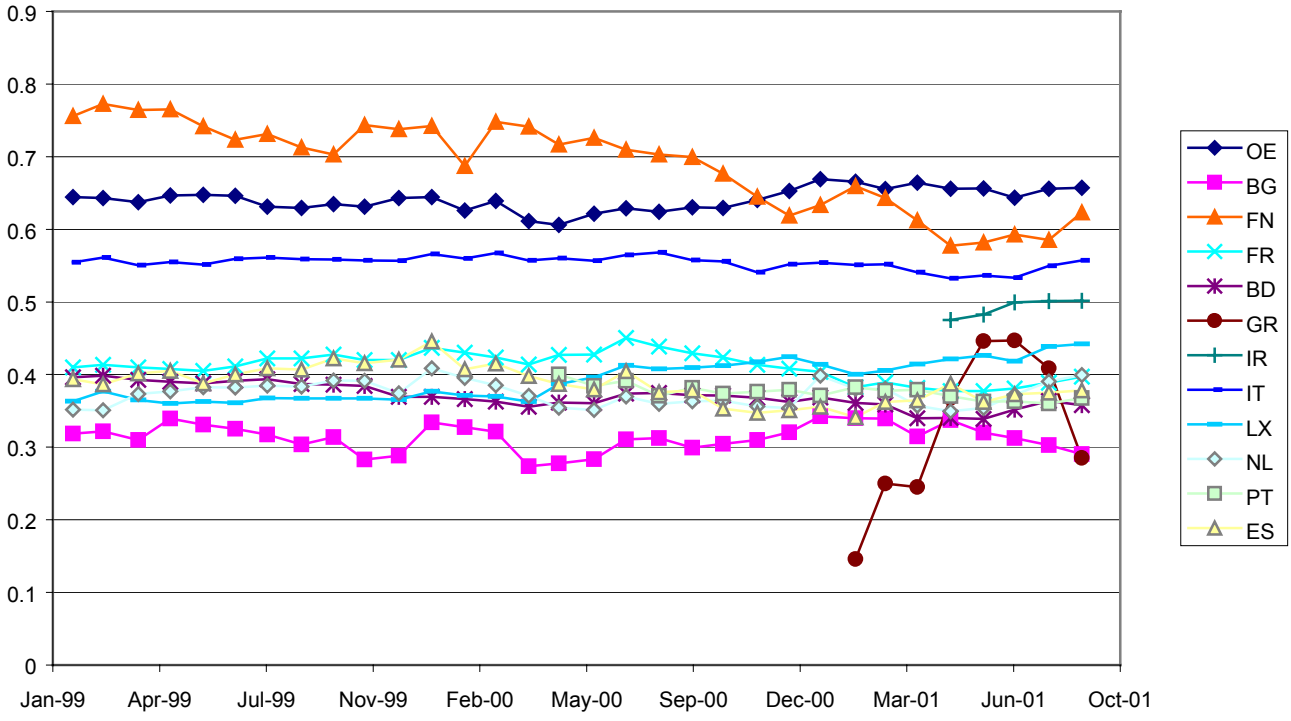


Figure 5.16: Foreign Liabilities held by the Banking Sector (Jan. 1999 - Sept. 2001)

Due to data availability problems the changes reported for Greece, Ireland, and Portugal regard the periods Jan.2001-Sept.2001, April 2001-Sept.2001, and April 2000-Sept.2001, respectively.

Figure 5.17: Asset Share of European-Wide Investing Money Market Funds Euro Zone Countries (Dec.1997 –Jun.2001)

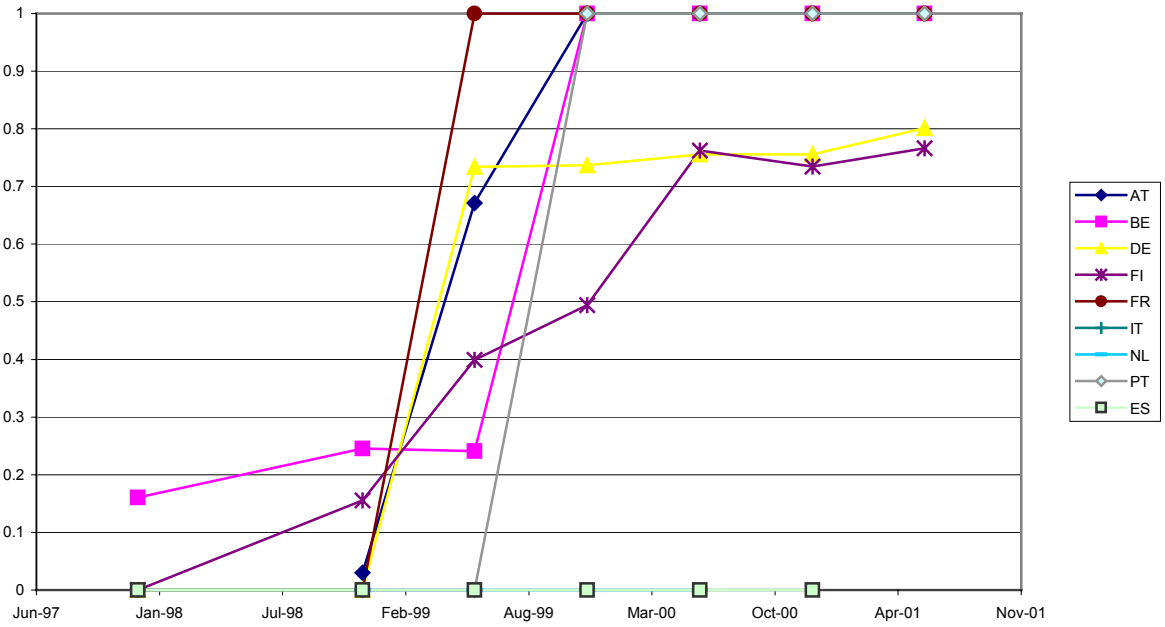


Figure 5.18: Asset Share of European-Wide Investing Bond Funds Euro Zone Countries (Dec.1997 – Jun.2001)

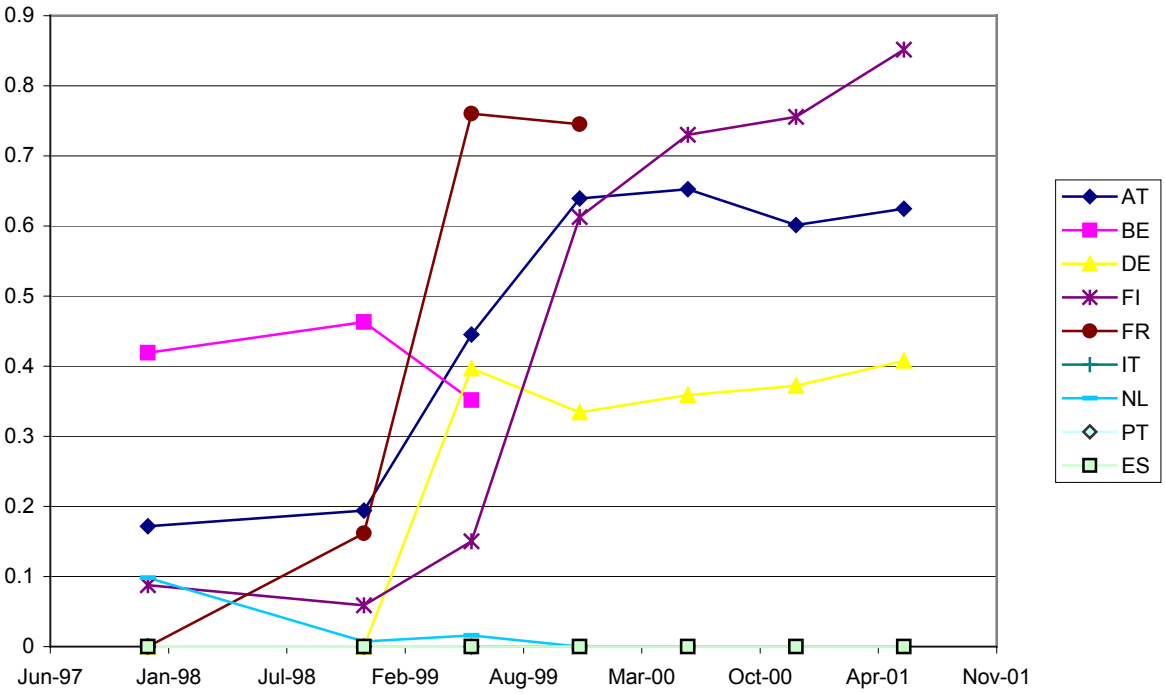


Figure 5.19: Asset Share of European-Wide Investing Bond Funds
European Non-Eurozone Countries (Dec.1997 – Jun.2001)

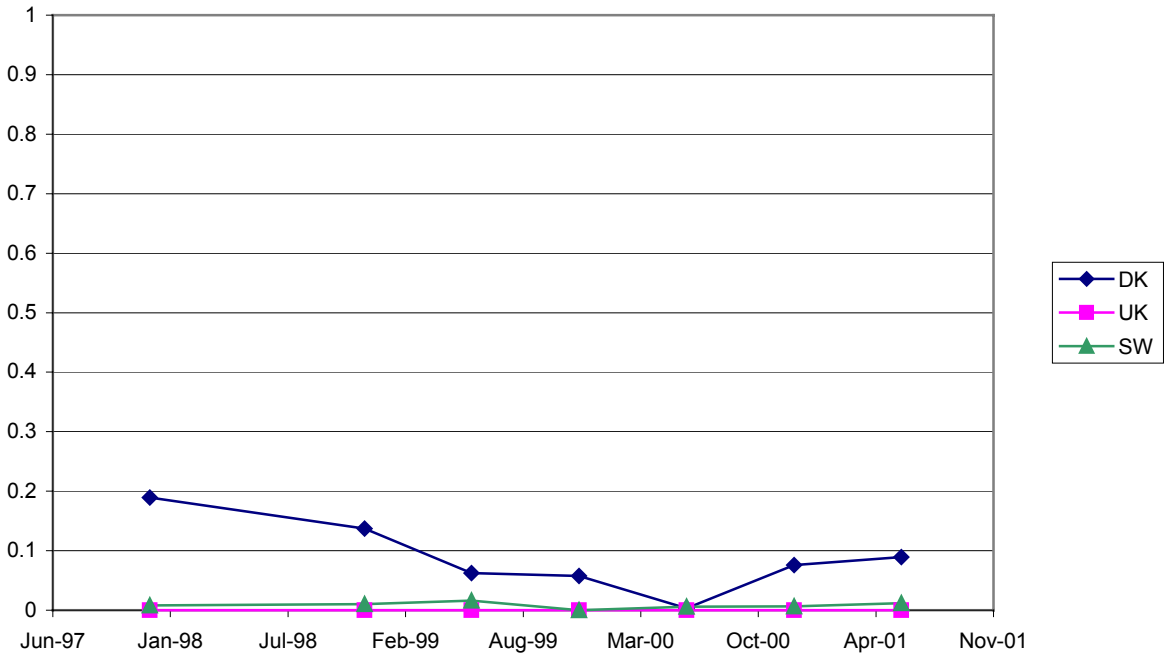


Figure 6.1: Stock market returns correlation, unweighted (Jan. 1995 – May 2001)

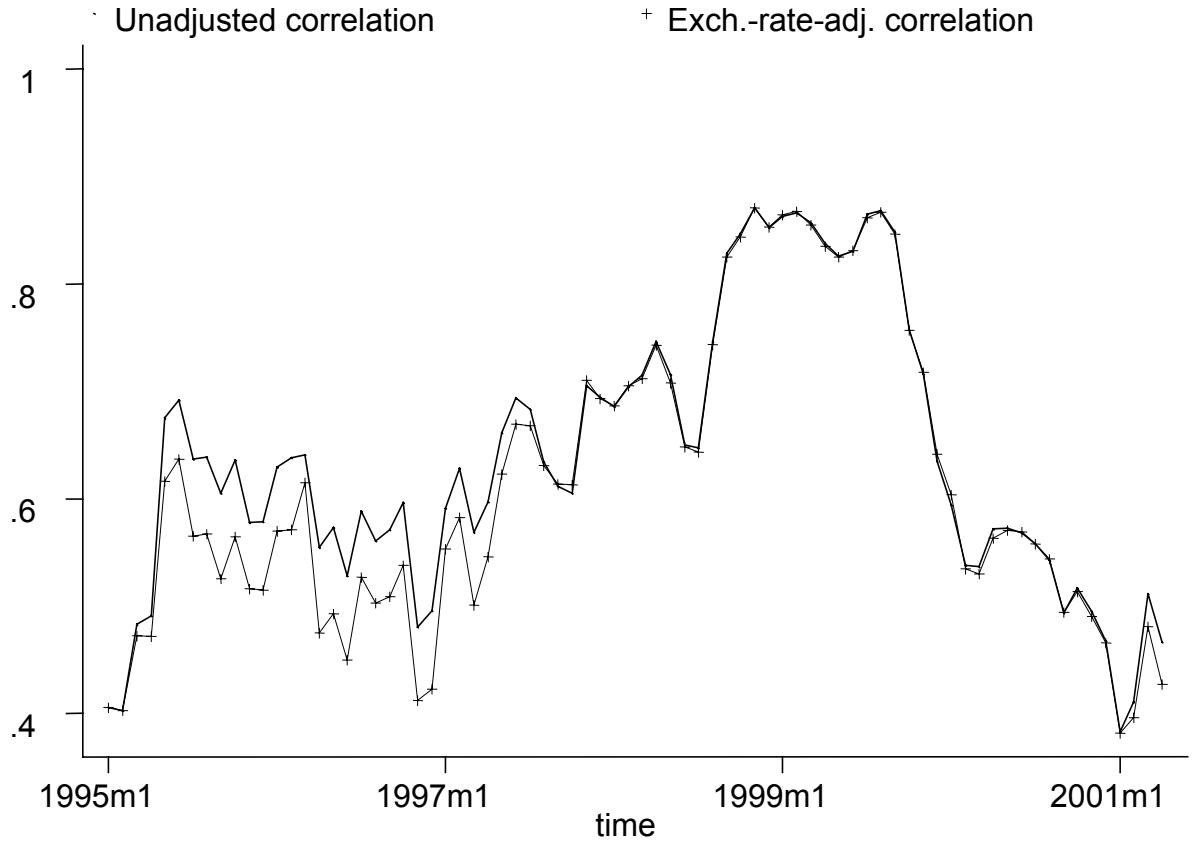


Figure 6.2: Stock market returns correlation, weighted by stock market capitalisation (Jan. 1995 – May 2001)

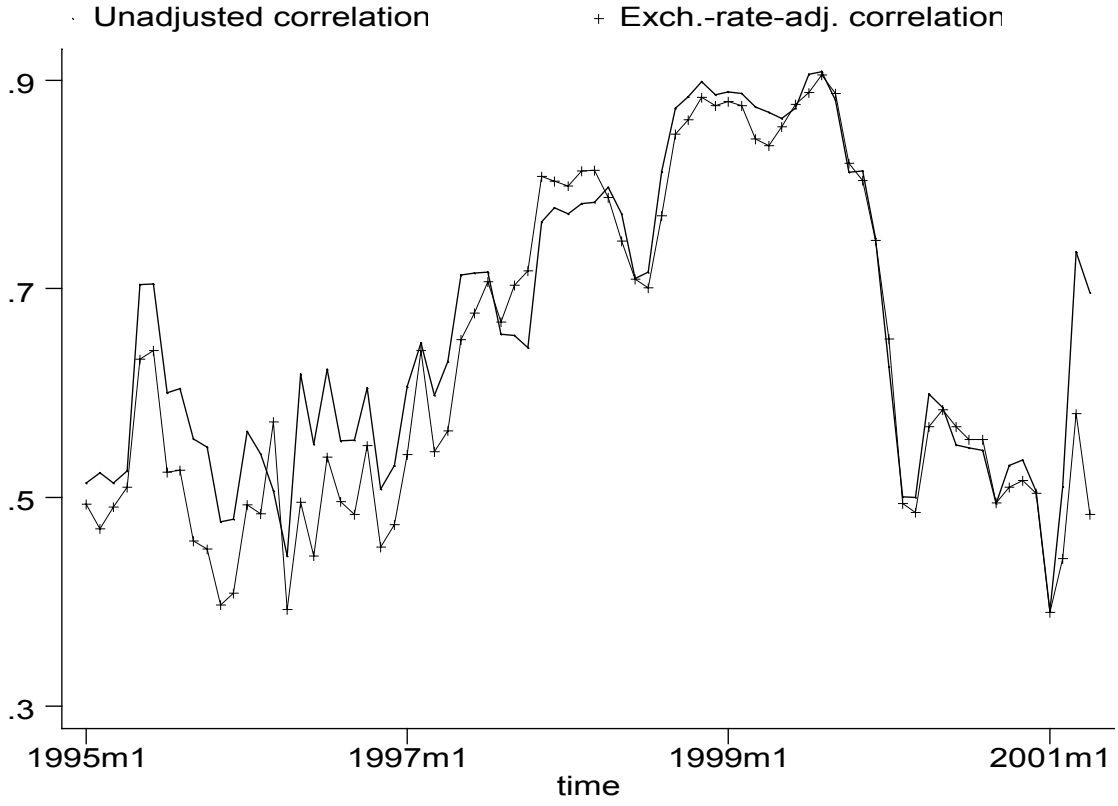


Figure 6.3: Asset Share of European-Wide Investing Equity Funds Euro Zone Countries (Dec.1997 – Jun.2001)

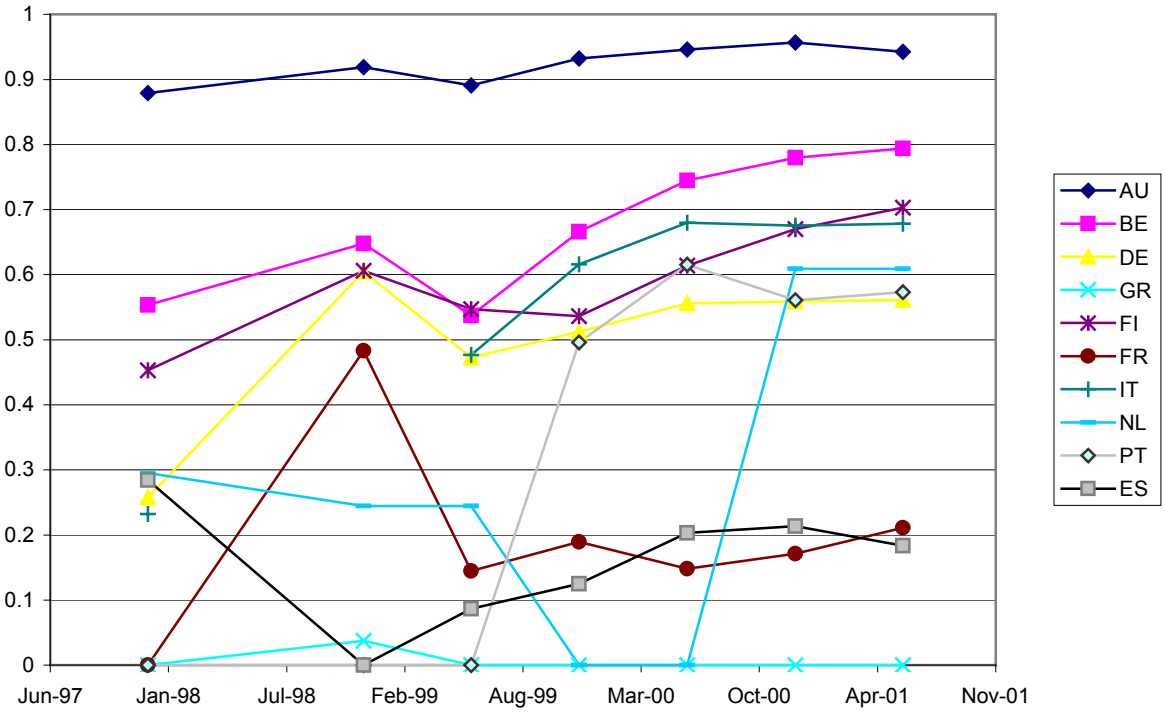


Figure 6.4: Integration Index for Equity Funds (Dec.1997 – Jun.2001)

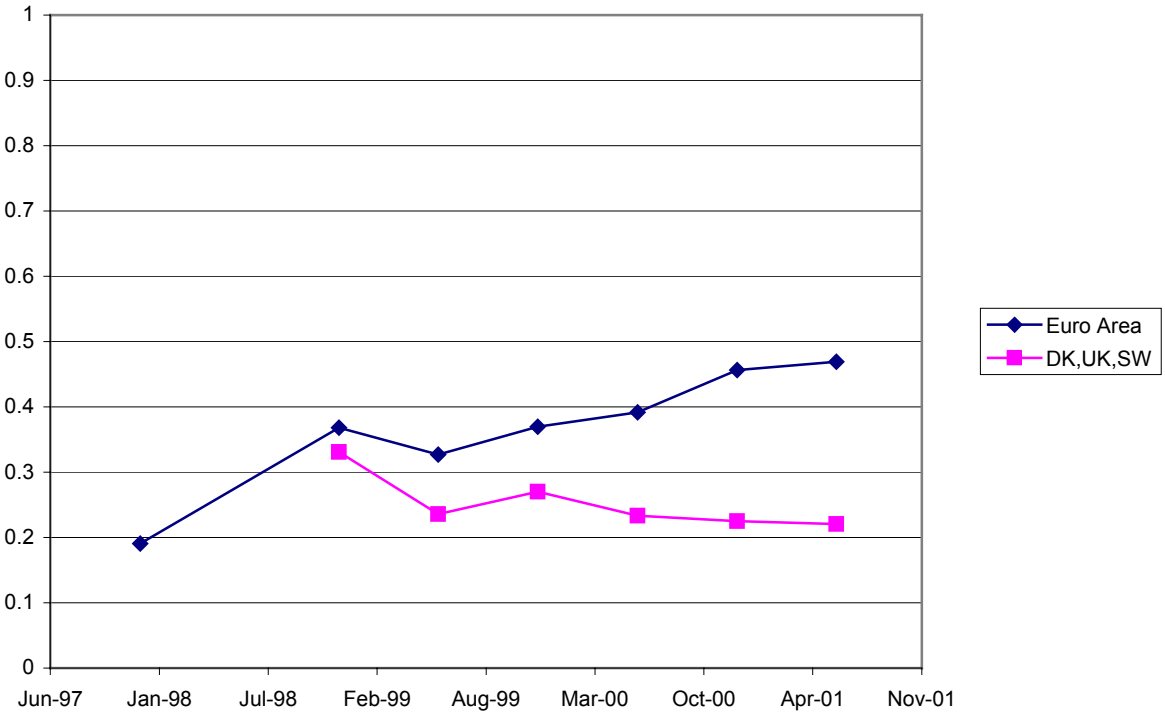


Figure 6.5: Pension Funds: Foreign Equities as a Percentage of Total Equities Invested Euro Zone Countries (1992-1999)

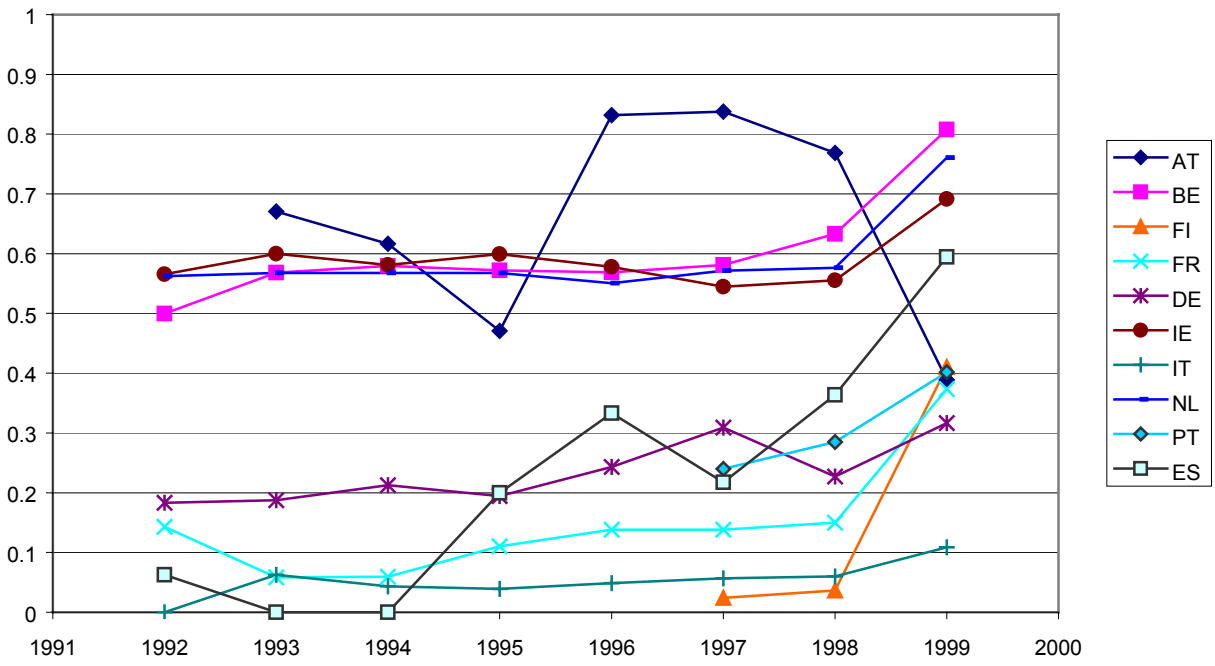


Figure 6.6: Insurance Companies - Foreign Equities as a Percentage of Total Equities Invested - Euro Zone Countries (1992-1999)

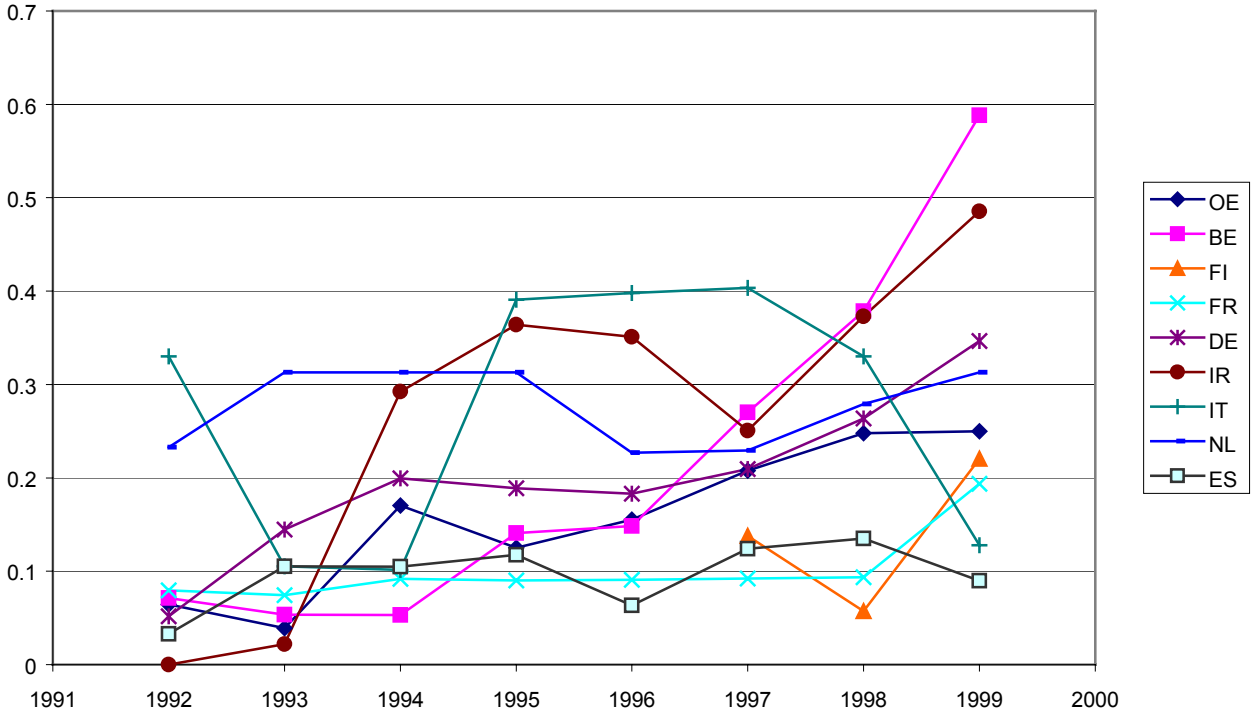


Figure 6.7: Insurance Companies - Foreign Equities as a Percentage of Total Equities Invested - Non-Euro Zone Countries (1992-1999)

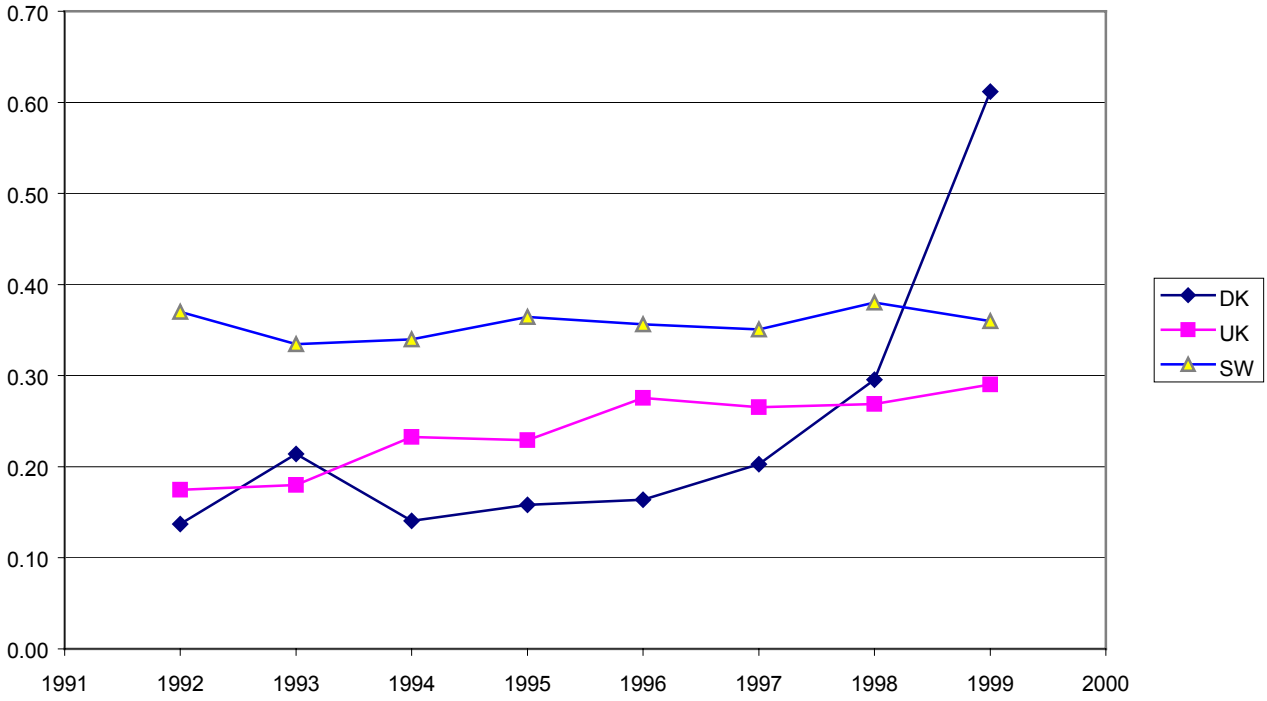


Figure 8.1: Mobility index, by value of M&A (confidence interval in bold) (1990-1999)

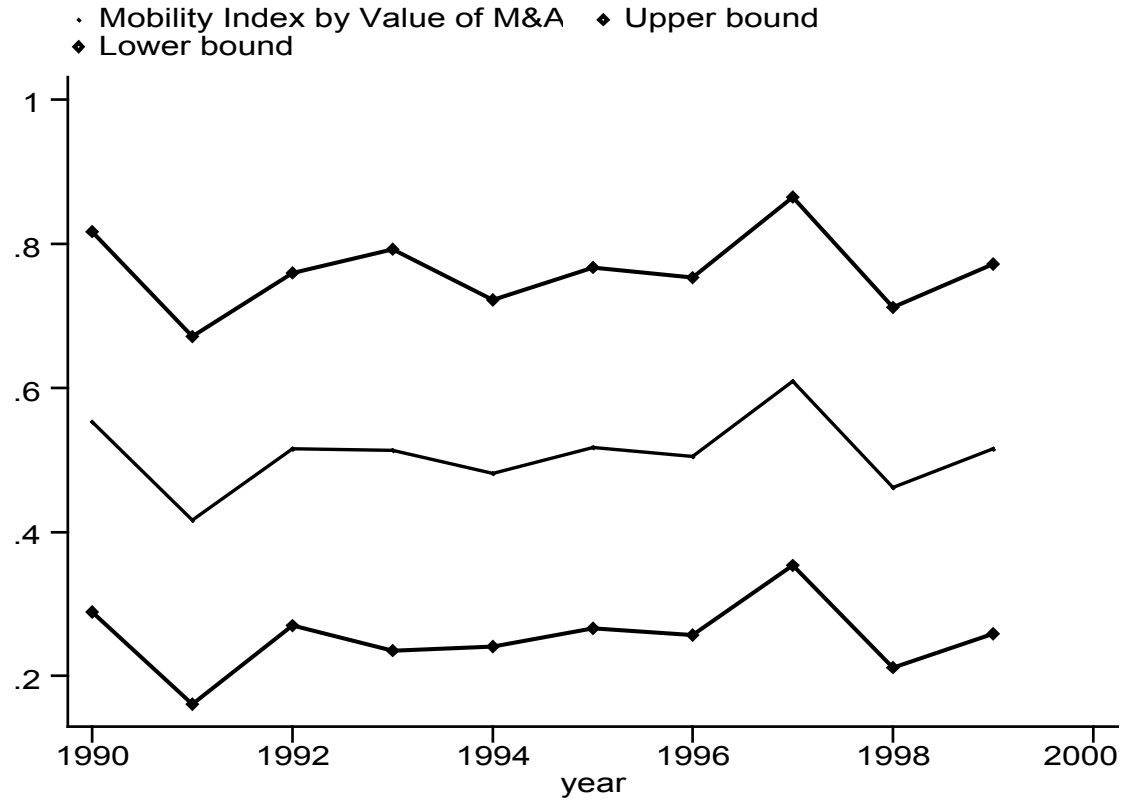


Figure 8.2: Mobility index, by number of M&A (confidence interval in bold) (1990-1999)

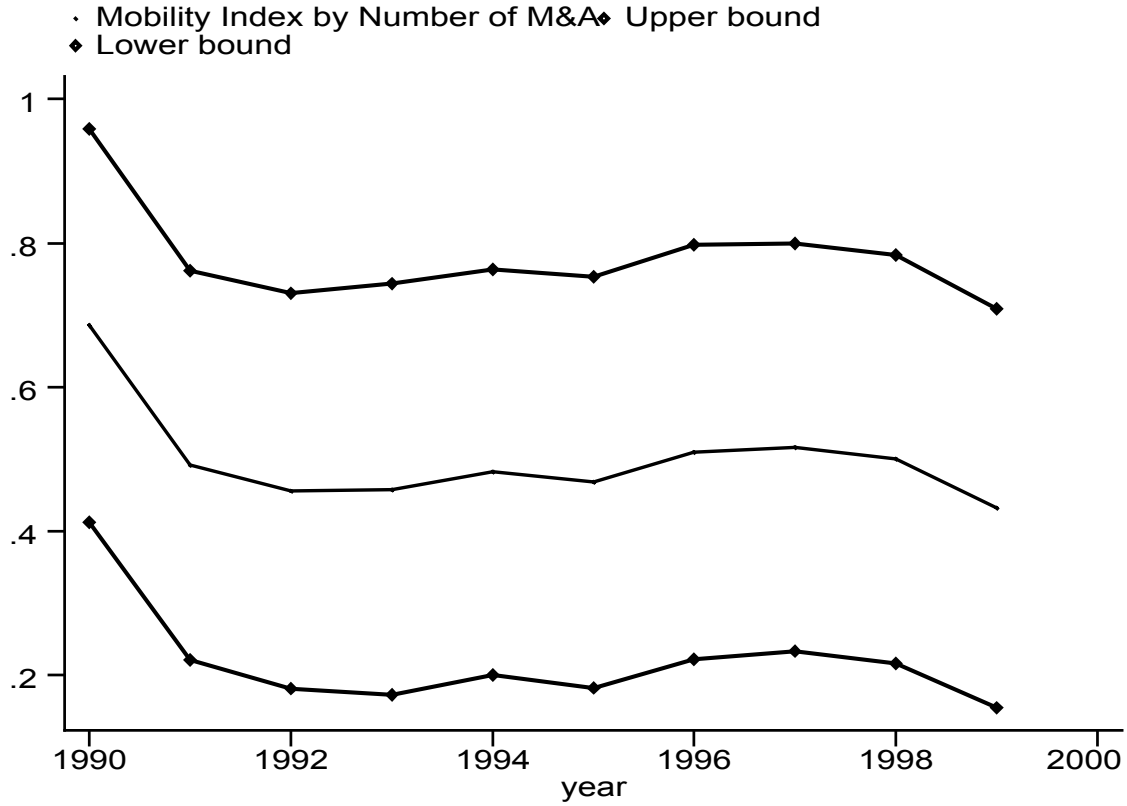


Figure 8.3: Inward mobility index, by value of M&A (1990-1999)

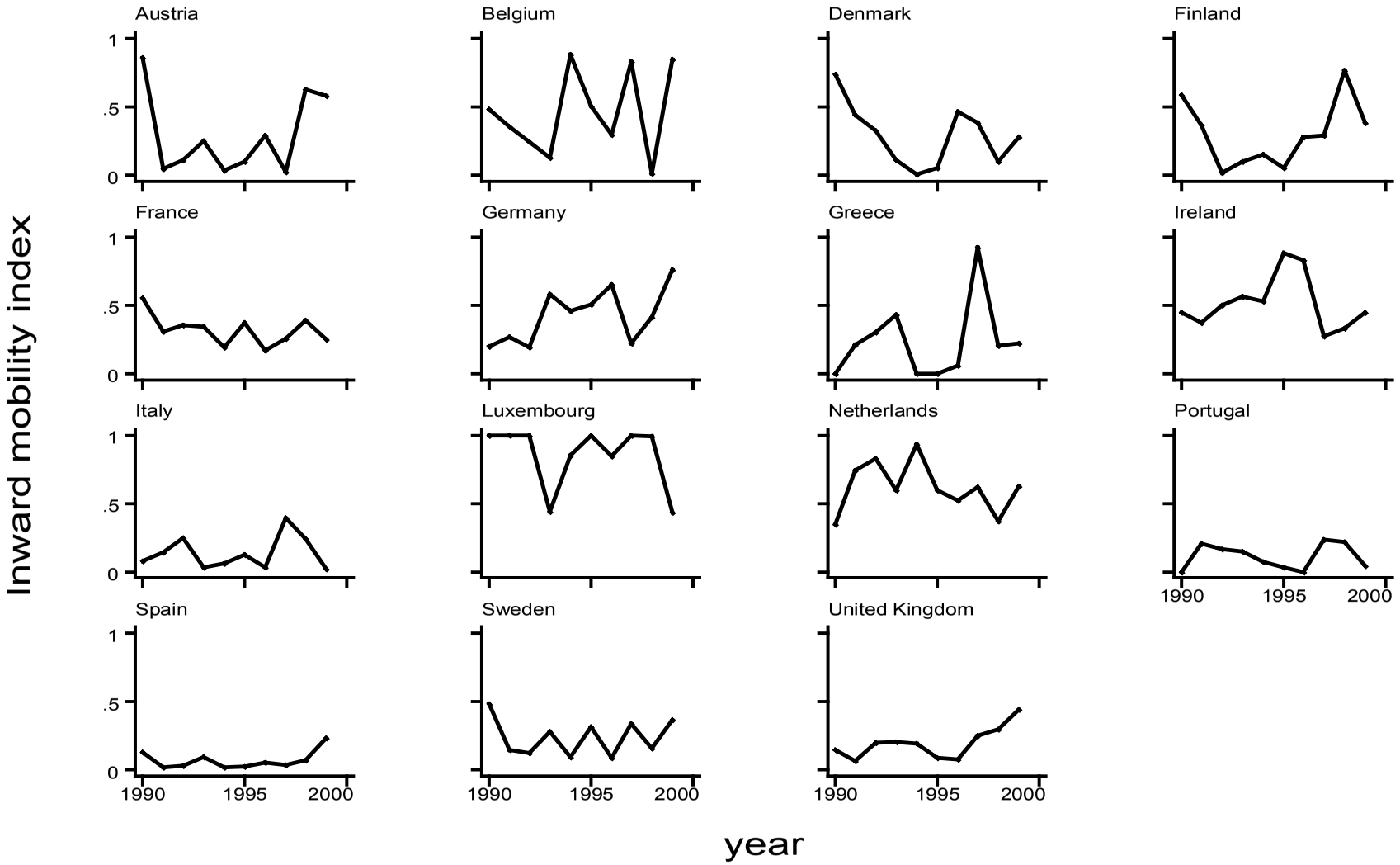


Figure 8.4: Inward mobility index, by number of M&A (1990-1999)

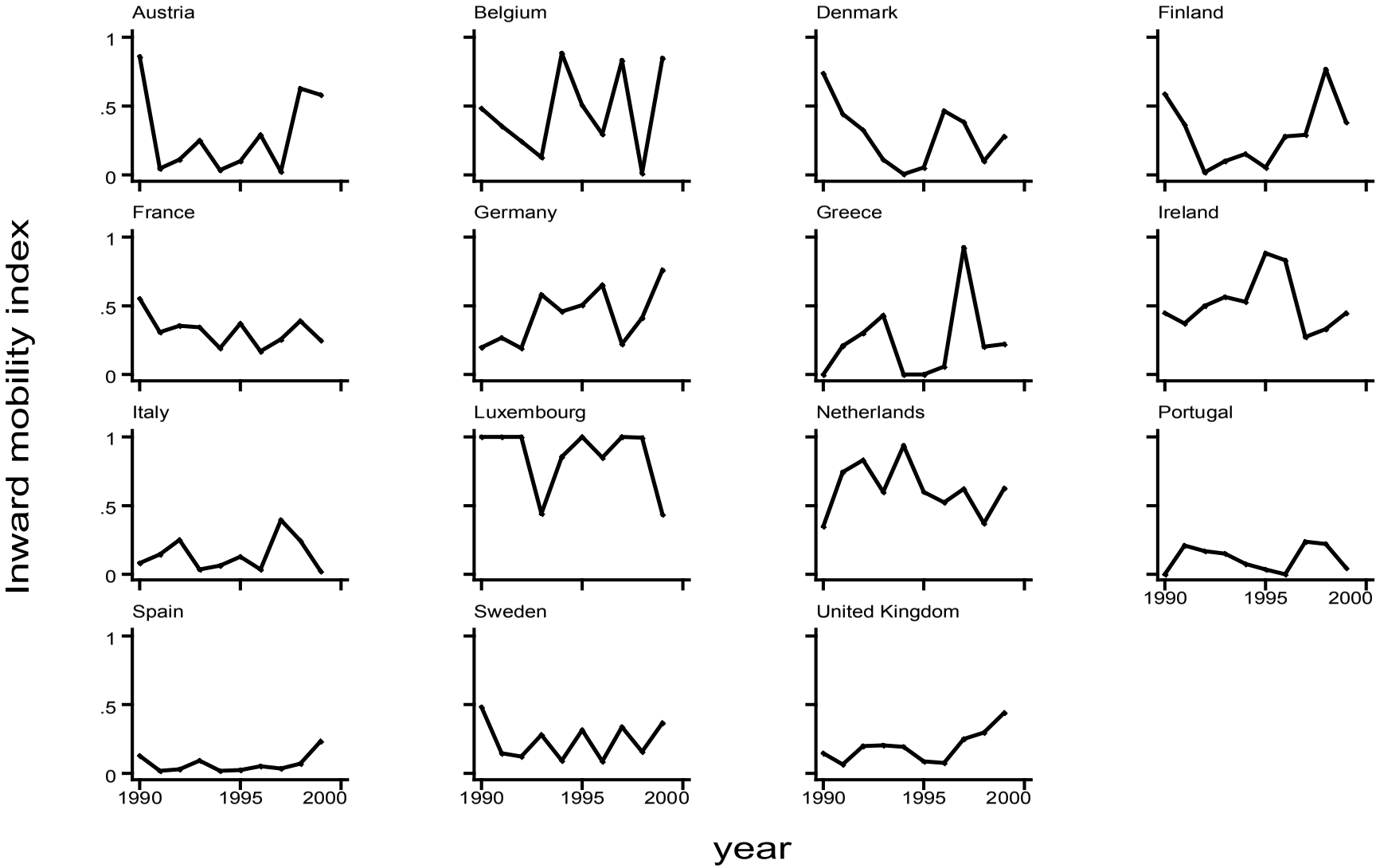


Figure 8.5: Outward mobility index, by value of M&A (1990-1999)

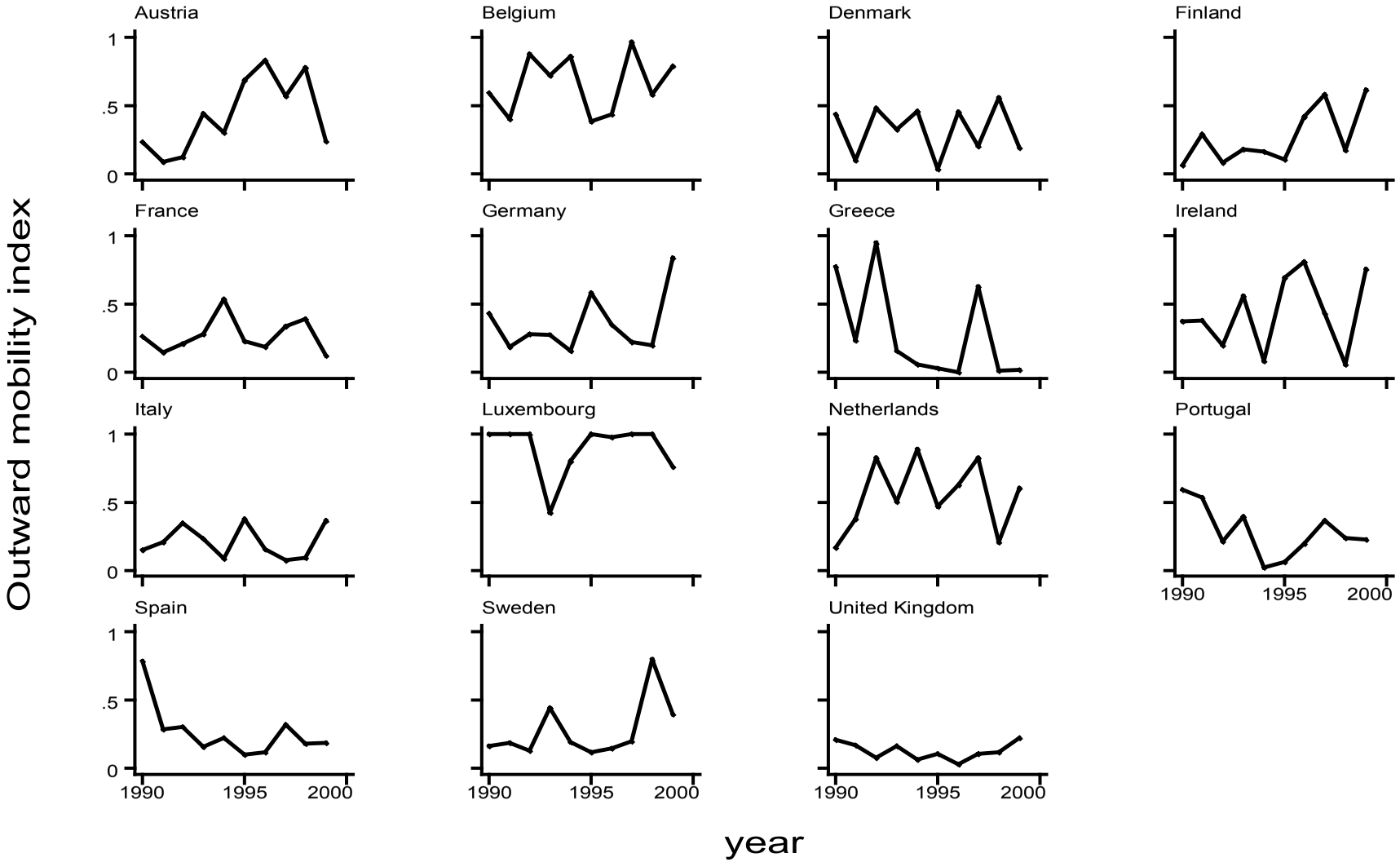
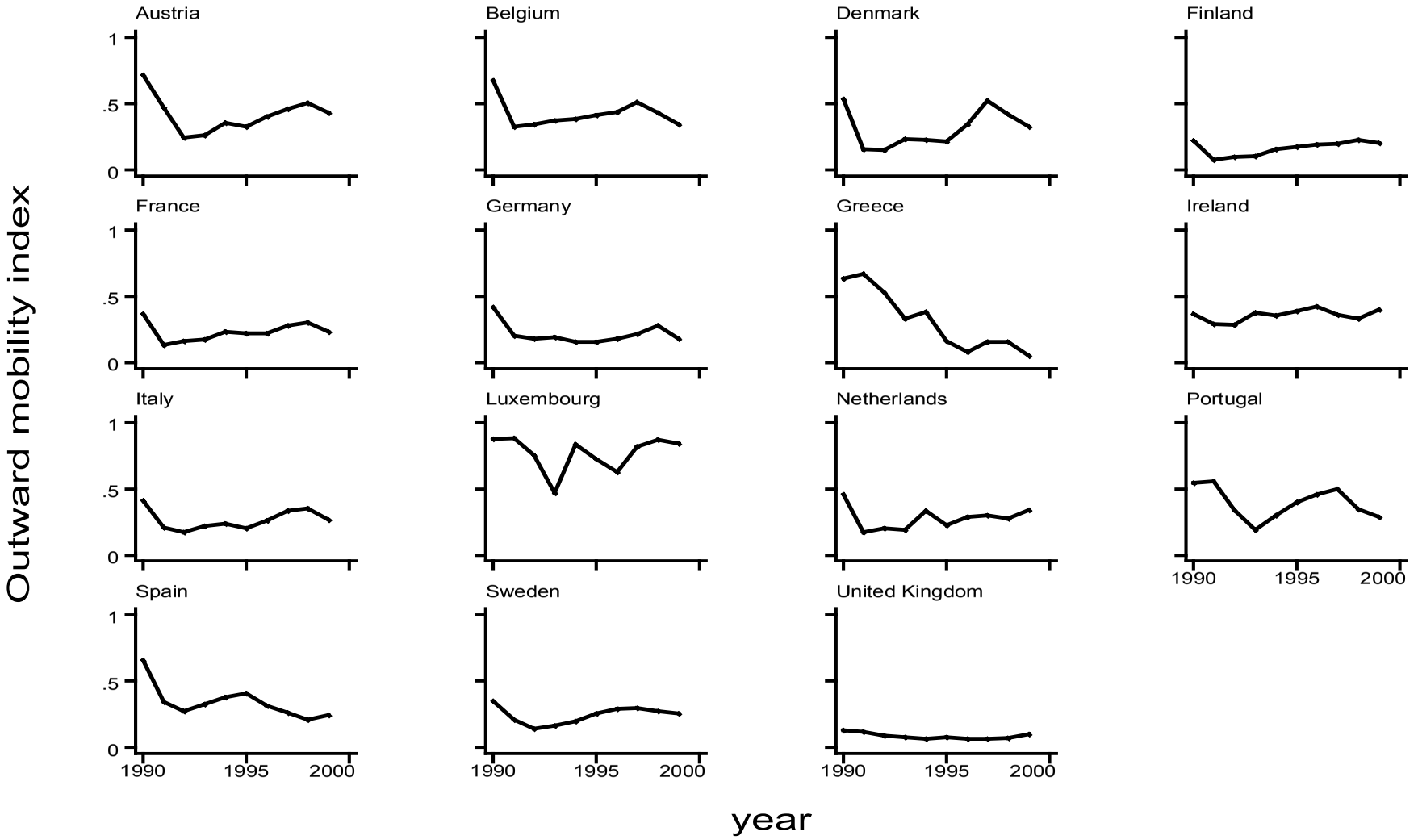


Figure 8.6: Outward mobility index, by number of M&A (1990-1999)



Data Appendix

Interest rates

Data are drawn from the New Chronos/Theme 2 data set compiled by Eurostat and DataStream. The data set covers an extensive time span, from the seventies to present, and a large number of countries. Thus, it has both a time-series and a cross-sectional dimension. Unfortunately, the sample is not a balanced panel. Moreover, some countries are present in the sample on a discontinuous basis.

The 3-months interbank rate, such as the LIBOR or the EURIBOR, is available for all 15 EU member countries except Luxembourg. The 10-year benchmark bond yield is available for the 15 EU member countries except Greece. The series we use start from 1990 for all countries except Finland (September 1991), Italy (April 1991), Luxembourg (February 1993), Portugal (August 1993) and Spain (May 1991). Both the 3-months interbank rate series and the 10-year benchmark bond yield currently end in September 2001.

Indicators Based on Cross-Border Lending and Borrowing of National Banking Sectors

The series were constructed using IMF data, which is available on DataStream from January 1999 at a monthly frequency and with a delay of ca. 3 months. Below we describe how we constructed our series from the DataStream series.
When making reference to DataStream codes the first two letters CC in the code stand for country code and have to be replaced by: OE for Austria, BG for Belgium, FN for Finland, FR for France, BD for Germany, GR for Greece, IR for Ireland, IT for Italy, LX for Luxembourg, NL for The Netherlands, PT for Portugal, ES for Spain, SD for Sweden, and UK for the United Kingdom.

All series are in million Euros, *except* for *Italian and Dutch* series, which are in billion Euros and which have to be transformed to make them comparable, and *Swedish and British* series which are reported in local currency. No data is available for Denmark.

a. Assets

The share of foreign assets held in the banking sector was calculated by dividing the series 'Banking Inst.: Foreign Assets' (DataStream-Code CCI21...A) by the total assets in the banking sector, which was constructed by summing the following series:

- 'Banking Inst.: Foreign Assets' (DataStream-Code CCI21...A)
- 'Banking Inst.: Claims on General Government in Country' (DataStream-Code CCI22A..A)
- 'Banking Inst.: Claims on Private Sector' (DataStream-Code CC22D..A)

The size of the domestic credit markets was estimated using the series 'Domestic Credit' (DataStream-Code: CCI32..A)

b. Liabilities

The share of foreign liabilities held in the banking sector was calculated by dividing the series 'Banking Inst.: Foreign Liabilities' (DataStream-Code CCI26C..A) by the total liabilities in the banking sector, which was constructed by summing the following series:

- 'Banking Inst.: Foreign Liabilities' (DataStream-Code CCI26C..A)
- 'Banking Inst.: Central Government Deposits in Country' (DataStream-Code CCI26D..A)
- 'Banking Inst.: Credit from Monetary Authorities' (DataStream-Code CCI26G..A)
- 'Banking Inst.: Money Market Instruments' (DataStream-Code CCI26M.UB)
- 'Banking Inst.: Bonds (Debt Securities)' (DataStream-Code FRI26N.UB)

The size of the domestic liability market was estimated summing the series

- 'Deposits – Demand' (DataStream-Code CCI34B.NA)
- 'Deposits – Other Than Demand' (DataStream-Code CCI35..NA)
- 'Money Market Instruments' (DataStream-Code CCI36M..A)
- 'Bonds' (DataStream-Code CC36N..A)

Foreign banks share and number of foreign banks

Data are drawn from the World-Bank database designed by Thorsten Beck, Asli Demirgùç-Kunt, and Ross Levine (1999) to monitor financial development. The database covers 1980-97. The sample includes Austria, Belgium, Denmark, Greece, Federal Republic of Germany (unified Germany after 1991), Finland, France, Ireland, Italy, Luxembourg, Netherlands, Portugal, Sweden, Spain, United Kingdom, Japan and United States. The 1991-97 sample is a balanced panel of yearly data. A bank is defined as foreign if at least 50 percent of its equity is owned by foreigners.

Stock market capitalisation and stock market indexes

We draw monthly data on stock market indexes from the Eurostat New Chronos/Theme 2 data set. The share price indexes are monthly averages and are rebased in 1995=100. The table below reports the index used for each country. Indexes are converted into ECU/euro using the monthly series based to 1995=100 available from the New Chronos/Theme 2.

Stock market indexes

Country	Index	Shares
Austria	ATX	20
Belgium	BEL 20	20
Denmark	KFX	21
Germany	DAX Xetra	30
Greece	General industrial index	not fixed
Spain	IBEX 35	35
Finland	HEX All Share Index	125
France	CAC 40	40
Ireland	ISEQ Overall	72
Italy	MIBTEL	299
Luxembourg	Indice des actions / LuxX	13
Netherlands	AEX	25
Portugal	BVL 30	30
Sweden	All Share Index	262 (02/01/98)
U.K.	FTSE 100	100

National account data

Annual data on consumption, investment, saving and GDP (current and constant prices) are drawn from the Eurostat NewChronos\Theme 2 data set. The table below reports the starting date of each series.

Starting date of national accounting series

Country	Consumption	Investment	Saving	GDP
Austria	1960	1988	1988	1960
Belgium	1960	1980	1980	1960
Denmark	1960	1966	1966	1960
Germany	1960	1991	1991	1960
Greece	1960	1980	1980	1960
Spain	1960	1995	1995	1960
Finland	1960	1970	1970	1960
France	1960	1978	1978	1960
Ireland	1960	1990	1990	1960
Italy	1960	1970	1970	1960
Luxembourg	1960	1995	n.a	1960
Netherlands	1960	1995	1995	1960
Portugal	1960	1995	1995	1960
Sweden	1960	1993	1993	1960
U.K.	1960	1948	1970	1960

Mergers and Acquisitions

Yearly data about the value and the number of domestic and cross-border M&A activity are drawn from SDC Platinum - Thompson Corporation. They are currently available for the period between 1990 and 1999.