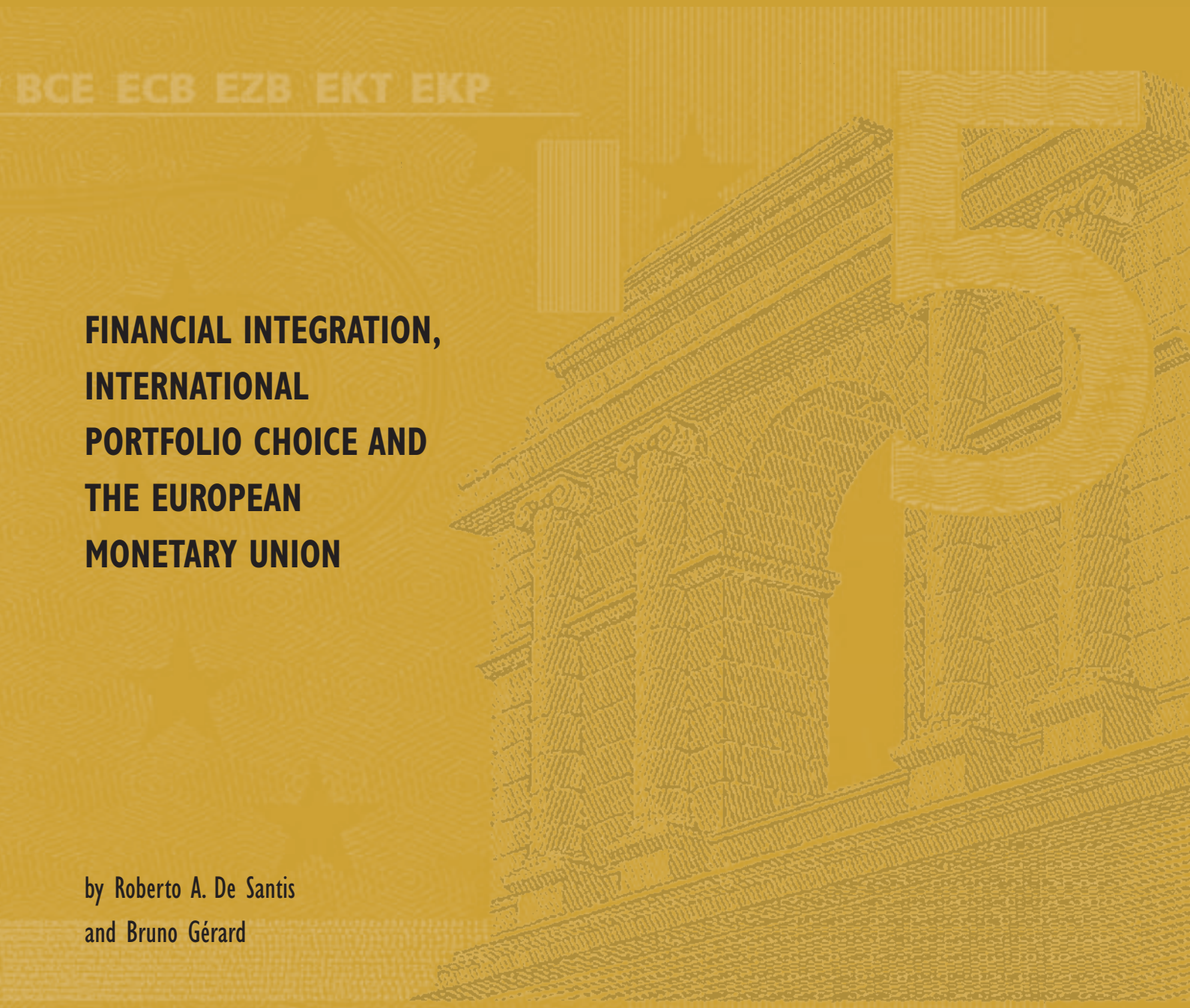
EUROPEAN CENTRAL BANK

WORKING PAPER SERIES
NO 626 / MAY 2006



FINANCIAL INTEGRATION, INTERNATIONAL PORTFOLIO CHOICE AND THE EUROPEAN MONETARY UNION

by Roberto A. De Santis
and Bruno Gérard

EUROPEAN CENTRAL BANK

WORKING PAPER SERIES
NO 626 / MAY 2006

FINANCIAL INTEGRATION, INTERNATIONAL PORTFOLIO CHOICE AND THE EUROPEAN MONETARY UNION [1]

by Roberto A. De Santis [2]
and Bruno Gérard [3]

In 2006 all ECB publications will feature a motif taken from the €5 banknote.

1 The views expressed in this paper are those of the authors and do not necessarily reflect those of the European Central Bank or the Eurosystem.

2 DG-Economics, External Developments Division, European Central Bank, Kaiserstrasse 29, 60311 Frankfurt am Main, Germany; e-mail: roberto.de_santis@ecb.int, tel: +49-69 1344 6611.

3 Department of Finance and CentER, Tilburg University, and Norwegian School of Management BI, Elias Smiths vei 18, Box 580 N-1302 Sandvika, Norway; e-mail: bruno.gerard@bi.no, tel: +47-67 55 71 05.

Address
Kaiserstrasse 29
60311 Frankfurt am Main, Germany

Postal address
Postfach 16 03 19
60066 Frankfurt am Main, Germany

Telephone
+49 69 1344 0

Internet
http://www.ecb.int

Fax
+49 69 1344 6000

Telex
411 144 ecb d

ISSN 1561-0810 (print)
ISSN 1725-2806 (online)

CONTENTS

Abstract

We investigate the determinants of bilateral international equity and bond portfolio reallocation across a large cross section of countries over the 1997 to 2001 period. We first argue that financial integration is not a global phenomenon, as equity and bond home biases declined significantly only among European countries, Australia, New Zealand and Singapore. Then, we show that the European Economic and Monetary Union (EMU) eased the access to the equity market and, to a larger extent, the bond market; thereby, enhancing regional financial integration in the euro area. Beside the effect of the EMU, the strongest determinants of the changes in portfolio weights are expected diversification benefits and the initial degree of underweight.

Keywords: Home bias - Risk diversification - International portfolio weights - EMU

JEL classification: C13, C21, F37, G11.

Non-technical summary

Financial systems in general serve not only to channel funds from those who have a surplus to those who have a shortage of savings, but they also serve to trade, hedge, diversify and pool risk. These functions help us to understand the economic benefits that can be derived from financial integration. There are two widely accepted economic benefits of financial integration: first, the better sharing and diversification of risk; and second, the increase of the potential for higher economic growth.

One of the important arguments in favour of the existence of the European Economic and Monetary Union (EMU) is that via a higher degree of financial integration it enhances potential output and risk sharing among its participating member states. By showing price convergence across a number of financial instruments, the ECB (2005) publication "*Indicators of financial integration in the euro area*" finds evidence that a significant degree of financial integration has indeed taken place. Although asset price convergence constitutes an important element of evaluating the degree of financial integration, it portrays only one facet of this process. Investigating whether capital has been reallocated across countries worldwide, and the extent of such reallocation associated with the introduction of the euro, could provide another important element of better gauging how EMU might have promoted the integration of financial markets both in the euro area as well as globally.

By using mainly a IMF global portfolio holdings database covering the 30 largest economies over the 1997 to 2001 period - during which cross-border capital flows rose sharply - (i) we review whether the reallocation of capital among countries is due to a general decline in home bias world-wide and/or to the establishment of EMU; (ii) we assess whether the EMU has enhanced financial integration among euro area member states; (iii) we investigate the determinants of portfolio reallocation. The 1997-2001 period is of particular relevance as it witnessed not only the establishment of EMU but also a sharp rise of the share of household savings allocated in international stock and bond markets. The key findings of our analysis are:

- Financial integration is not a global phenomenon, as equity and bond home biases – that is the tendency to invest in domestic assets – declined significantly only among European countries, Australia, New Zealand and Singapore. Equity and bond home biases, however, continue to remain at relatively high levels. The significant decreases in bond home biases for European countries are characterised by a strong regional focus and are driven, to a certain extent, by the euro area itself. Therefore, the dramatic increase in allocation of savings in capital markets, which has taking off in the mid 1990's involved important changes in investors' preferences only in a group of countries.

- The establishment of the EMU enhanced regional financial integration in the euro area in both equity and bonds markets. After controlling for the effect of a set of variables borrowed from the finance literature, there is evidence of active trading among euro area member states with euro area investors having assigned a higher weight to portfolio investment in euro area countries. The average increase in the weights – on top of the world average portfolio weight increase in euro area assets – amounts to 12.7 and 22.4 percentage points for equity and bonds and notes holdings respectively.
- Beside the effect of the EMU, the strongest determinants of the changes in portfolio weights were (1) the need to diversify across several countries the risks of holding foreign portfolio assets and (2) the willingness to close the gap between actual shares of foreign investment and the share of foreign assets that would be held in a "borderless" global portfolio, which suggests that rational portfolio optimization reasons were prime motives behind investor's international portfolio reallocation. This implies that (1) investors do not ignore the main principles of portfolio theory and (2) portfolio investments might be less prone to "boom and bust cycles" relative to other assets, being driven by long term economic fundamentals.

1 Introduction

The main objective of this paper is to investigate the determinants of international portfolio reallocation for the 30 largest world economies over the period spanning 1997 to 2001. Of particular interest is to evaluate the effects of the European Economic and Monetary Union (EMU) on international portfolio reallocation. Documenting a differential impact would have bearing on the assessment of the benefits of the adoption of the single currency on the degree of regional financial integration among euro area member states.[1]

The impact of a currency union on financial markets is not well understood, as it might not result in deeper financial integration (Rose, 2006). Therefore, it is fundamental to assess whether the euro eased capital market access enhancing regional and/or global financial integration.[2]

Specifically, we investigate three sets of questions. First, we document whether the reallocation of capital among countries over the 4 year period is due to a general decline in home bias. Measuring the degree of home bias across countries and asset classes as well as monitoring its evolution over time is fundamental in enhancing our understanding of the global financial integration process. Second, we assess whether the adoption of the euro has induced a portfolio reallocation towards euro area countries and/or within the euro area. Documenting the worldwide access to euro area capital markets provides a benchmark for understanding whether regional financial integration among euro area member states has deepened. Third, we investigate the

[1] There are two main approaches two measure the degree of financial integration. The *price-based measures* assume the law of one price, which states that, in an integrated market, two identical financial products should be sold at the same price. The *quantity-based measures* used in this study assume that, in an integrated market, cross-border capital flows should be able to meet any shortfall in the domestic financing of aggregate investment (Feldstein and Horioka, 1980). Therefore, they give information on the ease of market access and the size of portfolio home bias. In general, the liberalization of portfolio flows and lower transaction costs to access non-domestic financial products would facilitate the flow of capital to firms and countries that have better investment opportunities, thereby helping markets becoming more integrated (Stulz, 1999).

[2] A collection of stylised facts on the European financial integration based on price convergence across a number of financial assets can be found in Baele et al (2004) and ECB (2005). A greater degree of financial integration among countries belonging to a currency union is imperative, as it facilitates the smooth and effective transmission of monetary policy, enhances risk-sharing and supports a better allocation of capital – thereby affecting positively economic growth. Moreover, it reduces the volatility of asset prices in the presence of country-specific adverse shocks, as a fall in asset prices would be cushioned by capital inflows.

determinants of bilateral international portfolio reallocation and in particular test whether rational portfolio diversification motives can explain the reallocation decisions of investors.

To address these fundamental issues we use bilateral cross-border equity and bond holdings among 23 developed countries and 7 emerging market economies over the period 1997-2001, covering 84% of world's international investment in equity portfolios and 71% of world's international investment in bonds and notes portfolios in 2001. The reference period per sé is important from a financial integration perspective, because it is characterised by three key stylised facts: (i) the sharp rise in cross-border capital flows globally; (ii) the increased percentage of household savings invested in capital markets and (iii) the establishment of EMU in January 1999 that was a fundamental institutional change in the world economy. The key advantages of using the portfolio weights at end-1997 and end-2001 are twofold: first, economic fundamentals might play a much important role in affecting international investment decisions in the longer term; second, the initial period is appropriate in measuring the impact of euro adoption, as it places itself before the establishment of the European Central Bank in June 1998, while the final period is chosen after the downturn in stock markets that started in spring 2000.

We document that financial integration is not a global phenomenon, as equity and bond home biases declined significantly only among European countries, Australia, New Zealand and Singapore. Equity and bond home biases continue to remain at relatively high levels. The significant decreases in bond home bias for European countries are characterised by a strong regional focus and are driven, to a certain extent, by the euro area itself. Therefore, the dramatic increase in allocation of savings in capital markets, which has taken off in the mid 1990's involved important changes in investors' preferences only in a group of countries.

To investigate whether the euro adoption enhanced *regional financial integration*, we then employ a 30x29 country matrix of changes in portfolio weights over the period 1997-2001, which virtually include all major investment decisions. Of particular interest are the bilateral factors that may explain why different source countries attach sharply different weights across various host (destination) countries; thereby, allowing to assess whether investors regard or ignore the main principles of portfolio theory. After controlling for the effect of key variables borrowed from the finance literature, there is evidence of active portfolio re-balancing among euro area member states with euro area investors having assigned a higher weight to portfolio investment in euro area countries. The increase in the weights – on top of the world average portfolio

weight increase in euro area assets – amounts to 12.7 and 22.4 percentage points (p.p.) respectively for equity and bonds and notes holdings.

Beside the impact of the EMU, we find that the strongest determinants of the changes in portfolio weights were expected diversification benefits and the initial distance from optimal portfolio weights (i.e. initial degree of underweight), suggesting that rational portfolio optimization reasons are prime motives behind investors' international portfolio reallocation.

Recent developments in international financial markets have heightened the interest in the issues investigated in this paper. First, there is evidence of increased co-movements between the main economic and financial variables of the world's largest economies. The pattern of bilateral financial linkages may affect the level of international integration as well as influence the degree of business cycle synchronization (Imbs, 2004). Second, the geography of investment positions heavily shapes international risk-sharing patterns, as risk is spread through asset market diversification (Sorensen and Yoska, 1998). Third, there is compelling evidence that people invest in the familiar (Huberman, 2001) and that home bias is a puzzle (Solnik, 1974b; French and Poterba, 1991; Tesar and Werner, 1995a and 1995b).

Although some authors already considered aspects of the geography of international investment patterns, data limitations narrowed the focus of these contributions; for example, only considering a single source country, most often the United States being the recipient or the source of the investment.[3] There is a rapidly expanding literature trying to explain international patterns of bilateral investment. Typically, this literature has studied the determinants of bank and portfolio holdings using empirical methods borrowed from the gravity models of international goods trade.[4] Our paper is the first to study the determinants of bilateral changes in portfolio weights in both equity securities and fixed income for a large cross section of countries and to document the role of the EMU on portfolio re-balancing in international markets.

The reminder of the paper is organized as follows. Section 2 outlines the empirical approach. Section 3 describes the data. Section 4 documents developments in global financial integration. Section 5 investigates the determinants of portfolio reallocation and assesses whether EMU enhanced financial integration by means of an international portfolio choice model. Section 6 concludes.

[3] See for example Bohn and Tesar (1996), Brennan and Cao (1997), Coval and Moskowitz (1999), Froot, O'Connell and Seasholes (2001), Huberman (2001), Ahearne, Griever, and Warnock (2004).

[4] See for example Faruquee, Li and Yan (2004), Lane and Milesi-Ferretti (2004), Lane (2005), Papaioannou (2005), Portes and Rey (2005).

2 Empirical Approach

We take a portfolio approach to investigate the determinants of the changes in international portfolio composition.[5] Consider a representative investor from a generic country c and let γ_c denote the investor's degree of risk aversion. Also, indicate with μ_c the $(N \times 1)$-vector of expected returns in excess of the risk-free rate on the N risky assets, and with Σ_c the $(N \times N)$-covariance matrix for the risky assets, where the subscript c indicates that returns are measured in the currency of country c. If the investor faces no constraints on foreign holdings and financial markets are perfectly integrated, mean-variance optimization implies the following portfolio allocation

$$\mathbf{w}^*_{c,t} = \frac{1}{\gamma_c}\Sigma^{-1}_{c,t}\boldsymbol{\mu}_{c,t},$$

where $\mathbf{w}^*_{c,t}$ is the $(N \times 1)$-vector of optimal weights for the N risky assets.

Assuming that investor risk aversion does not change over the time, changes in optimal portfolio weights reflect either expectations on excess returns $\boldsymbol{\mu}_{c,t}$ or changes in the asset's contribution to the overall portfolio risk as reflected in changes in the covariance matrix of returns. Therefore, the empirical model aiming at studying the determinants of changes in portfolio weights ought to control for expected returns and expected marginal diversification benefits. Moreover, currency risk across euro area member states was expected to become nil after the EMU. Therefore, when computing the expected diversification benefits arising from portfolio reallocation, one needs to distinguish the asset specific risk from the currency risk.

In practice, however, financial markets are not perfectly integrated, and some countries impose restrictions on the foreign holdings of their nationals or on the domestic holdings of foreign nationals. In this case, actual holdings may deviate from the unconstrained mean-variance optimum and may exhibit significant home bias. Therefore, a third regressor is needed to measure the initial misallocation or degree of underweight in the destination country given the possibility of portfolio re-balancing in the subsequent period, especially if the initial underweight is due to trade costs that declined subsequently. Indeed, the benefits of increased financial integration should be most pronounced for the investors initially facing the highest barriers to cross-border investment, and whose initial holdings were furthest from optimal.

In order to estimate also the effects of the EMU on global portfolio reallocation,

[5] Jorion and Khoury (1996, Ch 7, pp. 273-322) provide a lucid and detailed discussion of international portfolio choice and pricing as well as references to the original contributions to the field.

the general equation estimated in the paper takes the following form:[6]

$$\begin{aligned}\Delta w_{ck,t} &= \alpha_0 + \alpha_1 DW_{ck,t-1} + \alpha_2 DB_{ck,t-1} + \alpha_3 Ret_{k,t} + \alpha_4 Ret_{k,t-1} + \\ &\beta_1 D_{k\subset EMU} + \beta_2 D_{k\subset EMU} \cdot D_{c\subset EMU} + \gamma' \mathbf{Z}_{ck,t-1}\end{aligned}$$

where $\Delta w_{ck,t}$ denotes the change in the share of country c's international equity portfolio invested in country k, $DW_{ck,t-1}$ is the difference between the actual and optimal share (initial degree of underweight) of country k assets in investor c portfolio, $DB_{ck,t-1}$ the aggregate marginal diversification benefit to investor c of increasing her investment in country k assets, $Ret_{k,t}$ the total returns on country k's market portfolio from time $t-1$ to t and D are binary variables used to capture the impact of the EMU on international portfolio reallocation. Finally, $Z_{ck,t-1}$ include three additional control variables borrowed from the capital flow literature that control for structural factors (i.e. distantness, population growth and institutional setting), which measured ex-ante could have a role in the subsequent portfolio reallocation. The construction of the variables is described in the following subsections.

2.1 Portfolio weights

The actual portfolio shares at the end of each survey year are computed as follows.

$$w_{ck,97} = \frac{Inv_{c,k,97}}{\sum_k Inv_{c,k,97}} \qquad \text{and} \qquad w_{ck,01} = \frac{Inv_{c,k,01}}{\sum_k Inv_{c,k,01}}$$

where $Inv_{c,k}$ is the US dollar amount invested by country c in country k financial assets.

The change in foreign investment values from 1997 to 2001 could be due the returns earned on the different assets over the four year period, to new investments or to reallocation of existing investment. Since the establishment of the EMU might have eased capital market access, we are particularly interested in the active re-balancing, that is the change in portfolio allocation that can be attributable to an investor decision and action, $\Delta w^A_{ck,t}$. Therefore, we need to disentangle the portfolio weight change due to return differentials from that due to investor reallocation decisions:

$$\Delta w^A_{ck,t} = w_{ck,t} - w_{ck,t-1}\frac{(1+r^c_{k,t})}{\sum_k (1+r^c_{k,t})} = w_{ck,t} - w_{ck,t-1}\frac{(1+r^c_{k,t})}{(1+r^c_{Pc,t})}$$

where $r^c_{k,t}$ is the return on investment k denoted in country c's currency and $r^c_{Pc,t}$ is

[6] As a matter of convention, the index c will be used to denote the investing country and k the receiving country.

the total return on country c's foreign portfolio.[7] More specifically, we subtract from the weights observed at the end of time t, the weights that would have been observed had the investor bought and held his initial portfolio over the 4 years.[8] Returns for the different foreign assets will be approximated by the total return on the equity and bond market index respectively for each country.

In general, portfolio re-balancing may also occur by means of a passive strategy. Especially if transaction costs are high, the accumulation of capital gains on foreign holdings may be an efficient and low-cost way to re-balance the portfolio. An active and passive re-balancing is captured by the change in portfolio weights gross of the capital gains/losses:

$$\Delta w^{B}_{ck,t} = w_{ck,t} - w_{ck,t-1}.$$

Both strategies are investigated in the paper, although the active international portfolio choice is the strategy to look at in order to assess whether the EMU enhanced regional financial integration.

2.2 Marginal diversification benefits and currency risk

Security risk can be diversified by constructing international portfolios of unrelated countries' assets. Specifically, we compute the marginal impact on portfolio risk of increasing or decreasing our position in a particular asset using the foreign investment portfolio variance, which can be computed as

$$\sigma^2_{P_c t} = \mathbf{w}'_{c,t} \Sigma_{c,t} \mathbf{w}_{c,t},$$

where $\mathbf{w}_{c,t}$ is the actual vector of weights for the N foreign assets and the subscript c indicates that the weights and the covariance matrix of returns are computed from the investing country c's perspective.

The decrease in portfolio variance for a marginal increase in the weight invested in asset k can be interpreted as a measure of the diversification benefit, $\mathbf{DB}_{c,t}$:

$$\mathbf{DB}_{c,t} = -\frac{\partial}{\partial \mathbf{w}_{c,t}} \sigma^2_{P_c t} = -\frac{\partial}{\partial \mathbf{w}_{c,t}} \left[\mathbf{w}'_{c,t} \Sigma_{c,t} \mathbf{w}_{c,t} \right] = -2 \Sigma_{c,t} \mathbf{w}_{c,t}.$$

That is,

[7] Since weigths are currency of denomination insensitive (Sercu, 1980), the adjustement can be done with all returns denominated in US$ instead of the local currency.

[8] If the investor made additional investment over the period spanning the two survey dates, the assumption would imply that new contributions were allocated using the portfolio shares observed at the initial survey date.

$$DB_{ck,t} = -\frac{\partial}{\partial w_{ck,t}}\left[\mathbf{w}'_{c,t}\Sigma_{c,t}\mathbf{w}_{c,t}\right] = -2\sum_{l=1}^{K} w_{cl,t}\sigma_{lk,t},$$

where $DB_{ck,t}$ measures the diversification benefit of adding asset k to investor c's position. We should expect it to be positively related to changes in portfolio weights.

For an international investor, the return on any foreign asset varies not only because of asset specific risk, but also because of unpredictable fluctuations in exchange rates. Currency risk is relevant not only for optimal portfolio construction (see De Santis, Gerard and Hillion, 2002), but also for the determination of international assets equilibrium returns (Adler and Dumas, 1983, De Santis and Gerard, 1998, De Santis, Gerard and Hillion, 2003.) In our context currency risk is important on two dimensions. First, since the currency risk exposure of asset portfolios can easily be hedged through derivatives transactions, it may be of interest to distinguish between the pure asset component and the currency risk component of the diversification benefit motive of portfolio reallocation. Second, between the two sampling points, the introduction of the single currency eliminated a substantial component of currency risk for many international investments in our sample. By the end of 1997, when the first survey was conducted, the Maastricht process was well underway and investors were keenly aware of the high likelihood that the intra-EMU currency risk would disappear. Therefore, we would also like to disentangle the currency risk effects of the adoption of the Euro from the aggregate currency risk effects of a change in portfolio allocation.

Consider an investor from a euro area member state, e.g. a Dutch investor. When, in 1997, she considers investing in financial assets traded in another euro area country, she is aware of the high likelihood of the disappearance of the currency risk component of the total risk of her investment, and she considers only the "fully hedged" asset risk, that is the pure asset component of the asset risk. When she considers investing in assets traded outside the euro area, she is aware that the share of the asset's currency risk related to intra-euro area currency fluctuations will disappear, but that she will remain exposed to the fluctuations of the euro relative to the currency in which the foreign investment is made. As an approximation, she could consider the investment as if she was a German investor. For investments outside the euro area she would then consider (a) the "fully hedged" risk of the asset, and (b) the currency risk of the asset *as if* she was a German investor.

Consider an investor from outside the euro area, e.g. a US investor. When she considers investing in financial assets traded in a euro area country, she is also aware of the high likelihood of the disappearance of the part of the asset's currency risk

related to intra-euro area zone currency fluctuations, but that she will still remain exposed to the fluctuations of the euro relative to her domestic currency. For an investment within the euro area, she considers (a) the "fully hedged" asset risk, and (b) the currency risk of the asset as if the asset was a German asset. When she considers investing in assets traded outside the euro area, she recognizes that she will be exposed fully to both the asset's intrinsic risk and to the full currency risk related to the fluctuations of her domestic currency relative to the currency in which the foreign investment is made. Therefore, for an investment outside the euro area, she considers (a) the "fully hedged" asset risk and (b) the full currency risk of the asset.

To make the argument slightly more formal, denote with r the continuously compounded (or log) returns and with x the continuously compounded (or log) exchange rate change. Then,

$$r_k^c = r_k^k + x_k^c = r_k^k + x_k^s + x_s^c,$$

where r_k^c is the return on country k portfolio denominated in currency c, and x_k^c the log of the change in the exchange rate between currency k and currency c. The first part of the equation is the well known decomposition of foreign investment returns in local asset return and currency return. The second equality reflects the no-triangular arbitrage condition for exchange rates.

We will consider three measures of diversification benefits: (i) an aggregate measure of diversification benefits based on the investor's foreign investments returns denominated in his domestic currency, $DB_{ck}^{Agg} = DB(r_k^c)$; (ii) a measure of diversification benefits based on the investor's foreign investments fully hedged returns, $DB_{ck}^{FH} = DB(r_k^k)$; and (iii) a measure of diversification benefits based on the currency component of the investor's foreign investments, $DB_{ck}^{Curr} = DB(x_k^c)$. The first measure is based on the covariance of asset returns measured in the investor's domestic currency and the investors starting portfolio weights, and combines both the impact of currency risk and fundamental asset risk. The second measure is a function of the covariance of asset returns measured in the asset's local currency and the investors starting portfolio weights. The third measure is based on the covariance of foreign currency returns expressed in the investor's domestic currency, and of the investor's starting portfolio weights. Therefore, both determinants of the diversification benefit, i.e. the covariance matrix of returns and the weights, are investor specific for the first and third measures; while, for the second measure, the covariance of local asset returns is common to investors from all countries, but the starting portfolio weights

are investor specific.[9]

The first two measures of the diversification benefit are easy to compute based on investor's currency denominated asset returns and local currency denominated returns respectively. The third measure, the currency component of the investor's diversification benefits, is then computed by taking the difference between the first two:

$$DB_{ck}^{Curr} = DB_{ck}^{Agg} - DB_{ck}^{FH}.$$

In the context of the adoption of the single currency, we want to distinguish between the fraction of the currency component of the diversification benefits due to intra-EMU currency fluctuations and that part due to extra-EMU currency fluctuations. The benefits from diversifying intra-EMU currency risk would be expected to disappear with the introduction of the Euro, while the risk associated with currency fluctuations outside the EMU zone would persist. Rational investors would take the second one into account when re-balancing, while ignoring the first one. To implement the decomposition we need to introduce some additional notation. We use the following decomposition

$$DB_{ck}^{Curr} = DB_{ck}^{Curr,X-EMU} + DB_{ck}^{Curr,EMU}$$

where X-EMU denote currency fluctuations external to the EMU, and EMU denote currency fluctuations internal to the euro area.

For investments made by a euro area member state in another euro area country, the external currency risk is inexistent and

$$DB_{ck}^{Curr,X-EMU} = 0 \Longrightarrow DB_{ck}^{Curr} = DB_{ck}^{Curr,EMU}.$$

For investments made by a non-EMU member outside the euro area, the currency risk internal to the euro area is inexistent and

$$DB_{ck}^{Curr,EMU} = 0 \Longrightarrow DB_{ck}^{Curr} = DB_{ck}^{Curr,X-EMU}.$$

[9] This discussion and the derivation of the diversification benefit are based on the implicit assumption that asset's local currency returns and exchange rate changes are uncorrelated. Although the covariance between local asset returns and exchange rate changes is non zero (see for example De Santis and Gerard, 1998; Cappiello and De Santis, 2005), explicitly considering non-zero covariances between local asset return and exchange rates will not affect the decomposition and the derivation materially and carry a considerable cost in terms of complexity, notation and intuition. Such a derivation is available from the authors on request. In the empirical exercise, however, these covariances have a degree of magnitude smaller than local asset returns covariances and exchange rate changes covariances.

For investments made by euro area member states outside the euro area and by non-EMU members inside the euro area both components of currency risk may affect investment decisions. To estimate the internal-EMU currency risk component, we will compute the total diversification benefit as if there were no internal currency fluctuations. The difference between the currency component of the investor's diversification benefit and our aggregate external diversification benefit will give us the estimate of the internal-EMU currency risk component.

The computation of diversification benefits

	Investment to:
Investment from:	EMU country ($k \in EMU$)
A. EMU country ($c \in EMU$)	$DB_{ck}^{Curr,X-EMU} = 0$ $DB_{ck}^{Curr,EMU} = DB_{ck}^{Curr}$
B. Non-EMU country ($c \notin EMU$)	$r_k^c = r_k^k + x_k^{DEM} + x_{DEM}^c$ $DB_{ck}^{Curr,X-EMU} = DB_{ck}^{Agg} - DB_{ck}(r_k^k + x_{DEM}^c)$ $DB_{ck}^{Curr,EMU} = DB_{ck}^{Curr} - DB_{ck}^{Curr,X-EMU}$
	Non-EMU country ($k \notin EMU$)
C. EMU country ($c \in EMU$)	$r_k^c = r_k^k + x_k^{DEM} + x_{DEM}^c$ $DB_{ck}^{Curr,X-EMU} = DB_{ck}^{Agg} - DB_{ck}(r_k^k + x_k^{DEM})$ $DB_{ck}^{Curr,EMU} = DB_{ck}^{Curr} - DB_{ck}^{Curr,X-EMU}$
D. Non-EMU country ($c \notin EMU$)	$DB_{ck}^{Curr,X-EMU} = DB_{ck}^{Curr}$ $DB_{ck}^{Curr,EMU} = 0$

We need to make a critical assumption for implementing the decomposition. We assume that prior to the adoption of the single currency, the Deutsche Mark was viewed by world investors as the currency to which the single currency would most closely relate in terms of exchange rate characteristics. This is a reasonable assumption as the characteristics of the ECU, the joint unit of account that preceded the Euro, were very similar to that of the DEM. That is, we assume that when investing in France, to compute her aggregate external diversification benefits a US investor would consider the fully hedged local French equity returns and only the currency fluctuations

between the US$ and DEM (see case B in the summary above). By the same token, a French investor investing in the US would consider the fully hedged local US equity returns and only the currency fluctuations between the US$ and DEM in order to compute her aggregate external diversification benefits measure (see case C).

Since re-balancing a portfolio entails transaction costs, it is unlikely to take place when estimated marginal diversification benefits are of small magnitude. Therefore, to introduce some non-linearities, the estimated values of DB_{ck}^{Agg}, DB_{ck}^{FH}, $DB_{ck}^{Curr,X-EMU}$ and $DB_{ck}^{Curr,EMU}$ are squared, when they are positive; and squared and multiplied by minus one, when they are negative.

2.3 Asset returns

Changes in portfolio allocation should be related to the expected returns of each asset. Brennan and Cao (1997) and Froot, O'Connell and Seasholes (2001) find a positive contemporaneous relationship between portfolio flows and contemporaneous returns unadjusted for portfolio risk. The contemporaneous correlation may be due to informational disadvantages by global investors relative to domestic investors, who have better knowledge of local market's economic conditions. The positive information releases unexpected by global investors will then influence the international allocation of portfolio holdings, as foreign investors purchase more of the domestic market portfolio from the better informed domestic investors.

Bohn and Tesar (1996) and Froot, O'Connell and Seasholes (2001) found that international portfolio flows co-move with lagged measures of expected returns. This suggests that international investors engage in positive feedback trading, also called "trend chasing".

2.4 Misallocation and degree of underweight

Since re-balancing a portfolio entails both direct and indirect transaction costs, it is unlikely to take place when actual portfolio weights differ only slightly from optimal portfolio weights. However, the larger the difference between actual and optimal share at the beginning of the sample the stronger the incentive to trade back to optimal weights, reducing the position when the actual weight exceeds the optimal weight and increasing your investments in an asset when it is under-weighted, especially if the initial underweight is due to trade costs that declined subsequently.

We use market capitalization to compute optimal weights. Since our data focus exclusively on the foreign holdings of each country, the optimal weight to be invested

in country k by country c is equal to country k's market capitalization in the world market index excluding the investing country c. Let w_c^* and w_k^* denote the market capitalization weight of countries c and k in the total world market portfolio, respectively. Then, the degree of underweight can be computed as follows:

$$DW_{ck,t} = w^*_{ck,t} - w_{ck,t}, \qquad w^*_{ck,t} = \frac{w^*_{k,t}}{1 - w^*_{c,t}}.$$

2.5 EMU impact on international portfolio allocations

To measure the average impact of the EMU on international portfolio allocations, we include two sets of binary variables. First we include a dummy which takes the value of 1 if the country receiving the investment belongs to the EMU. The coefficient of this dummy measure the average change in percentage points of the allocation to individual EMU countries for all investors. However, the effect of the single currency may be more pronounced on the investment decisions of investors residents in the euro area. To control for this differential effect, we include a dummy variable which takes the value of 1 when both investing and receiving countries belong to the EMU. The coefficient of this dummy measure the average change in percentage points of the allocation to individual EMU countries for EMU investors that comes *in addition to* the average change observed for all investors. Accordingly, it quantifies the average financial integration effect of euro adoption for the individual euro area member state.

A further complication comes from the role of the London market as a major European intermediary of foreign investments from and to the rest of the world. Due to the large size and higher sophistication of the London markets, many euro area investors and foreign investors in the euro area choose the London stock exchange to make their cross-border investments. The IMF data on portfolio holdings report an accurate country breakdown of bilateral investment, which tries to identify the residence of the issuer. Nevertheless, since the city of London is a key European player in the financial markets, we control for that by including two additional dummies. The first dummy takes a value of 1 if the receiving country is the UK. A second dummy takes the value of 1 if the investing country belongs to the EMU and the receiving country is the UK.

2.6 Other control variables

Other control variable as in 1997 include trade intensity in goods and services, population ageing, and investors' perceived corruption, the latter used as a measure of the quality of the institutions in the destination country.

The lower the informations asymmetry the lower the transaction and information costs. Trade in goods and services could reduce distantness and facilitate the information flow across trade partners increasing the willingness to conduct cross-border portfolio transactions. However, trade costs can also explain the equity portfolio home bias (Obstfeld and Rogoff, 2001). In both interpretations, the deeper the trade relationship between countries at the beginning of the sample, the bigger the portfolio reallocation in favour of the trade partner. Trade intensity is measured as the sum between the export share of the investing country c in the receiving country k and the export share of country k in country c.

A structural determinant of national savings is the demographic profile of a country. Relatively high youth and old-age dependency ratios would bring about net capital inflows, as a relatively large population of dependent young and old has a relatively lower savings rate (Ando and Modigliani, 1963). However, the expected positive relationship between dependency ratios and net capital inflows might not hold for all types of portfolio flows. If pensioners' savings were reallocated from equity securities to less risky assets, such as global government bonds, then the link with the dependency ratios would differ between types of portfolio flows. In general, households might take less financial risk, as they reach their retirement years (Constantinides, Donaldson and Mehra, 2002). For a more risk-adverse investor, the rational response is to demand higher returns on stock and/or a move to fixed income investment.[10] Alternatively, if cross-border capital flows were limited due to home bias, trade restrictions or large transaction costs, developed countries with a shrinking workforce could face an asset melt-down (i.e. a rapid fall in securities prices due to a withdrawal of assets by the retiring baby-boomers).

Several studies argue that institutions matter in shaping the flow of capital across countries (Alfaro, et al, 2005; De Santis and Lührmann, 2006). International investment decisions are affected by risks as well as by countries' corruption, turmoil, violence, instability, rule of law, property rights, freedom influence economic market sentiment. In general investors prefer to purchase or hold assets of countries with a

[10] Findings by Riley and Chow (1992), for example, indicate a U-shaped relationship between relative risk aversion and age. Similarly, Ameriks and Zeldes (2000) estimated a hump-shaped age effect on the fraction of household financial assets held in equity securities. Heaton and Lucas (2000) found that the share of equity relative to marketable financial assets declines above age 65, but this effect disappears when the wealth measure includes private business. De Santis and Lührmann (2006) show evidence that countries with relatively higher youth and old-age dependency ratios are associated with net equity inflows, while countries with a relatively higher old-age dependency ratio is associated with net outflows in debt instruments.

good institutional framework. In this study, we report the results using the corruption perceptions index score, which measures the degree of corruption in country k as perceived by business people and country analysts.

3 Data

The primary source for portfolio holdings is the Coordinated Portfolio Investment Survey (CPIS) conducted by the IMF and described more fully in the next sub-section. The CPIS reports for each investing country the total amount, denominated in US dollar, of foreign investment at the end of 1997 and at the end of 2001. Moreover, the data provide a geographical breakdown of international equity and bond holdings at the end of 1997 and of 2001 by 29 and 67 source countries, respectively. This include virtually all major international investors. Therefore, it allows one to explore the determinants of international portfolio positions in a comprehensive manner. Additional data compiled by the World Bank, Thomson Datastream and JP Morgan are used as the main data sources to construct the control variables.

3.1 International portfolio holdings

The geography of international investment has not been investigated in depth in the literature due to the lack of a consistent database on international portfolio allocation. In this paper, we use the IMF CPIS database, which reports the international portfolio positions disaggregated by regions and instruments. More specifically, the CPIS dataset provides a geographical breakdown of international portfolio holdings disaggregated by three instruments – equity securities, bonds and notes and money market instruments, and includes virtually all major international investors. An additional advantage of this dataset is the consistency of the compilation criteria:

- participants undertake a benchmark portfolio asset survey at the same time;
- participants follow definitions and classifications that are mutually consistent by following the same methodology;
- all participants provide a breakdown of their stock of portfolio investment assets by the country of residency of the non-resident issuer.

The database for the year 1997 covers 29 of the largest economies in the world, nine of which belonging to the euro area – Austria, Belgium, Finland, France, Ireland, Italy, Netherlands, Portugal and Spain -, the three old EU member states but not members of the euro area – Denmark, Sweden and the United Kingdom -, another ten developed countries – Australia, Bermuda, Canada, Iceland, Israel, Japan, New

Zealand, Norway, Singapore, the United States -, four Asian emerging markets – Indonesia, Korea, Malaysia, Thailand - and three Latin American emerging markets – Argentina, Chile and Venezuela. Germany did not report data in 1997, but did so in 2001. Since Germany is a key euro area member and its international portfolio holdings are substantial, we used an annual database on international investment positions from the Bundesbank to derive the geographical allocation of equities and bonds and notes position abroad held by German residents at end-1997. Specifically, we use the Bundesbank 1997 and 2001 records and adjust all the 1997 positions consistently (including exchange rate movements) to make them comparable to the 2001 holdings recorded in the CPIS.

At the end of 2001, 12.7 trillions of US dollars (that is, 50% of total GDP of OECD countries) were invested internationally, mostly in equity securities (40.9%) and bonds and notes (50.6%). Ten developed countries - the United States, the United Kingdom, Japan, Switzerland and six euro area countries - held 72.2% of all international portfolio holdings. Similarly, few developed countries host most of the international portfolio investment. The United States, the United Kingdom, Japan, Cayman Islands, Canada and five euro area countries were recipient of 74.1% of all international portfolio holdings (see Table 1).

It is interesting to point out that the United States held USD 1.6 trillion in foreign equity securities and only USD 0.6 trillion in foreign bonds and notes. Japan instead held only USD 0.2 trillion in foreign equity securities and USD 1 trillion in foreign bonds and notes. Conversely, the six euro area countries held 1.5 trillion in foreign equity securities and USD 2 trillion in foreign bonds and notes. Clearly, investors from different countries appear to have very different global asset allocation strategies, which may reflect differences in appetite for risk across the world.

With regard to the liability side of portfolio international investment, foreign investors held USD 1 trillion of US equity securities and USD 1.7 trillion of US bonds and notes. They also held respectively USD 1.5 trillion and USD 2.1 trillion of equity securities and bonds and notes issued by residents of the six euro area countries. In other words, the United States and the euro area are the main recipients of foreign capital. When examining the changes from 1997 to 2001 across the main regions of the world, it is evident that international portfolio allocation increased in developed countries while remaining small in emerging markets (see Figure 1).

In all, we employ a matrix formed by 30 countries from 1 year before (end-1997) to 3 year after (end-2001) the launch of the Euro, in order to study the medium term determinants of changes in portfolio weights and the impact of EMU on inter-

national portfolio allocations in both equity securities and bonds and notes. This procedure also has the advantage of abstracting from short-run variations in international portfolio holdings, which could be due to unexpected economic news, cyclical developments as well as phenomena which are difficult to pin down.[11]

3.2 Other data

To compute the optimal portfolio weights needed to generate appropriate measures of home bias and misallocation, we use the country weights in the Datastream total world index equity portfolio on December 31, 1997 and December 31, 2001, as proxies for the true market capitalization weights. As bond market total capitalization is not readily available for all countries in the sample, the optimal country bonds portfolios weights are estimated as the ratio of the country's GDP to the world aggregate GDP in 1997 and 2001 respectively.[12] The actual share of a country's foreign holdings is computed as the ratio of the country's foreign holdings to the country's total country portfolio holdings. For equities we estimate total country holdings as the sum of the domestic equity market capitalization provided by Datastream plus the country's foreign holdings, minus the sum of foreigners holdings of that country's equity. For bond portfolio, we use the same approach where domestic bond market value is estimated as the nominal value of all domestically issued debt provided by the BIS.

To estimate the covariance matrix needed to compute the expected marginal diversification benefits (see Appendix), we use weekly equity returns on the Datastream total market index and weekly bond returns on the JP Morgan total market index for each country denominated in local currency and in US dollars, from December 92 to December 97. Weekly bilateral exchange rates are also provided by Datastream.

Trade intensity is constructed using IMF data on bilateral trade in goods and services. Population ageing in country k consists of two variables constructed using

[11] To eliminate outliers from the sample, we adopted two sample filtering criteria. We excluded from the database the investing countries that allocated explicitly to specific receiving countries less than 75% of their international portfolio either in 1997 or in 2001, or those countries that held less than 100 million of US dollar in their international portfolio in 1997 or in 2001. Therefore, we excluded the investment of Argentina, Indonesia, Israel, Thailand and Venezuela from the equity holdings database and the investment of Iceland, Israel and New Zealand from the long-term debt instrument holdings database. Moreover, we excluded all zero entries. Hence, the original databases with 870 observations ended up with 667 observations for the equity holdings and with 639 observations for the long-term debt instruments holdings.

[12] We have also used the countries' bond outstanding at nominal values, and the optimal country bond portfolio weights remain invariant.

the UN database on world population: the relative youth dependency ratio (i.e. age: 0-15/15-65) and the relative old-age dependency ratio (i.e. age: 65+/15-65) of the recipient country relative to the world average. The corruption perceptions index score compiled by Transparency International ranges between 0 (highly corrupt) and 1 (highly clean).

4 Global financial integration

A typical measure used to document the financial integration of a country in the global financial system is home bias ($HB_{c,t}$), which is broadly defined as the tendency to invest more in domestic assets, even though the risk is shared more effectively if foreign assets are held. Hence, the extent of a country's home bias is a sign that financial integration is still not complete. Due to data limitation at global scale, the development over time of home bias is often documented for the United States only (Ahearne, Griever and Warnock, 2004). We show developments of home bias for 30 countries in equity and bond markets and assess whether its decline is a global phenomenon and/or asset specific.

An index that is generally used to measure home bias is one minus the Foreign Asset Acceptance Ratio (FAAR).[13] FAAR measures the extent to which the share of foreign assets in an investor's portfolio diverges from the share of foreign assets that would be held in a "borderless" global portfolio. By this metric, home bias is higher, the lower FAAR is from unity. Specifically, FAAR is computed as the actual share of foreign assets in total country holdings ($w_{cf,t}$) divided by the optimal share of foreign assets in the total country portfolio ($w^*_{cf,t}$). This implies that $HB_{c,t} = 1 - w_{cf,t}/w^*_{cf,t}$.[14]

To identify an observable estimate of the optimal shares, we call upon finance theory. In a fully integrated world where PPP holds, Solnik (1974a) and Sercu (1980) show that the international version of the simple CAPM of Sharpe (1964) and Lintner (1965) holds. Moreover, the equilibrium is achieved when all investors hold the world market portfolio, where each country portfolio is weighted by its market capitalization.

[13] See for example Ahearne, Griever and Warnock (2004) and IMF (2005).

[14] This measure has also several limitations. As pointed out by the IMF (2005), some investors may have good reasons for preferring domestic to foreign assets under certain conditions. Moreover, FAAR measures only consider the market in which a firm is listed, even if the firm is global in scope. Accordingly, the FAAR index may understate the overall degree of actual diversification of investors in highly international markets, particularly smaller markets where a few global firms may dominate the market index.

In this model, the optimal share invested in each country is equal to that country's market capitalization weight in the world index portfolio. By the same token, for each country, the optimal share invested abroad ($w^*_{cf,t}$) should be equal to 1 minus the investing country's market weight in the world index. The higher $HB_{c,t}$, the more home bias the portfolio exhibits.

Table 2 reports our estimates of the degree of home bias in the aggregate equity and fixed income portfolios of the countries in the sample. Our computations suggest that portfolio home bias is generally high across countries. Among the largest developed economies, Japan and Spain have the highest measured home bias in equity markets amounting to 88% and 80% in 2001 respectively; while the United States and Canada have the largest home bias in fixed income markets equalling 92% and 93% in 2001 respectively. Euro area member states and small developed economies such as New Zealand, Norway, Sweden and Singapore reported a large decline in home bias in both assets. Conversely, the home bias in the United States and Japan did not change much over the four year period.[15]

Turning to economic regions, non-EU developed countries and emerging market economies show very high levels of home bias in both equity and bond portfolios. This contrasts with the much lower average home bias in EU member states (see Figure 2). The average home bias across euro area countries was 63% in equity markets and sizably lower for bond markets (44%). However, when considering the euro area as one economic region (excluding intra-asset trade among euro area member states), equity and bond home bias measures in the euro area decline but to a lower extent and in 2001 amounted to 75% in equity markets and 68% in bond markets, suggesting a large reallocation within the euro area, particularly in the bond portfolios (see Figure 2). The larger decline in home bias by euro area member states relative to the euro area as a whole implies that the increased interest in foreign assets by euro area investors did not divert asset trade from other euro area member states.

All in all, financial integration is not a global phenomenon, as equity and bond home biases declined only among European countries, Australia, New Zealand and Singapore. Equity and bond home biases continue also to remain at relatively high levels. The significant decreases in bond home bias for European countries are characterised by a strong regional focus and are driven, to a certain extent, by the euro area itself.

[15] The degree and the change in home bias estimated for the US equity markets are similar to the estimates obtained by Ahearne, Griever and Warnock (2004) for the US equity market using a different database.

5 International portfolio choice and the single currency

We presented evidence that equity and bond home biases have decreased significantly across European countries, Australia, New Zealand and Singapore. Other developed countries and the emerging markets did not experience a change in their preferences for domestic and foreign assets. The larger average decline in home bias in the euro area provides also tentative signs that euro area financial markets could have become more integrated owing to the formation of the EMU. In this section, we show that the reduction in home bias has been accompanied by a large shift in holdings towards other euro area countries and that the EMU had a large impact on portfolio asset trade among euro area member states.

Tables 3 and 4 report the countries' share of assets issued by residents in the euro area in 1997 and 2001 respectively in their international and total portfolios. Euro area countries and in general European countries have increased the share of EMU assets as a fraction their portfolio holdings, particularly in bond portfolios.[16] The international portfolio holdings issued by euro area residents increased for EU member states and the emerging markets in equity holdings and across all countries in bonds and notes holdings (see Figures 3 and 4). While the intra euro area allocation of equities slightly increased, intra euro area investment in bonds rose sharply.

This stylised facts point to enhanced regional financial integration among euro area member states over the 1997-2001 period. Since there could be several economic reasons to invest in EMU assets, we have still to prove the "pure" regional integration effect of the EMU.

To investigate whether these general results are valid when looking at bilateral variations in portfolio allocation, we estimate an international portfolio choice model. The model looks at the bilateral variations in portfolio allocation among the 30 countries in our sample over the period 1997-2001.

We first investigate the determinants of active re-balancing and control for the degree of underweight at the beginning of the sample, the benefit arising from expected portfolio diversification and market performance, so that we can estimate the quantity-based financial integration index among euro area member states by means of binary variables.

The econometric results summarised in Tables 5 and 6 suggest that the EMU played a key role in the reallocation of capital among countries worldwide as well as

[16] Tables and Figures 3 and 4 are constructed including the portfolio assets issued by residents of Luxemburg. The investing euro area countries continue to be the 10 member states listed in section 3.1 for which the geographical portfolio allocation is available.

among euro area member states, thereby enhancing financial integration and potentially international risk-sharing. Due to the establishment of the EMU, the portfolio weights assigned by euro area investors to portfolio investment in euro area countries increased in equity portfolios and bonds and notes portfolios (see coefficient on D_2). This trade creation effect (i.e. *Rose* effect in the asset market) among euro area member states is statistically significant at 1% in both markets and this gain is on top of the mere elimination of the exchange rate risk, the latter captured by $DB^{EMU}_{ck,t-1}$.[17]

Beside the EMU effect, pointing towards enhanced financial integration among euro area member states in both equity and fixed income markets, we find that the strongest determinants of the changes in portfolio weights are (1) the need to diversify across several countries the risks of holding foreign portfolio assets (i.e. expected diversification benefits) and (2) the willingness to close the gap between actual foreign investment weights and the share of foreign assets that would be held in a "borderless" global portfolio (i.e. receiving country underweight). The latter variables increases the adjusted R^2 by approximately 20 percentage points in both equity and fixed income portfolios.

On the one hand, the expected diversification benefit is not significant if the "fully hedged" risk is aggregated with the currency risk of the asset (see specifications 2 in Tables 5 and 6). On the other hand, the "fully hedged" asset risk set alone plays an important role in explaining changes in portfolio weights in both assets and, most importantly, in equity portfolios as the adjusted R^2 increases by an additional 16 p.p. (see specifications 3 in Tables 5 and 6). We would indeed normally expect that adding securities to the portfolio will tend to reduce portfolio risk. The diversification benefits arising from the currency component are insignificant for expected currency fluctuations external to the euro area, and significant, positive and small for expected currency fluctuations within EMU, but only for the equity portfolio model. These findings imply that investors might have preferred to hedge against exchange rate risks, as there is no strong evidence of diversification benefits from the currency component (see specifications 4-5 in Tables 5 and 6). Finally, particularly past performance is important for the allocation of bond portfolios.[18]

Given the sizeable adjusted R^2, these results suggest that rational portfolio op-

[17] Rose (2000) finds strong evidence of a positive impact of currency unions on commodity trade, particularly for smaller countries.

[18] De Santis and Lührmann (2006) showed that net equity flows are not affected by stocks' past performance, while net flows in debt instruments are driven by lagged long-term yield differentials. The effect of the redemption yield is positive in the medium term (momentum motive), but negative in the shorter run (portfolio re-balancing motive).

timization reasons are prime motives behind investors' international portfolio active allocation in the long term.

We also investigate the determinants of the active and passive re-balancing strategy. In this case, the change in portfolio weights is mostly function of the initial degree of underweight in the destination country (see Table 7). The effect of the expected diversification benefits is washed away because investors tend to add securities to the portfolio in order to reduce overall portfolio risk as found in the specifications with the active re-balancing only.

As for the other explanatory variables of changes in portfolio weights, bilateral trade intensity at the beginning of the sample affects the subsequent reallocation of equity portfolios as well as bonds and notes portfolios in both models. The stronger the bilateral trade relationship in goods and services, the lower the distantness and the information asymmetry, the higher the reallocation of the portfolio. As for the ageing variables, the result indicate that investors in fixed income preferred to reallocated away from countries that are ageing. If this result is confirmed by other studies, bond prices could be strongly negatively affected after the retirement of the baby-boom generation, supporting therefore the "asset melt-down" hypothesis in fixed income markets. Finally, there is mild evidence to reallocate away from the bond markets of countries where the degree of corruption was perceived to be high at the beginning of the sample.[19] All in all, by adding additional control variables, the results on the key variables forming the international portfolio choice model remain invariant.

By focusing on the active re-balancing model specifications, we can refine the estimates of the impact of the single currency on market access. The portfolio weights assigned by euro area investors to portfolio investment in euro area countries increased by 12.7 p.p. (0.014 multiplied by 9 countries) in equity portfolios and by 22.4 p.p. (0.025 multiplied by 9 countries) in bonds and notes portfolios. Moreover, all countries of the world in the sample have increased their relative investment in the euro area by 6.2 p.p. (0.006 multiplied by 10 euro area countries) in equity securities and 18.1 p.p. (0.018 multiplied by 10 euro area countries) in bonds and notes. Furthermore, the British weight in euro area portfolio holdings increased by 3.2. p.p. in equity portfolios (trade creating effect) and declined by 3.8 p.p. and bonds and notes portfolios (trade diverting effect). This implies that, if the city of London were trading assets issued

[19] We have also used alternative proxies for the instituional framework, such as the repudiation and the risk of expropriation of La Porta, Lopez-de-Silanes and Shleifer (1998), the Civil Liberties of Freedom House and the International Country Risk Guide (ICRG). Regardless of the indeces used, the results are similar.

by investors residents in the euro area (i.e. not captured by the IMF database), the quantity-based financial integration effect due to the establishment of EMU would at most amount to 15.9 p.p in the equity market and 20.6 p.p in the bond market.

How robust are the results when the smaller investing countries are excluded from the analysis? This question is important because the change in portfolio weights for i.e. the pair US-Germany has the same weight as for i.e. the pair Iceland-Chile. Table 8 reports the results when excluding the smallest investing countries with a GDP below USD 100 billion in 2001; these are Bermuda, Chile, Iceland, Malaysia, New Zealand and Singapore.[20] The results are generally very similar to those reported in Table 7. Should we worry about investment in financial centres such as Bermuda? The econometric results so far discussed would not change whatsoever when removing Bermuda as a recipient of international investment.

The analysis focused on changes in demand pointing to a significant shift in equity and bond portfolios among euro area countries. Could important shifts occurring also on the supply side affect the results? The Maastricht accord imposed tight restrictions on government debt. The effects of this, however, were not symmetric across countries, and may have had a significant impact on the composition of fixed income securities available to investors. To assess whether the results remain robust to changes on the supply side, we use BIS data to compute the net new international equity and bond issues (the difference between completed issues and redemptions in a given period) over the period 1998-2001, which permit to measure the amount of new fund raised on the international markets. The net issuance of each individual country is then scaled by the total country portfolio. The results indicate that the investors' portfolio re-balancing has been also affected by the new fund raised on the international equity markets by the destination country and that all the coefficients on the other variables continue to remain robust (see Table 9).

6 Conclusions

Financial systems in general serve not only to channel funds from those who have a surplus to those who have a shortage of savings, but they also serve to trade, hedge, diversify and pool risk. These functions help us to understand the economic benefits that can be derived from financial integration. There are two widely accepted economic benefits of financial integration: first, the better sharing and diversification

[20] The GDP of Israel amounted to USD 114 billion in 2001, but this country was already excluded from the main analysis for other reasons explained in the data section.

of risk; and second, the increase of the potential for higher economic growth.

The establishment of the European Economic and Monetary Union (EMU) in January 1999 has been a fundamental institutional change in the world economy, which has reshaped financial systems and could help explaining the large reallocation of capital that took place worldwide. Therefore, this paper investigates the determinants of international portfolio reallocation for the 30 largest world economies over the period spanning 1997 to 2001 and evaluate the effects of the EMU on international allocation of equity and fixed income portfolios. Moreover, the sharp rise in cross-border capital flows globally and the increased percentage of household savings invested in international capital markets might have enhanced global financial integration.

Hence, we examine three sets of questions. First, we assess whether the degree of home bias has changed over the 4 year period. Second, we investigate whether the EMU has induced a portfolio reallocation towards euro area countries, within the euro area or among all countries. Third, we explore the determinants of international portfolio reallocation and in particular test whether rational portfolio diversification motives can explain the reallocation decisions of investors.

We document that global financial integration strengthened only across some countries over the 1997 to 2001 period. This is reflected in the significant average decline of home bias across the European countries, Australia, new Zealand and Singapore in both equity and bond markets. We also find that the decline in home bias was on average significantly more pronounced for euro area member states. This is due to the EMU, which has enhanced regional financial integration among euro area member states by easing market access in both equity and bonds markets. After controlling for the effect of a set of variables borrowed from the finance literature, we uncover evidence of euro area investors having assigned a higher weight to portfolio investment in euro area countries, which implies that the EMU has facilitated portfolio market access.

Beside the effect of the EMU, we find that the strongest determinants of the changes in portfolio weights are (i) the need to diversify across several countries the risks of holding foreign portfolio assets and (ii) the willingness to close the gap between actual shares of foreign investment and the share of foreign assets that would be held in a "borderless" global portfolio, which suggests that rational portfolio optimization reasons are prime motives behind investor's international portfolio reallocation. This implies that (i) investors do not ignore the main principles of portfolio theory and (ii) portfolio investments might be less prone to "boom and bust cycles" relative to other assets, being driven by long-term economic fundamentals.

References

[1] Adler, Michael and Bernard Dumas, 1983, International Portfolio Choice and Corporate Finance: A Synthesis, *Journal of Finance*, 38: 925-984.

[2] Ahearne, Alan B., William Griever and Frank Warnock, 2004, Information Costs and the Home Bias, *Journal of International Economics*, 62: 313-336.

[3] Alfaro, Laura, Kalemli-Ozcan, Sebnem and Vadym Volosovych, 2005, Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation.*NBER Working Paper*, n. 11901.

[4] Ando, Albert and Modigliani, Franco, 1963, The 'Life Cycle' Hypothesis of Savings: Aggregate Implications and Tests", *American Economic Review*, 53: 55-84.

[5] Ameriks, John and Stephen P. Zeldes, 2000, How Do Household Portfolio Shares Vary with Age?", presented at the NBER-Universities Research Conference on "*Asset Pricing and Portfolio Allocation*," organized by M.W. Brandt and J.C. Heaton, Cambridge, 12-13 May 2000.

[6] Baele, Lieven, Ferrando, Annalisa, Hördahl, Peter, Krylova, Elizaveta and Cyril Monnet, 2004, Measuring Financial Integration in the Euro Area, *Oxford Review of Economic Policy*, 20: 509-503.

[7] Bohn, Henning and Linda L. Tesar, 1996, U.S. Equity Investment in Foreign Markets: Portfolio Rebalancing or Return Chasing?, *American Economic Review*, 86: 77–81.

[8] Brennan, Michael J. and H. Henry Cao, 1997, International Portfolio Investment Flows, *Journal of Finance*, 52: 1851–1880.

[9] Cappiello, Lorenzo and Roberto A. De Santis, 2005, Explaining Exchange Rate Dynamics at Short Horizon: The Uncovered Equity Return Parity Condition, *ECB Working Paper Series*, n. 529.

[10] Constantinides, George M., Donaldson, John B. and Rajnish Mehra, 2002, Junior Can't Borrow: A New Perspective on the Equity Premium Puzzle, *Quarterly Journal of Economics*, 117: 269–296.

[11] Coval, Joshua D. and Tobias J. Moskowitz, 1999, The Geography of Investment: Informed Trading and Asset Prices, *Journal of Finance*, 54: 2045-2073.

[12] De Santis, Giorgio and Bruno Gerard, 1998, How Big is the Premium for Currency Risk?, *Journal of Financial Economics,* 49: 375-412.

[13] De Santis, Giorgio, Bruno Gerard and Pierre Hillion, 2002, International Portfolio Management, Currency Risk and the Euro, *Norwegian School of Management BI Working Paper.*

[14] De Santis, Giorgio, Bruno Gerard and Pierre Hillion, 2003, The Relevance of Currency Risk in the EMU, *Journal of Economics and Business,* 55: 427-462.

[15] De Santis, Giorgio, Bob Litterman, Adrien Vesval, and Kurt Winkelmann, 2003, Covariance Matrix Estimation. In: Litterman, B. and the Quantitative Resources Group, GSAM, Ed. *Modern Investment Management: An Equilibrium Approach*, Wiley, 224-248.

[16] De Santis, Roberto A. and Melanie Lührmann, 2006, On the Determinants of External Imbalances and Net International Portfolio Flows: A Global Perspective, *ECB Working Paper Series*, forthcoming.

[17] ECB (2005), *Indicators of Financial Integration in the Euro Area*, Frankfurt am Main.

[18] Faruqee, Hamid, Shujing, Li and Isabel K. Yan, 2004, The Determinants of International Portfolio Holdings and Home Bias, *IMF Working Paper Series*, n. 34.

[19] Feldstein, Martin and Charles Y. Horioka, 1980, Domestic Savings and International Capital Flows, *The Economic Journal*, 90: 314-329.

[20] French, Kenneth R. and James M. Poterba, 1991, Investor Diversification and International Equity Markets, *American Economic Review*, 81: 222-226.

[21] Froot, Kenneth A., O'Connell, Paul G. J. and Mark S. Seasholes, 2001, The Portfolio Flows of International Investors, *Journal of Financial Economics*, 59: 151–193.

[22] Huberman, Gur, 2001, Familiarity Breeds Investment, *Review of Financial Studies*, 14: 659-80.

[23] Imbs, Jean, 2004, Trade, Finance, Specialization, and Synchronization, *The Review of Economics and Statistics*, 86: 723-734.

[24] IMF (2005), *Global Financial Stability Report*, September 2005, Washington DC.

[25] Jorion, Phillippe and Sam J. Khoury, 1996, *Financial Risk Management*, Basil Blackwell, Cambridge, MA.

[26] Lane, Philippe R. and Gian Maria Milesi-Ferretti, 2004, International Investment Patterns, *IMF Working Paper Series*, n. 134.

[27] Lane, Philippe R., 2005, Global Bond Portfolios and EMU, *ECB Working Paper Series*, n. 553.

[28] La Porta, Rafael, Lopez-de-Silanes, Florencio and Andrei Shleifer, 1998, Law and Finance, *Journal of Political Economy*, 106: 1113-1155

[29] Lintner, John, 1965, The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, *Review of Economics and Statistics*, 47:13-37.

[30] Obstfeld, Maurice and Kenneth Rogoff, 2001, The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?, " in *NBER Macoeconomics Annual 2000*, Bernanke, B. and Rogoff, K. (eds), Cambridge, MIT press, 339-390.

[31] Papaioannou, Elias, 2005, What Drives International Bank Flows? Politics, Institutions and Other Determinants, *ECB Working Paper Series*, n. 437.

[32] Portes, Richard and Helene Rey, 2005, The Determinants of Cross-Border Equity Flows, *Journal of International Economics*, 65: 269-296.

[33] Riley, William B. and K. Victor Chow, 1992, Asset Allocation and Individual Risk Aversion", *Financial Analysts Journal*, 48: 32-37.

[34] Rose, Andrew .K., 2000, One Money, One Market: Estimating the Effect of Common Currencies on Trade", *Economic Policy*, 15: 7-46.

[35] Rose, Andrew .K., 2006, Currency Unions. In: Newman, P., Editor, *The New Palgrave Dictionary of Economics and the Law*, London, Palgrave Macmillan, forthcoming.

[36] Sercu, Piet, 1980, A Generalization of the International Asset Pricing Model, *Revue de l'Association Française de Finance*,1: 91-135.

[37] Sharpe, William, 1964, Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, *Journal of Finance*, 19: 425-42.

[38] Solnik, Bruno, 1974a, An Equilibrium Model of the International Capital Markets, *Journal of Economic Theory*, 8: 500-524.

[39] Solnik, Bruno, 1974b, Why Not Diversify Internationally Rather than Domestically?, *Financial Analysts Journal*, 30: 48-54.

[40] Sorensen, Bent and Oved Yosha, 1998, International Risk Sharing and European Monetary Unification, *Journal of International Economics*, 45: 211-238.

[41] Stulz, René M., 1999, International Portfolio Flows and Security Markets, in Feldstein, M. (Ed.), *International Capital Flows*, NBER and University of Chicago Press, 257-293.

[42] Tesar, Linda L. and Ingrid M.Werner, 1995a, Home Bias and High Turnover, *Journal of International Money and Finance*, 14: 467–492.

[43] Tesar, Linda L. and Ingrid M.Werner, 1995b, International Equity Transactions and U.S. Portfolio Choice. In: Frankel, J., Editor, *The Internationalization of Equity Markets*, Chicago, University of Chicago Press, 185–220.

Appendix: Estimating the covariance matrix

Accurate estimates of the covariance matrix of returns are critical for a good estimate of the expected portfolio risk and diversification benefits associated with different assets. We use 5 years of weekly returns data, $r_c(x)$, to compute the covariance matrix. To reflect the time varying nature of volatility and correlations, we estimate the covariance matrix using the exponentially weighted moving average (EWMA) procedure advocated by De Santis et al (2003) adjusting for serial correlation at lag 1 and using decay parameters of 0.98 at the weekly frequency for variance estimation and decay parameter of 0.995 at weekly frequency for correlation estimation. The weighting scheme assigns a weight of 1 to the most recent observation t.

More specifically, the covariance matrix ($\mathbf{\Sigma}$) can be decomposed as follows:

$$\mathbf{\Sigma} = \mathbf{D\Omega D}'$$

where $\mathbf{D}$ is the diagonal matrix of return volatility, as measured by the standard deviations, and $\mathbf{\Omega}$ is the corresponding correlation matrix. This decomposition has a strong practical appeal since one can estimate volatility, $\hat{var}[r_c(x)]$, and correlations, $\hat{corr}[r_c(x)]$, using different assumptions on their dynamics:

$$\begin{aligned} \hat{var}[r_c(x)] &= \frac{\Sigma_{t=1}^{T}\phi_t r_{c,t}^2(x)}{\Sigma_{t=1}^{T}\phi_t}, \\ \hat{corr}[r_c(x), r_k(x)] &= \frac{\left[\Sigma_{t=1}^{T}\nu_t r_{c,t}(x)\, r_{k,t}(x)\right] / \Sigma_{t=1}^{T}\nu_t}{std[r_c(x)] \times std[r_k(x)]}. \end{aligned}$$

Table 1

Top Ten Economies by Size of Portfolio Investment Holdings in 2001 (US$ billions)

All foreign holdings come from the IMF CPIS data base. The values reported for the euro area grouping is the sum of holdings of 10 euro area member states.

Country	Equity	Bonds & notes	Money market	Total
		Assets		
United States	1613	555	136	2304
United Kingdom	558	667	78	1304
Japan	227	1005	58	1290
Luxemburg	319	414	87	821
Germany	381	402	9	792
France	202	462	46	710
Italy	239	308	5	552
Switzerland	247	228	14	489
Netherlands	235	245	6	486
Ireland	134	184	115	433
Others	1044	1957	530	3532
Total Investment	5200	6426	1084	12711
		Liabilities		
United States	1027	1661	413	3101
United Kingdom	713	395	181	1290
Germany	273	806	87	1167
France	390	337	50	777
Netherlands	289	376	40	705
Italy	120	428	32	580
Japan	332	169	41	542
Luxemburg	380	134	12	525
Cayman Islands	98	294	24	416
Canada	97	207	15	320
Others	1480	1610	191	3288
Total investment	5200	6419	1084	12711

Source: IMF.

Table 2

The Home Bias Decline in Equity and Bond Portfolios

The table reports the measure of home bias in aggregate equity and bond portfolios for the 30 countries in our sample at the end of 1997 and 2001. The home bias measure is computed as one minus the actual share of foreign assets in the total country portfolio divided the optimal share of foreign assets in total country holdings. The optimal share invested abroad is estimated as to 1 minus the country market weight in the world index. The actual share is computed as the ratio between the country's total foreign portfolio holdings and the country's total country portfolio holdings. To estimate the total country equity portfolio, we subtract foreigners holdings from total domestic equity market capitalization and add the country total foreign portfolio. Cross-country weighted averages are reported for each regional group, using GDP weights. Euro area (exc. EA intra trade) and grand average (exc. EA intra trade) treat the euro area as one economic entity by excluding intra-trade among euro area member states.

	Equity			Fixed Income		
Country	1997	2001	Δ_{97-01}	1997	2001	Δ_{97-01}
Austria	0.67	0.34	0.33	0.69	0.18	0.51
Belgium	0.60	0.50	0.10	0.73	0.46	0.27
Finland	0.92	0.77	0.15	0.86	0.54	0.32
France	0.81	0.76	0.05	0.75	0.42	0.32
Germany	0.76	0.58	0.18	0.82	0.32	0.49
Ireland	0.55	0.34	0.21	0.27	0.07	0.20
Italy	0.76	0.61	0.16	1.00	0.65	0.35
Netherlands	0.72	0.51	0.20	0.70	0.57	0.13
Portugal	0.90	0.82	0.08	0.68	0.34	0.34
Spain	0.87	0.80	0.08	0.88	0.55	0.33
EMU countries	*0.77*	*0.63*	*0.14*	*0.82*	*0.44*	*0.37*
Denmark	0.72	0.57	0.15	0.90	0.83	0.07
Sweden	0.72	0.57	0.15	0.88	0.48	0.40
UK	0.74	0.69	0.05	0.46	0.33	0.13
Non-EMU EU	*0.74*	*0.66*	*0.07*	*0.56*	*0.39*	*0.17*
Australia	0.85	0.82	0.03	0.84	0.61	0.23
Bermuda	0.03	0.07	-0.05	0.02	0.02	0.00
Canada	0.72	0.68	0.04	0.92	0.92	0.00
Iceland	0.99	0.99	0.00	0.97	0.96	0.02
Israel	0.94	0.92	0.01	0.97	0.94	0.03
Japan	0.92	0.88	0.03	0.77	0.76	0.01
New Zealand	0.82	0.65	0.16	0.59	0.11	0.48
Norway	0.81	0.53	0.28	0.54	0.17	0.37
USA	0.76	0.74	0.02	0.91	0.92	-0.01
Singapore	0.82	0.68	0.13	0.62	0.24	0.38
Non EU dev. countries	*0.81*	*0.78*	*0.03*	*0.86*	*0.86*	*0.00*
Emerging Markets	*0.94*	*0.93*	*0.01*	*0.80*	*0.95*	*-0.15*
Grand Average	*0.80*	*0.74*	*0.06*	*0.82*	*0.73*	*0.09*
Euro area (exc. EA intra-trade)	0.85	0.75	0.10	0.88	0.68	0.20
Grand Average (exc. EA intra-trade)	0.82	0.77	0.05	0.84	0.79	0.05

Table 3
Share of EMU Assets in Foreign Portfolios

The table reports the share of EMU assets as a fraction of total foreign holdings by investing country and region at the end of 1997 and 2001. All foreign holdings come from the IMF CPIS data base, except for Germany, for which the 1997 data is from the Bundesbank. The values reported for country groupings are regional aggregates and not regional averages.

	Equity			Fixed Income		
Country	1997	2001	Δ_{01-97}	1997	2001	Δ_{01-97}
Austria	0.502	0.533	0.030	0.452	0.594	0.142
Belgium	0.839	0.789	-0.050	0.587	0.724	0.136
Finland	0.349	0.311	-0.039	0.285	0.747	0.462
France	0.390	0.511	0.120	0.445	0.567	0.122
Germany	0.626	0.596	-0.030	0.441	0.615	0.174
Ireland	0.138	0.254	0.116	0.424	0.415	-0.009
Italy	0.539	0.642	0.104	0.195	0.487	0.292
Netherlands	0.226	0.264	0.038	0.682	0.646	-0.035
Portugal	0.540	0.655	0.116	0.427	0.565	0.138
Spain	0.456	0.542	0.086	0.261	0.665	0.404
EMU countries	*0.481*	*0.511*	*0.030*	*0.433*	*0.582*	*0.149*
Denmark	0.320	0.262	-0.058	0.499	0.518	0.019
Sweden	0.408	0.315	-0.093	0.401	0.446	0.045
UK	0.353	0.413	0.060	0.387	0.389	0.001
Non-EMU EU	*0.357*	*0.389*	*0.032*	*0.392*	*0.398*	*0.005*
Australia	0.148	0.151	0.003	0.166	0.115	-0.051
Bermuda	0.148	0.109	-0.039	0.112	0.063	-0.049
Canada	0.134	0.139	0.005	0.070	0.109	0.039
Iceland	0.538	0.304	-0.234	0.137	0.254	0.117
Israel	0.027	0.064	0.037	0.147	0.160	0.013
Japan	0.166	0.168	0.001	0.268	0.309	0.041
New Zealand	0.100	0.066	-0.033	0.141	0.118	-0.023
Norway	0.244	0.265	0.021	0.348	0.413	0.065
USA	0.310	0.284	-0.026	0.210	0.267	0.057
Singapore	0.045	0.079	0.034	0.078	0.236	0.158
Non EU dev. countries	*0.271*	*0.249*	*-0.022*	*0.233*	*0.280*	*0.047*
Emerging Markets	*0.040*	*0.197*	*0.157*	*0.020*	*0.085*	*0.066*
Grand Average	*0.334*	*0.357*	*0.022*	*0.325*	*0.434*	*0.109*

Table 4
Share of EMU Portfolio Assets in Total Portfolios

The table reports the share of EMU assets as a fraction of total holdings by investing country and region at the end of 1997 and 2001. All foreign holdings come from the IMF CPIS data base, except for Germany, for which the 1997 data is from the Bundesbank. The values reported for country groupings are regional aggregates and not regional averages.

	Equity			Fixed Income		
Country	1997	2001	Δ_{01-97}	1997	2001	Δ_{01-97}
Austria	0.147	0.327	0.180	0.136	0.368	0.232
Belgium	0.296	0.344	0.049	0.154	0.353	0.199
Finland	0.021	0.058	0.037	0.099	0.572	0.472
France	0.066	0.100	0.034	0.102	0.278	0.175
Germany	0.134	0.183	0.049	0.068	0.264	0.197
Ireland	0.059	0.164	0.105	0.308	0.385	0.077
Italy	0.121	0.231	0.110	0.032	0.152	0.120
Netherlands	0.069	0.142	0.073	0.288	0.566	0.278
Portugal	0.077	0.121	0.044	0.131	0.327	0.196
Spain	0.042	0.075	0.033	0.030	0.267	0.237
EMU countries	*0.108*	*0.166*	*0.058*	*0.092*	*0.285*	*0.193*
Denmark	0.070	0.097	0.027	0.048	0.079	0.032
Sweden	0.082	0.121	0.039	0.047	0.181	0.134
UK	0.077	0.106	0.030	0.234	0.267	0.033
Non-EMU EU	*0.077*	*0.107*	*0.031*	*0.176*	*0.228*	*0.052*
Australia	0.018	0.026	0.008	0.023	0.028	0.004
Bermuda	0.144	0.101	-0.043	0.110	0.062	-0.048
Canada	0.026	0.035	0.008	0.005	0.007	0.002
Iceland	0.094	0.104	0.010	0.004	0.010	0.006
Israel	0.001	0.003	0.002	0.004	0.009	0.005
Japan	0.012	0.017	0.005	0.051	0.063	0.012
New Zealand	0.018	0.023	0.005	0.044	0.077	0.033
Norway	0.037	0.115	0.077	0.154	0.304	0.149
USA	0.031	0.031	0.001	0.012	0.012	-0.001
Singapore	0.007	0.021	0.014	0.023	0.171	0.148
Non EU dev. countries	*0.028*	*0.030*	*0.002*	*0.024*	*0.029*	*0.005*
Emerging Markets	*0.002*	*0.004*	*0.003*	*0.003*	*0.003*	*0.000*
Grand Average	*0.044*	*0.061*	*0.016*	*0.049*	*0.086*	*0.038*

Table 5

Determinants of International Equity Portfolio Reallocation:
Active re-balancing ($\Delta w^{A}_{ck,t}$)

This table reports the results of the pooled cross sectional regression of the change in the share of each foreign holding for each investing country on dummy variables denoting whether the receiving country belongs to the EMU (D1), whether both the receiving and investing countries belong to the EMU (D2), whether the receiving country is the UK (D1UK) and whether the investing country belongs to EMU and the receiving country is the UK (D2UK) and the following explanatory variables: $DW_{ck,97}$ = Difference between optimal and actual weights in 1997. $DB^{AGG}_{ck,t-1}$ = Aggregate Expected Diversification benefits. $DB^{FX}_{ck,t-1}$ = Expected Diversification benefits - fully hedged returns. $DB^{EMU}_{ck,t-1}$ = Expected Diversification benefits - internal EMU currency exposure. $DB^{X-EMU}_{ck,t-1}$ = Expected Diversification benefits - external EMU currency exposure. $Ret_{k,t}$ = Total market return of receiving country, end-1997 to end-2001. $Ret_{k,t-1}$ = Total market return of receiving country, end-1993 to end-1997. White heteroskedasticity-consistent standard errors are reported in parentheses.

Explanatory	Specif 2		Specif 3		Specif 4		Specif 5	
Variables	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*
Cst	-0.004**	(0.002)	0.004**	(0.002)	0.004**	(0.004)	0.004**	(0.003)
D_1	0.006**	(0.003)	0.003*	(0.002)	0.004*	(0.002)	0.004	(0.002)
D_2	0.016***	(0.003)	0.017***	(0.003)	0.017***	(0.003)	0.017***	(0.003)
D_{1UK}	-0.002	(0.016)	-0.009	(0.016)	-0.009	(0.016)	-0.009	(0.016)
D_{2UK}	0.032*	(0.018)	0.034*	(0.019)	0.033*	(0.018)	0.033*	(0.018)
$DW_{ck,97}$	0.300***	(0.071)	0.237***	(0.050)	0.237***	(0.050)	0.237***	(0.050)
$DB^{AGG}_{ck,t-1}$	0.018	(0.020)						
$DB^{FX}_{ck,t-1}$			16.64***	(3.831)	16.61***	(3.747)	16.59***	(3.876)
$DB^{EMU}_{ck,t-1}$					0.008***	(0.003)	0.008***	(0.003)
$DB^{X-EMU}_{ck,t-1}$					0.013	(0.032)	0.014	(0.032)
$Ret_{k,t}$							0.001	(0.001)
$Ret_{k,t-1}$							0.000	(0.002)
Adjusted R^2	0.271		0.433		0.432		0.431	
$F-Stat$	42.360		85.616		64.356		51.352	
Sample size	667		667		667		667	

Table 6

Determinants of International Bond Portfolio Reallocation:
Active re-balancing ($\Delta w^{A}_{ck,t}$)

This table reports the results of the pooled cross sectional regression of the change in the share of each foreign holding for each investing country on dummy variables denoting whether the receiving country belongs to the EMU (D1), whether both the receiving and investing countries belong to the EMU (D2), whether the receiving country is the UK (D1UK) and whether the investing country belongs to EMU and the receiving country is the UK (D2UK) and the following explanatory variables: $DW_{ck,97}$ = Difference between optimal and actual weights in 1997. $DB^{AGG}_{ck,t-1}$ = Aggregate Expected Diversification benefits. $DB^{FX}_{ck,t-1}$ = Expected Diversification benefits - fully hedged returns. $DB^{EMU}_{ck,t-1}$ = Expected Diversification benefits - internal EMU currency exposure. $DB^{X-EMU}_{ck,t-1}$ = Expected Diversification benefits - external EMU currency exposure. $Ret_{k,t}$ = Total market return of receiving country, end-1997 to end-2001. $Ret_{k,t-1}$ = Total market return of receiving country, end-1993 to end-1997. White heteroskedasticity-consistent standard errors are reported in parentheses.

Explanatory	Specif 2		Specif 3		Specif 4		Specif 5	
Variable	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*
Cst	-0.008***	(0.003)	-0.007**	(0.003)	-0.008***	(0.003)	-0.015***	(0.003)
D_1	0.012***	(0.004)	0.014***	(0.004)	0.014***	(0.004)	0.011**	(0.004)
D_2	0.027***	(0.005)	0.026***	(0.005)	0.027***	(0.005)	0.027***	(0.005)
D_{1UK}	0.026***	(0.010)	0.029***	(0.009)	0.027***	(0.010)	0.021**	(0.009)
D_{2UK}	-0.040***	(0.014)	-0.041***	(0.015)	-0.038***	(0.014)	-0.038***	(0.014)
DW_{97}	0.354***	(0.094)	0.359***	(0.089)	0.350***	(0.091)	0.354***	(0.091)
$DB^{AGG}_{ck,t-1}$	-0.304	(0.192)						
$DB^{FX}_{ck,t-1}$			164.30**	(69.62)	173.44**	(71.41)	220.86***	(71.42)
$DB^{EMU}_{ck,t-1}$					-0.227	(0.227)	-0.236	(0.236)
$DB^{X-EMU}_{ck,t-1}$					-0.144*	(0.085)	-0.147*	(0.086)
$Ret_{k,t}$							0.003*	(0.002)
$Ret_{k,t-1}$							0.025***	(0.008)
Adjusted R^2	0.227		0.219		0.228		0.233	
$F-Stat$	32.331		26.630		24.547		20.340	
Sample size	639		639		639		639	

Table 7

Determinants of International Portfolio Reallocation:

Active ($\Delta w^{A}_{ck,t}$) / active and passive ($\Delta w^{B}_{ck,t}$) re-balancing

This table reports the results of the pooled cross sectional regression of the change in the share of each foreign holding for each investing country on dummy variables denoting whether the receiving country belongs to the EMU (D1), whether both the receiving and investing countries belong to the EMU (D2), whether the receiving country is the UK (D1UK) and whether the investing country belongs to EMU and the receiving country is the UK (D2UK) and the following explanatory variables: $DW_{ck,97}$ = Difference between optimal and actual weights in 1997. $DB^{FX}_{ck,t-1}$ = Expected Diversification benefits - fully hedged returns. $DB^{EMU}_{ck,t-1}$ = Expected Diversification benefits - internal EMU currency exposure. $DB^{X-EMU}_{ck,t-1}$ = Expected Diversification benefits - external EMU currency exposure. $Ret_{k,t}$ = Total market return of receiving country, end-1997 to end-2001. $Ret_{k,t-1}$ = Total market return of receiving country, end-1993 to end-1997. $Young_{k,97}$ and $Old_{k,97}$ = Young and old dependents to working-age population in country k relative to the world average in 1997. $Trade_{ck,97}$ = Country k's export share in country c plus country c's export share in country k in 1997. $Corrup_{k,97}$ = Corruption index in country k in 1997: 0 (highest risk) and 1 (lowest risk). White heteroskedasticity-consistent standard errors are reported in parentheses.

	Equity portfolio				Bond portfolio			
Explanatory variables	$\Delta w^{B}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{A}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{B}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{A}_{ck,t}$ Coeff.	*s.e.*
Cst	0.001	(0.003)	0.011	(0.003)	-0.026***	(0.009)	-0.030***	(0.010)
D_1	0.003	(0.003)	0.006**	(0.003)	0.012**	(0.005)	0.018***	(0.005)
D_2	0.013***	(0.003)	0.014***	(0.003)	0.019***	(0.005)	0.025***	(0.005)
D_{1UK}	-0.014	(0.016)	-0.008	(0.016)	0.021*	(0.010)	0.025**	(0.010)
D_{2UK}	0.034*	(0.019)	0.032 *	(0.018)	-0.041***	(0.014)	-0.039***	(0.014)
$DW_{ck,97}$	0.207***	(0.049)	0.234***	(0.050)	0.314***	(0.108)	0.394***	(0.102)
$DB^{FX}_{ck,t-1}$	2.751**	(1.145)	17.35***	(3.736)	128.16	(82.32)	188.84**	(88.67)
$DB^{EMU}_{ck,t-1}$	0.003	(0.003)	0.008***	(0.003)	-0.247	(0.219)	-0.219	(0.194)
$DB^{X-EMU}_{ck,t-1}$	0.006	(0.029)	0.012	(0.033)	-0.156*	(0.085)	-0.139*	(0.082)
$Ret_{k,t}$	0.005***	(0.001)	0.003	(0.002)	0.009	(0.006)	0.004	(0.006)
$Ret_{k,t-1}$	-0.000	(0.003)	0.003	(0.005)	0.027**	(0.011)	0.029**	(0.012)
$Young_{k,97}$	0.035**	(0.014)	0.031	(0.018)	-0.006	(0.031)	0.007	(0.031)
$Old_{k,97}$	0.011	(0.032)	-0.010	(0.034)	-0.094*	(0.051)	-0.113**	(0.051)
$Trade_{ck,97}$	0.029**	(0.014)	0.040**	(0.020)	0.069***	(0.023)	0.045*	(0.026)
$Corrup_{k,97}$	0.001	(0.004)	-0.008	(0.005)	0.020	(0.014)	0.026*	(0.015)
Adjusted R^2	0.239		0.444		0.163		0.241	
$F - Stat.$	15.946		38.968		9.886		15.491	
Sample size	667		667		639		639	

Table 8

Sensitivity Analysis A: Determinants of International Portfolio Reallocation of Larger Countries

Active ($\Delta w^{A}_{ck,t}$) / active and passive ($\Delta w^{B}_{ck,t}$) re-balancing

This table reports the results of the pooled cross sectional regression of the change in the share of each foreign holding for each investing country with a GDP higher than USD 100 billion in 2001 on dummy variables denoting whether the receiving country belongs to the EMU (D1), whether both the receiving and investing countries belong to the EMU (D2), whether the receiving country is the UK (D1UK) and whether the investing country belongs to EMU and the receiving country is the UK (D2UK) and the following explanatory variables: $DW_{ck,97}$ = Difference between optimal and actual weights in 1997. $DB^{FX}_{ck,t-1}$ = Expected Diversification benefits - fully hedged returns. $DB^{EMU}_{ck,t-1}$ = Expected Diversification benefits - internal EMU currency exposure. $DB^{X-EMU}_{ck,t-1}$ = Expected Diversification benefits - external EMU currency exposure. $Ret_{k,t}$ = Total market return of receiving country, end-1997 to end-2001. $Ret_{k,t-1}$ = Total market return of receiving country, end-1993 to end-1997. $Young_{k,97}$ and $Old_{k,97}$ = Young and old dependents to working-age population in country k relative to the world average in 1997. $Trade_{ck,97}$ = Country k's export share in country c plus country c's export share in country k in 1997. $Corrup_{k,97}$ = Corruption index in country k in 1997: 0 (highest risk) and 1 (lowest risk). The countries excluded with a GDP below USD 100 billion in 2001 are: Bermuda, Chile, Iceland, Malaysia, New Zealand and Singapore. White heteroskedasticity-consistent standard errors are reported in parentheses.

	Equity portfolio				Bond portfolio			
Explanatory variables	$\Delta w^{B}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{A}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{B}_{ck,t}$ Coeff.	*s.e.*	$\Delta w^{A}_{ck,t}$ Coeff.	*s.e.*
Cst	-0.001	(0.002)	0.006	(0.004)	-0.015**	(0.016)	-0.017**	(0.008)
D_1	0.005	(0.003)	0.007**	(0.003)	0.011*	(0.006)	0.017***	(0.006)
D_2	0.012***	(0.003)	0.013***	(0.029)	0.019***	(0.005)	0.023***	(0.005)
D_{1UK}	0.011	(0.012)	0.015	(0.011)	0.025**	(0.012)	0.028**	(0.012)
D_{2UK}	0.009	(0.016)	0.008	(0.015)	-0.043***	(0.015)	-0.042***	(0.015)
$DW_{ck,97}$	0.174***	(0.063)	0.179***	(0.062)	0.288***	(0.103)	0.348***	(0.093)
$DB^{FX}_{ck,t-1}$	2.798**	(1.360)	16.095***	(6.023)	144.92	(77.57)	214.00***	(81.24)
$DB^{EMU}_{ck,t-1}$	0.160	(0.234)	0.160	(0.213)	-0.188	(0.149)	-0.149	(0.152)
$DB^{X-EMU}_{ck,t-1}$	0.069	(0.152)	0.075	(0.175)	-0.159*	(0.092)	-0.145*	(0.086)
$Ret_{k,t}$	0.005***	(0.001)	0.002	(0.001)	0.004	(0.006)	-0.002	(0.006)
$Ret_{k,t-1}$	-0.001	(0.003)	0.003	(0.003)	0.027**	(0.013)	0.028**	(0.013)
$Young_{k,97}$	0.030**	(0.012)	0.022	(0.014)	-0.009	(0.033)	0.001	(0.034)
$Old_{k,97}$	0.012	(0.029)	-0.011	(0.029)	-0.093*	(0.054)	-0.108**	(0.051)
$Trade_{ck,97}$	0.032**	(0.014)	0.043**	(0.021)	0.055**	(0.022)	0.032	(0.026)
$Corrup_{k,97}$	0.001	(0.004)	-0.005	(0.004)	0.007	(0.012)	0.011	(0.013)
Adjusted R^2	0.196		0.282		0.157		0.221	
$F-Stat.$	10.091		15.587		8.254		12.080	
Sample size	552		522		547		547	

Table 9

Sensitivity Analysis B: Determinants of International Portfolio Reallocation with Supply Effects

Active ($\Delta w^{A}_{ck,t}$) / active and passive ($\Delta w^{B}_{ck,t}$) re-balancing

This table reports the results of the pooled cross sectional regression of the change in the share of each foreign holding for each investing country controlling for net new international equity and bond issuance over the period 1998-2001. D1 = 1 if the receiving country belongs to the EMU. D2 = 1 if both the receiving and investing countries belong to the EMU. D1UK = 1 if the receiving country is the UK. D2UK = 1 if the investing country belongs to EMU and the receiving country is the UK. $DW_{ck,97}$ = Difference between optimal and actual weights in 1997. $DB^{FX}_{ck,t-1}$ = Expected Diversification benefits - fully hedged returns. $DB^{EMU}_{ck,t-1}$ = Expected Diversification benefits - internal EMU currency exposure. $DB^{X-EMU}_{ck,t-1}$ = Expected Diversification benefits - external EMU currency exposure. $Ret_{k,t}$ = Total market return of receiving country, end-1997 to end-2001. $Ret_{k,t-1}$ = Total market return of receiving country, end-1993 to end-1997. $Young_{k,97}$ and $Old_{k,97}$ = Young and old dependents to working-age population in country k relative to the world average in 1997. $Trade_{ck,97}$ = Country k's export share in country c plus country c's export share in country k in 1997. $Corrup_{k,97}$ = Corruption index in country k in 1997: 0 (highest risk) and 1 (lowest risk). $Net\ Issues_{k,t}$ = Net international issuance of each individual country divided by the total country portfolio. White heteroskedasticity-consistent standard errors are reported in parentheses.

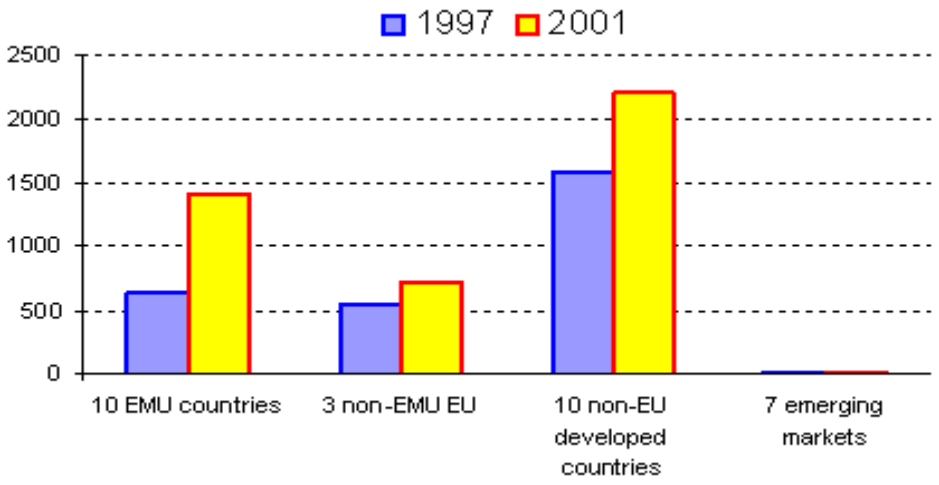
	Equity portfolio				Bond portfolio			
Explanatory	$\Delta w^{B}_{ck,t}$		$\Delta w^{A}_{ck,t}$		$\Delta w^{B}_{ck,t}$		$\Delta w^{A}_{ck,t}$	
variables	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*	Coeff.	*s.e.*
Cst	0.006	(0.003)	0.014	(0.006)	-0.028***	(0.009)	-0.031***	(0.010)
D_1	0.002	(0.003)	0.006*	(0.003)	0.011**	(0.005)	0.017***	(0.005)
D_2	0.013***	(0.003)	0.014***	(0.003)	0.019***	(0.005)	0.025***	(0.005)
D_{1UK}	-0.013	(0.016)	-0.007	(0.016)	0.019*	(0.011)	0.023**	(0.011)
D_{2UK}	0.034*	(0.019)	0.031	(0.018)	-0.041***	(0.014)	-0.039***	(0.013)
$DW_{ck,97}$	0.211***	(0.050)	0.242***	(0.051)	0.316***	(0.109)	0.397***	(0.102)
$DB^{FX}_{ck,t-1}$	3.323*	(1.700)	21.97***	(6.512)	137.94	(83.80)	199.48**	(88.70)
$DB^{EMU}_{ck,t-1}$	0.002	(0.003)	0.008**	(0.003)	-0.240	(0.218)	-0.212	(0.217)
$DB^{X-EMU}_{ck,t-1}$	0.007	(0.037)	0.014	(0.038)	-0.152*	(0.084)	-0.135*	(0.081)
$Ret_{k,t}$	0.005***	(0.001)	0.001	(0.002)	0.012*	(0.006)	0.007	(0.006)
$Ret_{k,t-1}$	0.001	(0.005)	0.005*	(0.003)	0.025**	(0.012)	0.027**	(0.012)
$Young_{k,97}$	0.037**	(0.014)	0.040*	(0.020)	-0.002	(0.030)	0.012	(0.029)
$Old_{k,97}$	0.010	(0.032)	-0.024	(0.035)	-0.078	(0.053)	-0.096*	(0.056)
$Trade_{ck,97}$	0.029**	(0.014)	0.039**	(0.019)	0.070***	(0.022)	0.046*	(0.026)
$Corrup_{k,97}$	0.000	(0.004)	-0.012**	(0.005)	0.019	(0.014)	0.026*	(0.015)
$Net\ Issues_{k,t}$	0.023***	(0.007)	0.049***	(0.013)	0.009	(0.007)	0.010	(0.007)
Adjusted R^2	0.239		0.427		0.163		0.242	
$F-Stat.$	14.974		34.096		9.300		14.546	
Sample size	667		667		639		639	

Figure 1

Aggregate non-Domestic Portfolio Holdings by Region

The figures report the aggregate foreign holdings for country groupings. Foreign asset holdings are from the IMF CPIS surveys of 1997 and 2001, except for Germany, for which the 1997 data is from the Bundesbank. The 10 EMU countries are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain. The three non-EMU EU countries are: Denmark, Sweden, the United Kingdom. The 10 non-EU developed countries include: Australia, Bermuda, Canada, Iceland, Israel, Japan, New Zealand, Norway, the United States, Singapore. The seven emerging markets are Argentina, Chile, Indonesia, Korea, Malaysia, Thailand, Venezuela.

a. Aggregate non-domestic equity holdings (US$ Billion)



b. Aggregate non-domestic fixed income holdings (US$ Billion)

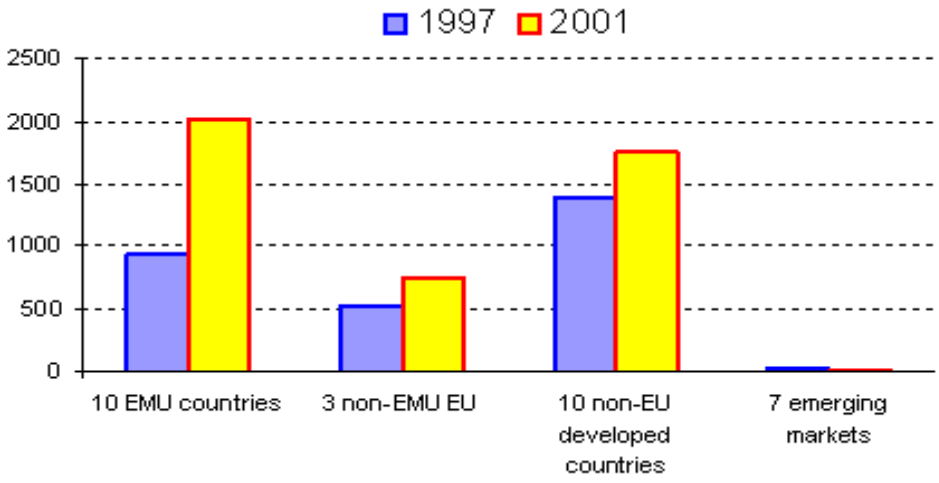
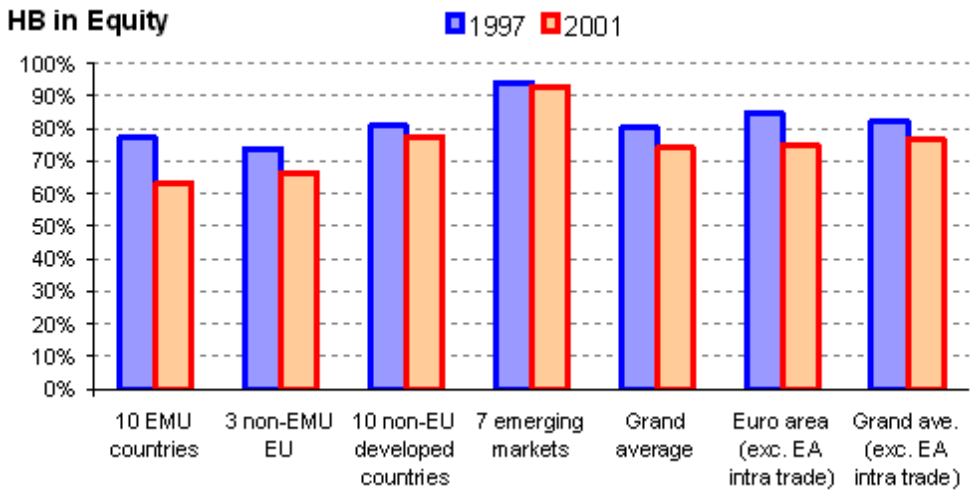


Figure 2

The Decline in Home Bias in Equity and Bond Portfolios by Region

The figures report measured home bias in 1997 and 2001 of equity and fixed income for country groupings. Cross-country weighted averages are reported for each regional group, using GDP weights. Foreign asset holdings are from the IMF CPIS surveys of 1997 and 2001, except for Germany, for which the 1997 data is from the Bundesbank. The 10 EMU countries are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain. The three non-EMU EU countries are: Denmark, Sweden, the United Kingdom. The 10 non-EU developed countries include: Australia, Bermuda, Canada, Iceland, Israel, Japan, New Zealand, Norway, the United States, Singapore. The 7 emerging markets are: Argentina, Chile, Indonesia, Korea, Malaysia, Thailand, Venezuela. Euro area (exc. EA intra trade) and grand average (exc. EA intra trade) treat the euro area as one economic entity by excluding intra-trade among euro area member states.



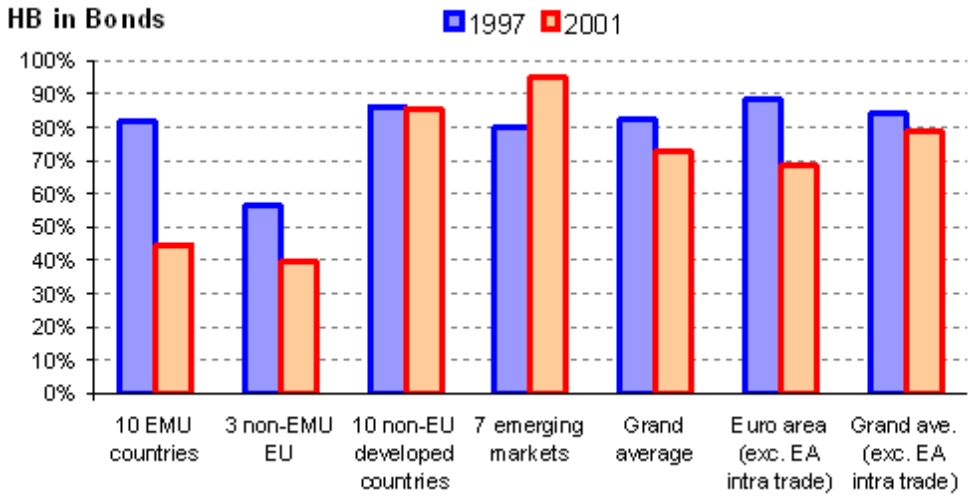
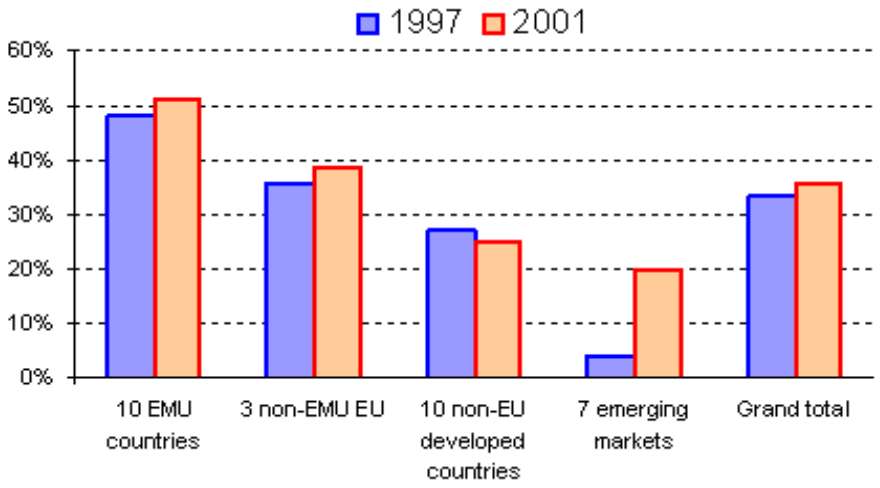


Figure 3

Non-Domestic EMU Portfolios by Region

Figures in (a) report the EMU equity assets held by residents of region i relative to foreign equity assets held in region i. Figures in (b) report the EMU bond assets held by residents of region i relative to foreign bond assets held in region i. Foreign asset holdings are from the IMF CPIS surveys of 1997 and 2001, except for Germany, for which the 1997 data is from the Bundesbank. The 10 EMU countries are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain. The 3 non-EMU EU countries are: Denmark, Sweden, the United Kingdom. The 10 non-EU developed countries include: Australia, Bermuda, Canada, Iceland, Israel, Japan, New Zealand, Norway, the United States, Singapore. The 7 emerging markets are: Argentina, Chile, Indonesia, Korea, Malaysia, Thailand, Venezuela.

a. Share of non-domestic EMU equity holdings in foreign equity portfolio (%)



b. Share of non-domestic EMU bond holdings in foreign bond portfolio (%)

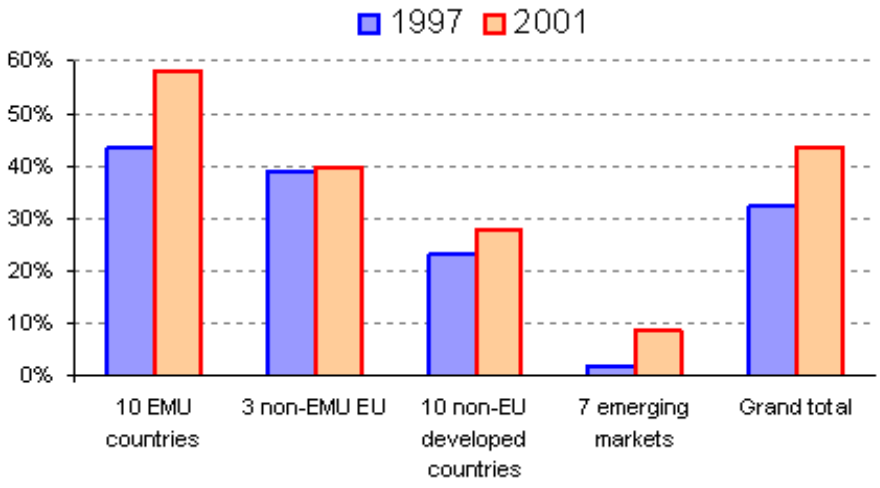
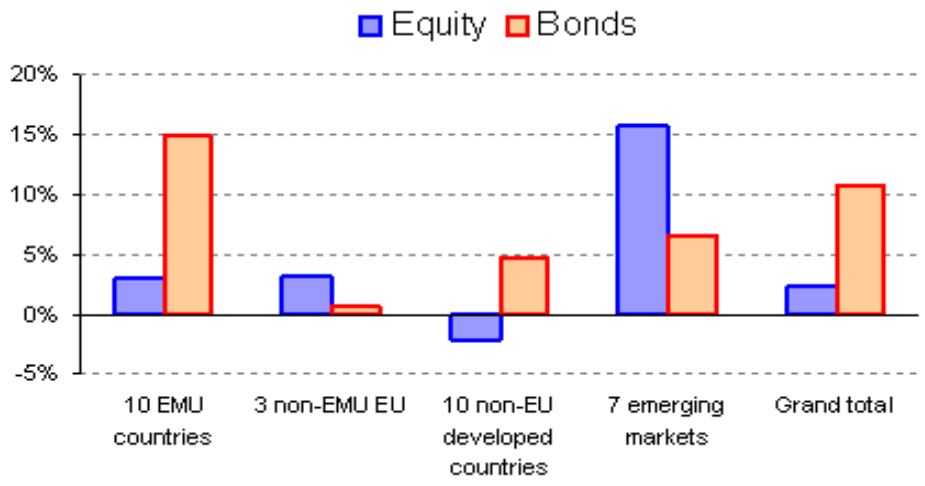


Figure 4

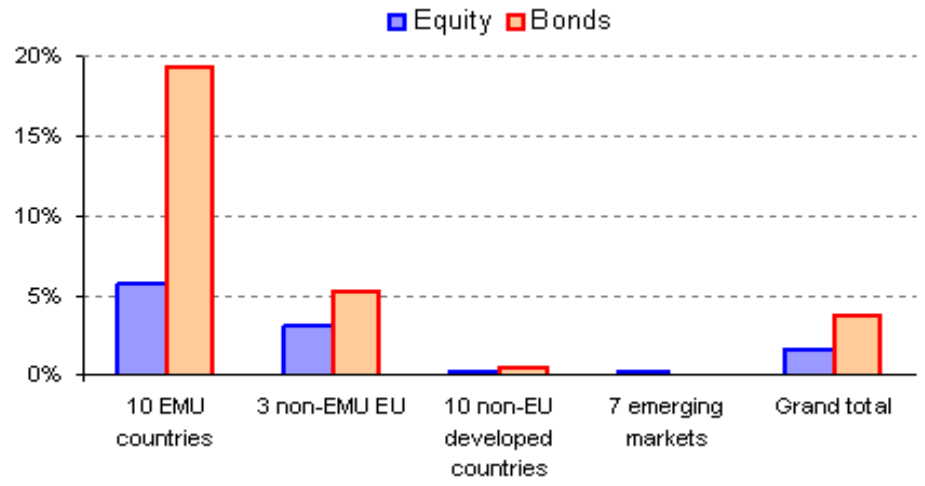
Changes in the Share of non-Domestic EMU Assets by Region

Figures in (a) correspond to the 1997 to 2001 changes in EMU assets held by residents of region i relative to foreign assets held in region *i*. Figures in (b) correspond to the 1997 to 2001 changes in EMU assets held by residents of region i relative to total assets held in region *i*. Foreign asset holdings are from the IMF CPIS surveys of 1997 and 2001, except for Germany, for which the 1997 data is from the Bundesbank. The 10 EMU countries are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain. The 3 non-EMU EU countries are: Denmark, Sweden, the United Kingdom. The 10 non-EU developed countries include: Australia, Bermuda, Canada, Iceland, Israel, Japan, New Zealand, Norway, the United States, Singapore. The 7 emerging markets are: Argentina, Chile, Indonesia, Korea, Malaysia, Thailand, Venezuela.

a. Share of non-domestic EMU holdings in foreign portfolio (percentage points)



b. Share of non-domestic EMU holdings in total portfolio (percentage points)



European Central Bank Working Paper Series

For a complete list of Working Papers published by the ECB, please visit the ECB's website (http://www.ecb.int)

585 "Are specific skills an obstacle to labor market adjustment? Theory and an application to the EU enlargement" by A. Lamo, J. Messina and E. Wasmer, February 2006.

586 "A method to generate structural impulse-responses for measuring the effects of shocks in structural macro models" by A. Beyer and R. E. A. Farmer, February 2006.

587 "Determinants of business cycle synchronisation across euro area countries" by U. Böwer and C. Guillemineau, February 2006.

588 "Rational inattention, inflation developments and perceptions after the euro cash changeover" by M. Ehrmann, February 2006.

589 "Forecasting economic aggregates by disaggregates" by D. F. Hendry and K. Hubrich, February 2006.

590 "The pecking order of cross-border investment" by C. Daude and M. Fratzscher, February 2006.

591 "Cointegration in panel data with breaks and cross-section dependence" by A. Banerjee and J. L. Carrion-i-Silvestre, February 2006.

592 "Non-linear dynamics in the euro area demand for M1" by A. Calza and A. Zaghini, February 2006.

593 "Robustifying learnability" by R. J. Tetlow and P. von zur Muehlen, February 2006.

594 "The euro's trade effects" by R. Baldwin, comments by J. A. Frankel and J. Melitz, March 2006.

595 "Trends and cycles in the euro area: how much heterogeneity and should we worry about it?" by D. Giannone and L. Reichlin, comments by B. E. Sørensen and M. McCarthy, March 2006.

596 "The effects of EMU on structural reforms in labour and product markets" by R. Duval and J. Elmeskov, comments by S. Nickell and J. F. Jimeno, March 2006.

597 "Price setting and inflation persistence: did EMU matter?" by I. Angeloni, L. Aucremanne, M. Ciccarelli, comments by W. T. Dickens and T. Yates, March 2006.

598 "The impact of the euro on financial markets" by L. Cappiello, P. Hördahl, A. Kadareja and S. Manganelli, comments by X. Vives and B. Gerard, March 2006.

599 "What effects is EMU having on the euro area and its Member Countries? An overview" by F. P. Mongelli and J. L. Vega, March 2006.

600 "A speed limit monetary policy rule for the euro area" by L. Stracca, April 2006.

601 "Excess burden and the cost of inefficiency in public services provision" by A. Afonso and V. Gaspar, April 2006.

602 "Job flow dynamics and firing restrictions: evidence from Europe" by J. Messina and G. Vallanti, April 2006.

603 "Estimating multi-country VAR models" by F. Canova and M. Ciccarelli, April 2006.

604 "A dynamic model of settlement" by T. Koeppl, C. Monnet and T. Temzelides, April 2006.

605 "(Un)Predictability and macroeconomic stability" by A. D'Agostino, D. Giannone and P. Surico, April 2006.

606 "Measuring the importance of the uniform nonsynchronization hypothesis" by D. A. Dias, C. Robalo Marques and J. M. C. Santos Silva, April 2006.

607 "Price setting behaviour in the Netherlands: results of a survey" by M. Hoeberichts and A. Stokman, April 2006.

608 "How does information affect the comovement between interest rates and exchange rates?" by M. Sánchez, April 2006.

609 "The elusive welfare economics of price stability as a monetary policy objective: why New Keynesian central bankers should validate core inflation" by W. H. Buiter, April 2006.

610 "Real-time model uncertainty in the United States: the Fed from 1996-2003" by R. J. Tetlow and B. Ironside, April 2006.

611 "Monetary policy, determinacy, and learnability in the open economy" by J. Bullard and E. Schaling, April 2006.

612 "Optimal fiscal and monetary policy in a medium-scale macroeconomic model" by S. Schmitt-Grohé and M. Uribe, April 2006.

613 "Welfare-based monetary policy rules in an estimated DSGE model of the US economy" by M. Juillard, P. Karam, D. Laxton and P. Pesenti, April 2006.

614 "Expenditure switching vs. real exchange rate stabilization: competing objectives for exchange rate policy" by M. B. Devereux and C. Engel, April 2006.

615 "Quantitative goals for monetary policy" by A. Fatás, I. Mihov and A. K. Rose, April 2006.

616 "Global financial transmission of monetary policy shocks" by M. Ehrmann and M. Fratzscher, April 2006.

617 "New survey evidence on the pricing behaviour of Luxembourg firms" by P. Lünnemann and T. Y. Mathä, May 2006.

618 "The patterns and determinants of price setting in the Belgian industry" by D. Cornille and M. Dossche, May 2006.

619 "Cyclical inflation divergence and different labor market institutions in the EMU" by A. Campolmi and E. Faia, May 2006.

620 "Does fiscal policy matter for the trade account? A panel cointegration study" by K. Funke and C. Nickel, May 2006.

621 "Assessing predetermined expectations in the standard sticky-price model: a Bayesian approach" by P. Welz, May 2006.

622 "Short-term forecasts of euro area real GDP growth: an assessment of real-time performance based on vintage data" by M. Diron, May 2006.

623 "Human capital, the structure of production, and growth" by A. Ciccone and E. Papaioannou, May 2006.

624 "Foreign reserves management subject to a policy objective" by J. Coche, M. Koivu, K. Nyholm and V. Poikonen, May 2006.

625 "Sectoral explanations of employment in Europe: the role of services" by A. D'Agostino, R. Serafini and M. Ward-Warmedinger, May 2006.

626 "Financial integration, international portfolio choice and the European Monetary Union" by R. A. De Santis and B. Gérard, May 2006.

ISSN 1561081-0