

# **Portfolio holdings in the euro area – home bias and the role of international, domestic and sector-specific factors**

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## **Abstract**

This paper aims to identify the determinants of portfolio restructuring in EMU member states since the introduction of the euro and especially during the financial turbulence of the past years. We find that, besides exchange rate volatility and traditional indicators of information and transaction costs, the perception of sovereign risk has become more important as a determinant of portfolio allocation. The shares of financial corporations have been affected disproportionately by this development. At the same time, banks substantially reduced their international investment, possibly the result of a deleveraging process.

### **Keywords:**

Financial Integration, Home Bias, Institutional Sectors, Financial Crisis

### **JEL-Classification:**

F30, F32, F36, G11

## **Non-technical summary**

This paper analyses the development of the *home bias* in portfolio holdings of Germany and other euro area countries focussing on equity securities. It ties in with the risk aspect of home bias and tries to find out, whether the perception of risk related to foreign assets differs with regard to investment outside and inside the euro area and with regard to different sectors. Besides real exchange rate volatility, which can possibly explain the regional orientation of investors, we are looking for additional aspects that might play a role in market segmentation.

In doing so, we use two newly available detailed databases. The IMF's Coordinated Portfolio Investment Survey (CPIS) allows exploring bilateral portfolio holdings. We find that financial integration is decisively more advanced within European Monetary Union (EMU) than between member countries and countries outside the euro area. This outcome can partially be attributed to the abolition of exchange rate risk. Traditional indicators of information and transaction costs have also play a role. Sovereign risks do not seem to have affected investment in equity securities prior to the crisis.

The analysis of German deposit statistics reveals that the financial crisis had a clear impact on the regional and sectoral structure of German portfolio holdings. Apparently, the shares of financial corporations were affected disproportionately by reshuffling in security portfolios. An important result is the fact that especially banks have substantially reduced their investment abroad. These developments might be part of a deleveraging process that has been triggered by the financial crisis.

## **Nichttechnische Zusammenfassung**

Die vorliegende Untersuchung befasst sich mit der Entwicklung des Home Bias in Deutschland und anderen Ländern der Europäischen Währungsunion. Dabei konzentrieren wir uns auf Dividendenpapiere. Das Papier knüpft an die Risikoaspekte des Home Bias an und versucht herauszufinden, ob sich die Risikoeinstellung gegenüber ausländischen Wertpapieren in Hinblick auf Anlagen innerhalb und außerhalb der Währungsunion sowie von Sektor zu Sektor unterscheidet. Neben Wechselkursvolatilität, die möglicherweise regionale Präferenzen erklären kann, suchen wir nach zusätzlichen Aspekten, die für eine mögliche Marktsegmentierung verantwortlich sein könnten.

Dafür verwenden wir zwei neue, detaillierte Datensätze. Der Coordinated Portfolio Investment Survey (CPIS) des IWF erlaubt die Untersuchung bilateraler Wertpapierbestände. Wir kommen zu dem Ergebnis, dass die Finanzmarktintegration innerhalb der Europäischen Währungsunion (EWU) entschieden weiter fortgeschritten ist als zwischen Mitgliedstaaten und Nichtmitgliedstaaten der EWU. Dieses Ergebnis kann teilweise auf den Wegfall von Wechselkursrisiken zurückgeführt werden. Traditionelle Indikatoren für Informations- und Transaktionskosten spielen ebenfalls eine Rolle. Länderrisiken haben in der Vorkrisenzeit die Investitionen in Dividendenpapiere nicht signifikant beeinträchtigt.

Eine Untersuchung auf Basis der deutschen Depotstatistik offenbart einen deutlichen Einfluss der Finanzkrise auf die regionale und sektorale Aufteilung deutscher Wertpapierbestände. Es zeigt sich, dass die Aktien von Finanzinstituten überproportional von der Umschichtung der Portfolios betroffen waren. Ein wichtiges Ergebnis ist auch, dass insbesondere Banken ihr Auslandsengagement stark reduziert haben. Diese Entwicklungen könnten zum Teil auch Folge eines Deleveraging-Prozesses gewesen sein, der durch die Finanzkrise in Gang gesetzt wurde.



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# **Portfolio Holdings in the Euro Area - Home Bias and the Role of International, Domestic and Sector-Specific Factors\***

## **I. Introduction**

This paper analyses the development and the determinants of European financial integration since the introduction of the euro with a special focus on investment behaviour during the financial crisis. We will compare equity portfolio holdings of euro area investors in other euro area countries to those in major countries outside the monetary union. This should reveal, to what extent investors regard the euro area as a single financial market, whether this assessment has changed since the turbulence of the past years and how far financial integration in the euro area has caused a stronger exposure to international financial transmission channels during the crisis.

Devereux and Yetman (2009) and Krugman (2008) suggest that there exists an international transmission channel of crises not only via the traditional trade links but also via financial linkages, namely via the process of financial deleveraging. The process of deleveraging, triggered by an adverse shock in the home or the host country, can entail strong macroeconomic effects and also contribute to the contagion of third economies. Possible channels are the lower amount of loans provided by financial institutions to borrowers abroad, who may be faced with problems of revolving existing credits, or the vicious circle of deleveraging, falling asset prices and the detrimental effects on the balance sheets of other financial institutions that also need to deleverage as a consequence.

Against this background, it is of interest to analyse financial integration on the sectoral level. We will differentiate for both the sector of investment and the sector of investor. Doing so, affords a better understanding of spill-over effects of financial shocks and may give additional insight into the investment behaviour and risk attitude of various types of investors. Given the origins and the characteristics of the past crisis, the banking sector is deemed to have played a key role in the spread of market disturbances and the subsequent restructuring of financial assets.

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A popular (inverse) measure of financial integration is the *home bias* in national portfolio holdings. According to the International Capital Asset Pricing Model (I-CAPM) of Solnik (1974), the composition of stock portfolios should be identical in all individual countries and correspond to the structure of world market capitalisation. Since the pioneering work of French and Poterba (1991), if not earlier, it has been well known that domestic investors of almost any country hold too little of their financial wealth in foreign assets when compared with the benchmark of standard portfolio theory.

The existence of a home bias is commonly attributed to transaction and information costs, which are incurred in imperfect capital markets and encourage the holding of domestic stocks. In this vein, studies by Kang and Stulz (1997), Hau (2001), Ahearne, Grier and Warnock (2004), Cai and Warnock (2004), Dvorak (2005), Portes and Rey (2005), Kho, Stultz and Warnock (2006) and Daude and Fratzscher (2006) find that information costs, like telecommunication infrastructure or distance, have a major explanatory power for the observed home bias.

By contrast, the influence of transaction costs is much disputed in the literature. Tesar and Werner (1995) argue that the large volume of cross-border capital flows and the high turnover rate of foreign equity investments relative to turnover on domestic equity markets suggest that transaction costs are an unlikely explanation for home bias. Warnock (2002) challenges the finding of a high turnover rate but confirms that transaction costs are an unlikely explanation. Other studies such as Faruqee, Li and Yan (2004), however, find a major explanatory power for corresponding variables, such as bilateral distance or bilateral phone costs.<sup>1</sup>

Another strand of the literature tries to explain deviations of portfolio holdings from the I-CAPM benchmark by additional classes of risk that are omitted in the basic model. While Cooper and Kaplanis (1994) do not find evidence for the hypothesis that the preference of domestic shares can be traced back to the hedging of domestic inflation, Fidora, Fratzscher and Thimann (2007) stress the segmenting effect of real exchange rate volatility. However, Wincoop and Warnock (2006) conclude that the empirical correlation between excess equity returns and the real exchange rate is too low to explain observed equity home bias. In response to this objection, Coeurdacier and Gourinchas (2009) show that while *real exchange rate risks* are indeed hedged through international *bond holdings*, *domestic equities* can provide a good hedge against *non-financial income risk*.

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<sup>1</sup> Apparently, the distinction between variables representing information costs and transaction costs is not clear.

This paper ties in with the risk aspect of home bias and tries to find out, whether the perception of risk related to foreign assets differs with regard to investment outside and inside the euro area and with regard to different sectors. Besides real exchange rate volatility, which can at the best explain the regional orientation of investors, we are looking for additional aspects that might play a role in market segmentation.

Our approach differs from the cited literature, in that it uses detailed databases of the IMF and the Deutsche Bundesbank, which have only recently become available. The IMF's Coordinated Portfolio Investment Survey (CPIS) allows an exploration of bilateral portfolio holdings of euro-area countries since 2001 by including determinants of the partner countries and bilateral factors. In earlier studies, this was possible only for flows of investment, the structure of which, however, may deviate substantially from the regional composition of stocks. An even more detailed investigation of the regional and sectoral composition of German portfolio holdings can be undertaken using the German Securities Statistics Database of the Deutsche Bundesbank.

We find that financial integration is decisively more advanced within European Monetary Union (EMU) than between member countries and countries outside the euro area. This outcome can partially be attributed to the abolition of exchange rate risk. Traditional indicators of information and transaction costs also seem to be relevant. In addition, the perception of sovereign risk became more important as a determinant of portfolio allocation during the financial crisis. In the years before the crisis, this aspect had obviously been neglected, and risk aspects have systematically been "underpriced" in stock markets.<sup>2</sup> On the sectoral level, the shares of financial corporations have been affected disproportionately by reshuffling in security portfolios during the crisis. Furthermore, deleveraging of monetary financial institutions also played an active role with respect to portfolio restructuring during the crisis.

The remainder of the paper is structured as follows. Section II gives a brief overview of economic theory on portfolio holdings and home bias. Data are described briefly in section III, before section IV highlights developments of home bias in euro-area countries and differences between intra and extra-EMU portfolio holdings. In section V, we analyse the determinants of bilateral home bias, while section VI focuses on sectoral characteristics and the impact of the financial crisis on German portfolio holdings. Section VII concludes.

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<sup>2</sup> Lane and Milesi-Ferretti (2010, 8).

## II. The Concepts of Optimal Portfolio Selection and Home Bias

### 1. Optimal Portfolio Selection

According to Tobin's famous *separation theorem* "... the proportionate composition of the non-cash assets is independent of their aggregate share of the investment balance..." if markets are purely competitive and investors are risk-averse.<sup>3</sup> Following the notation of Lintner (1965), expected returns and the variance of the total portfolio are given by<sup>4</sup>

$$\mu = (1 - \omega)r + \omega\mu_p = r + \omega(\mu_p - r) \quad (1)$$

$$\sigma^2 = \omega^2 \sigma_p^2 \quad (2)$$

where  $\mu$  = total expected returns,  $\mu_p$  = expected returns of the stock portfolio,  $r$  = riskless returns of the bond portfolio,  $\sigma^2$  = variance of returns of the total portfolio,  $\sigma_p^2$  = variance of returns of the stock portfolio.

By combining investments in riskless bonds and a given market portfolio, an investor can realise any point on the *market opportunity line*, which is given by the linear relationship<sup>5</sup>

$$\mu = r + \theta\sigma \quad (3)$$

where  $\theta \equiv \frac{\mu_p - r}{\sigma_p}$

defines the slope of the *market opportunity line*. Given the assumption that investors are risk-averse, the optimal composition of the market portfolio can be derived by maximising  $\theta$  subject to the share of individual stocks included in the portfolio. Under the assumptions mentioned above and if short-selling is permitted, the vector of optimal stock shares in the market portfolio is given by

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<sup>3</sup> Tobin (1958, 85). While Tobin's original proof further relies on quadratic utility functions or multivariate normal rates of return, Lintner (1965) has proved the separation theorem to be valid independently of these additional assumptions.

<sup>4</sup> An equivalent model was developed by Sharpe (1963).

<sup>5</sup> If borrowing is unrestricted, the share of total wealth invested in the market portfolio ( $\omega$ ) may even exceed unity.

$$\tilde{\omega} = \frac{\sum^{-1} \mu_e}{\mathbf{1}' \sum^{-1} \mu_e} \quad (4)$$

where  $\Sigma$  = variance-covariance matrix of returns,  $\mu_e$  = vector of excess returns over the risk-free rate,  $\mathbf{1}$  = unit vector.

The International Capital Asset Pricing Model (I-CAPM) developed by Solnik (1974) introduces exchange rates as an additional aspect and derives important conclusions concerning the diversification in stock and bond portfolios. While the stock portfolio is hedged against exchange rate risks, bond holdings are (only) speculative in the exchange risk dimension. One important implication of the model is that the composition of stock portfolios is identical in all individual countries and corresponds to the structure of world market capitalisation. This *market portfolio* serves as a reference for the following analysis.

## 2. Home Bias and Possible Extensions

In reality, most national stock portfolios differ from this benchmark, with domestic shares being relatively over-represented as against foreign shares. Referring to the pioneering work of French and Poterba (1991), this phenomenon has become familiar as *home bias* and can be measured by the formula:

$$hb_i = 1 - \frac{f_{\neq i}^i}{\tilde{f}_{\neq i}} \quad (5)$$

where the subindex  $i$  indicates country  $i$ ,  $f_{\neq i}^i$  is the share of foreign stocks in country  $i$ 's stock portfolio and  $\tilde{f}_{\neq i}$  their weight in the world market portfolio.

If the index is unity, the domestic portfolio exclusively contains domestic shares, while a value of zero describes a perfect match of the domestic portfolio with the market portfolio.<sup>6</sup> The index may also adopt negative values if foreign shares are over-represented with respect to their share in the market portfolio.

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<sup>6</sup> In the text and the figures, home bias is usually reported as a percentage. An increase of the home bias by 1 percentage point indicates an increase in the under-representation of foreign stocks in domestic portfolios by 1% of their share in the world market portfolio.

In addition to the general home bias defined above, it is possible to calculate a bilateral home bias vis-à-vis an individual country or a specific region like the euro area. In this case equation (5) becomes

$$hb_{ij} = 1 - \frac{f_j^i}{\tilde{f}_j} \quad (6)$$

where  $f_j^i$  is the share of country  $j$ 's stocks in country  $i$ 's stock portfolio and  $\tilde{f}_j$  is the share of country  $j$ 's stocks in the world market portfolio.

### III. The Data

Since there is no single dataset that allows for a comprehensive investigation of home bias before and during the financial crisis, this paper draws mainly on two data sources, the Coordinated Portfolio Investment Survey (CPIS) of the International Monetary Fund (IMF) and the German Securities Statistics Database of the Deutsche Bundesbank. To calculate portfolio holdings in **Figure 1**, we have furthermore used data of the IMF International Financial Statistics database and the dataset on the External Wealth of Nations (EWN), provided by Lane and Milesi-Ferretti (2007).

Bilateral investment data for equity securities of ten EMU countries<sup>7</sup> and three major non-EMU investment partner countries<sup>8</sup> stem from the CPIS (**Figure 2**). The CPIS contains stock data for bilateral portfolio investment and was first edited for the year 1997. Starting in 2001, it is available on an annual basis.

For analysing investment behaviour during the financial crisis, we use quarterly data for German investments in the same countries as above from the German Securities Statistics Database. This contains sectorally disaggregated bilateral portfolio holdings for Germany on a quarterly basis. Consistent data are available since the fourth quarter of 2007. The observation period covered in the following analysis spans the period until the fourth quarter of 2009.

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<sup>7</sup> Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain. Ireland and Luxemburg are excluded because of special factors related to their financial industry which heavily distort their data of revealed home bias. For countries that joined the euro area after 2001, the relevant datasets are still incomplete.

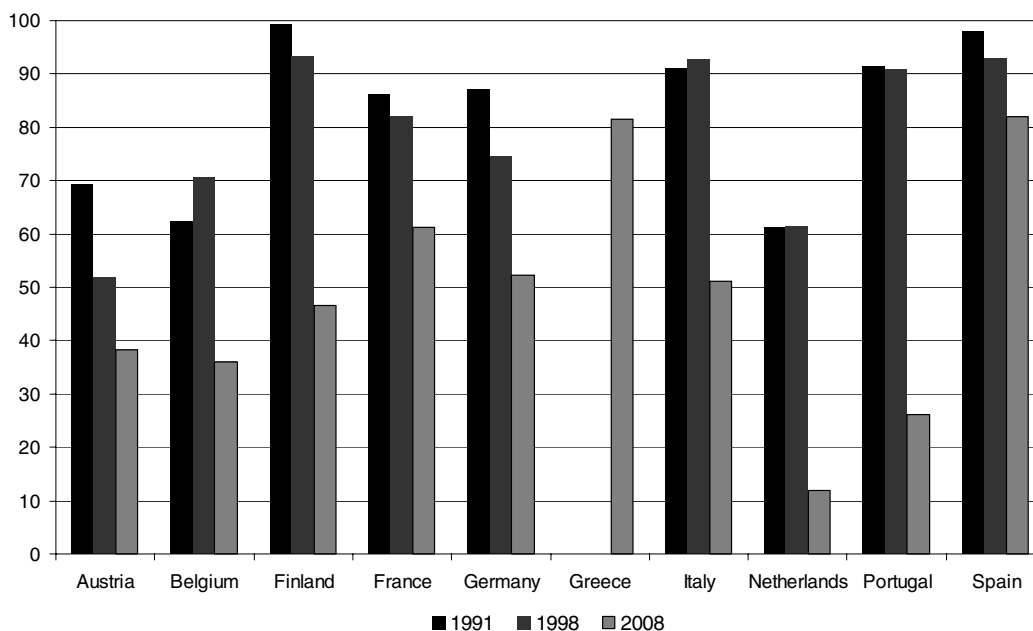
<sup>8</sup> Japan, United Kingdom and United States.

Data on market capitalisation stem from the ECB database on Security Issues Statistics, Eurostat, the Bank of International Settlements (BIS), the Federation of European Securities Exchanges, and the World Federation of Exchanges.

#### IV. Development of the Home Bias in EMU Countries

**Figure 1** depicts the historical development of general home bias from 1991 onwards. In 1991, when the data were first collected, most countries exhibited very high values. Spain and Finland were close to 100%, France, Germany, Italy and Portugal ranged between 86% and 92%. In 1991, only Austria, Belgium and the Netherlands displayed values below 70%. Until 1998 these values barely changed. Then, however, the solely lateral movement ended and a general decrease in home bias commenced. It was only in Greece and Spain that investors still display a strong bias towards investing domestically with a home bias of slightly above 80%. The Netherlands, with a home bias of only 12%, range at the other end of the scale.

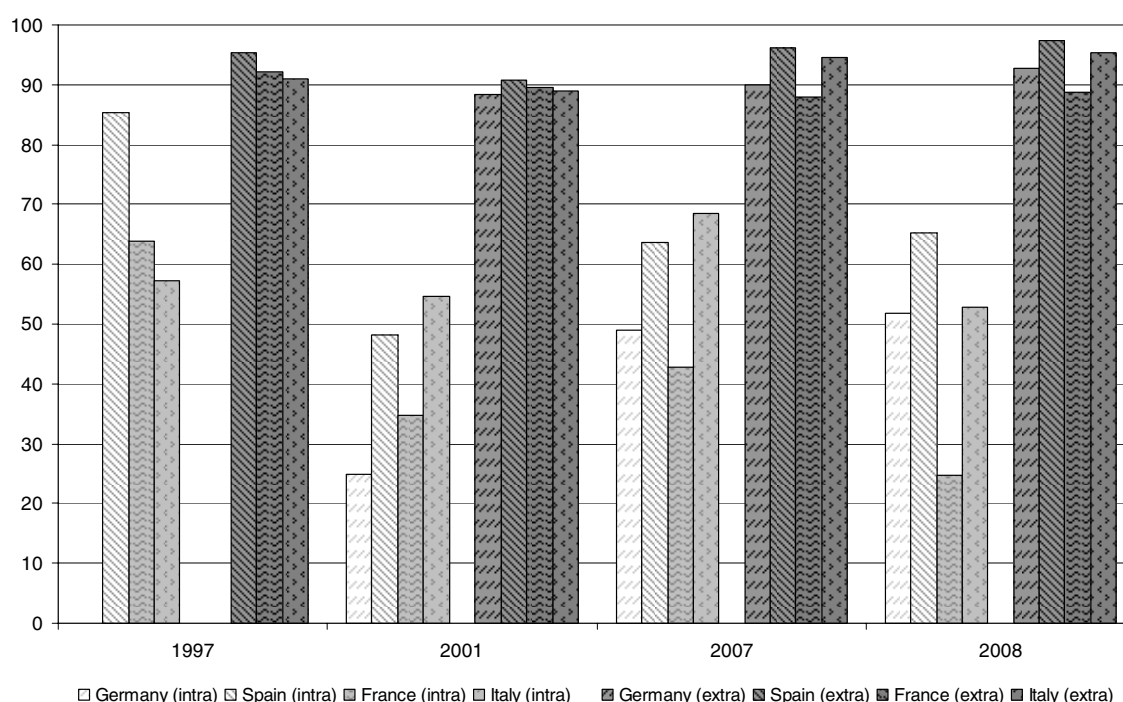
**Figure 1: General Home Bias in the ten Euro-Area Countries (as a percentage)**



Sources: European Central Bank, International Monetary Fund, Bank of International Settlements, Federation of European Securities Exchanges, World Federation of Exchanges, own calculations.

**Figure 2** illustrates the regional decomposition of home bias in portfolio holdings of intra and extra-EMU equity securities for the four biggest EMU economies from 1997 onwards.<sup>9</sup> As depicted, the data reveal a clear difference in home bias for intra and extra-euro-area investments. While the home bias for investments stemming from EMU investor countries in Japan, the US and the UK remains at rather high levels, it has fallen distinctly for investments within the euro area, especially during the first years after the introduction of the euro.

**Figure 2: Intra-EMU Compared with Extra-EMU Home Bias (as a percentage)**



Sources: European Central Bank, International Monetary Fund, Bank of International Settlements, Federation of European Securities Exchanges, World Federation of Exchanges, own calculations.

For France, Germany, Italy and Spain, the extra-EMU home bias fluctuates around 90% in all the years displayed, whereas the intra-EMU home bias ranges perceptibly lower. In some cases, negative values can be observed for the bilateral home bias between individual countries, i.e. some countries “overinvest” in other countries compared with the I-CAPM

<sup>9</sup> Germany did not participate in the 1997 survey, which means that German data are available only for the period since 2001.



benchmark.<sup>10</sup> However, we abstain from a graphical presentation of bilateral home bias for reasons of clarity.

## V. Determinants of Portfolio Holdings in EMU Member States

### 1. Intra- and Extra-EMU Portfolio Holdings

In this section, we investigate the underlying causes of regional differences in equity holdings and, thus, in bilateral home bias as illustrated in section IV for the time up to the financial crisis. With data from ten EMU countries for the period 2001-2008, we perform a panel investigation of their bilateral holdings among each other as well as between them as investor countries and the top three non-EMU destinations, namely Japan, the United Kingdom and the United States.<sup>11</sup>

Separate estimations for intra and extra-euro-area investments are performed. The corresponding regression equation is<sup>12</sup>

$$\ln ptf_{ij,t} - \ln ptf_{iw,t} = \alpha_0 + \alpha_1 (\ln kap_{j,t} - \ln kap_{w,t}) + \alpha_2 cost_{ij,t} + \alpha_3 risk_{ij,t} + \varepsilon_{ij,t} \quad (8)$$

where  $ptf_{i,j}$  denotes the part of country  $i$ 's portfolio that is invested in equity securities of country  $j$ .  $ptf_{i,w}$  is country  $i$ 's total equity portfolio,  $kap_j$  country  $j$ 's market capitalisation and  $kap_w$  the world portfolio. If investments followed the I-CAPM, we would expect  $\alpha_1$  to equal unity. Standard portfolio theory assumes that capital markets are perfect, i.e. there are no transaction costs, taxes or capital controls and no constraints on international capital flows.<sup>13</sup> This implies that the traditional I-CAPM scenario ignores additional variables.

In reality, capital markets are far from frictionless. In order to explain the resulting deviation of capital allocation from the benchmark, the I-CAPM has been augmented by a number of control variables representing information and transaction costs. They are summarised by the vector  $cost_{i,j}$  in equation (8) and comprise the logarithm of distance

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<sup>10</sup> Lane (2006) has also found a “euro area bias” of EMU member states for bond portfolios.

<sup>11</sup> For intra-EMU holdings, all country pairs are considered where both countries are members of the EMU. For extra-EMU holdings, the analysis includes country pairs where the investing country is one of the ten EMU countries and the emitting country is Japan, the US or the UK.

<sup>12</sup> Linear regression estimates are performed using Stata 11.0 including AR(1) terms. When computing the standard errors and the variance-covariance estimates, disturbances were assumed to be heteroskedastic and contemporaneously correlated across panels.

<sup>13</sup> See Solnik (1974, 502).

between the capitals of the issuing and investing countries ( $dist_{ij}$ ), a dummy variable that takes the value one if the two countries share a common border and zero otherwise ( $neighbour_{ij}$ ), the corruption perception index score published by *transparency international* ( $tpi_j$ ) and the logarithmic number of analyst reports per company contained in the IBES stock index ( $analysts_j$ ).<sup>14</sup> In addition to these cost factors, various risk elements represented by the vector  $risk_{ij}$  may also have a distracting effect on the allocation of capital that goes beyond the potential of diversification in the world market portfolio. In our regressions, we have accounted for the bilateral exchange rate volatility ( $fx_{ij}$ ), measured by the coefficient of variation, to capture bilateral fluctuations, the role of the Chicago Board Options Exchange Market Volatility Index (VIX) as a measure of global uncertainty on stock markets as well as the price of credit default swaps for five-year government bonds of country  $j$  ( $cds_j$ ), which is used as a measure of sovereign risk directly perceived by the markets.<sup>15</sup> Governments have played a crucial role in managing and alleviating the financial crises of recent years, which underlines the relevance of their own solvency for investors, even in the private equity segment.<sup>16</sup> The incentives of foreigners to retreat their capital in order to escape the consequences of an imminent national insolvency might be even more pronounced than for residents, who have to be aware of potential repercussions on the national economic environment and will anyway stay within the grasp of their government. In addition, aspects beyond conventional yield-risk optimisation may also play a role. Investors with a high preference for domestic shares generally seem to be led by other motives, as well. Consequently, they might be less sensitive to changes in domestic cds premia than investors with a more diversified stock portfolio.

Performing the regressions without control variables, i.e. testing the traditional I-CAPM, the elasticity of portfolio holding,  $\alpha_1$ , significantly exceeds unity for intra-EMU investments and is less than unity for extra-EMU investments. The corresponding estimation is presented in the first column of **Table 1** for investments within euro-area countries and in the third column for investments outside the euro area. As the 95%

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<sup>14</sup> Data for *analysts* are provided by Thomson Financial, Datastream. Alternatively to the number of companies, we have normalised the number of analysts by national market capitalisation. The estimation results, however, alter only marginally.

<sup>15</sup> Data for VIX and CDS also stem from Thomson Financial, Datastream. An alternative measure, the sovereign bond spreads to German government bonds calculated on the base of benchmark yields published by the Bank of International Settlement (BIS), leads to very similar results for investments in other euro area countries throughout all the following regressions. For investment in non-EMU countries, however, this indicator is less adequate, since it includes anticipated exchange rate changes. For a detailed discussion of EMU countries' sovereign bond spreads as a measure of market perceptions of default probabilities, see Dötz and Fischer (2010).

<sup>16</sup> See ECB (2010), pp. 10 ff.

confidence interval clearly demonstrates, in both cases the coefficient is different from unity. Thus, theoretical prediction and the real outcome do not coincide. This result points to a high reactivity of investors with regard to developments in other euro-area countries and to a high degree of financial integration and interdependency. It also corresponds to the elevated home bias of EMU countries vis-à-vis countries outside the euro area that has been depicted in **Figure 2** and is also consistent with the finding of De Santis (2010) and De Santis and Gérard (2009), who determine that euro-area investors have increased the weight of portfolio investments in other euro-area countries due to the economic and monetary union. Apparently, cross-border capital flows of euro-area countries are diverted to other EMU member states as a response to lasting frictions in the international financial markets.

Including the traditional control variables, such as transaction and information costs, as well as the inclusion of risk aspects shifts  $\alpha_1$  towards unity in both scenarios, intra and extra-euro-area. Results are depicted in the second and fourth columns of Table 1. Without control variables,  $\alpha_1$  equals 1.29 or 0.64, and, including control variables, 1.10 or 1.23 (in intra and extra-EMU investments respectively). The 95% confidence interval for those coefficients clearly demonstrates that unity is included only in the comprehensive regressions.<sup>17</sup>

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<sup>17</sup> The confidence intervals are displayed in squared brackets, but only for national weights in the market portfolio as an explanatory variable. The reason for this is that, in this case, the coefficient equals unity under  $H_0$ . For all the other coefficients,  $H_0$  predicts values of zero, and statistical significance is indicated by asterisks.

**Table 1: Portfolio Holdings of Intra-EMU and Extra-EMU Equity Securities  
(2001-2008)**

	<b>EMU basic</b> $ptf_{ij} - ptf_{iw}$	<b>EMU control</b> $ptf_{ij} - ptf_{iw}$	<b>Non-EMU basic</b> $ptf_{ij} - ptf_{iw}$	<b>Non-EMU control</b> $ptf_{ij} - ptf_{iw}$
<b><i>kap<sub>j</sub> - kap<sub>w</sub></i></b>	1.29 (0.061) [1.17 - 1.41]	1.10 (0.06) [0.98 - 1.21]	0.64 (0.11) [0.43 - 0.86]	1.23 (0.12) [1.00 - 1.46]
<b><i>cds<sub>j</sub></i></b>		0.02 (0.37)		0.75 (0.52)
<b><i>analyst<sub>j</sub></i></b>		0.45** (0.23)		-0.82** (0.33)
<b><i>tpi<sub>j</sub></i></b>		0.13*** (0.05)		-0.08 (0.13)
<b><i>dist<sub>ij</sub></i></b>		-0.99*** (0.14)		-0.75*** (0.08)
<b><i>neighbour<sub>ij</sub></i></b>		0.27** (0.11)		
<b><i>fx<sub>ij</sub></i></b>				-3.69** (1.78)
<b>N</b>	720	720	240	240
<b>R<sup>2</sup></b>	0.73	0.78	0.57	0.66

Standard errors in parentheses, 95% confidence interval in squared brackets.

\*\*\* (\*\*) [\*] denote significance at the level of 1% (5%) or [10%].

## 2. Explanatory Power of Control Variables on Home Bias

After having shown that the inclusion of the control variables shifts the elasticity of portfolio holdings towards its theoretical benchmark in both samples, in this section we want to further explore the explanatory power of control variables for the home bias. Thus

instead of regressing  $\ln ptf_{i,j,t} - \ln ptf_{i,t}$  on  $\ln kap_{j,t} - \ln kap_{w,t}$  and the control variables, we regress home bias on the set of control variables introduced above:<sup>18</sup>

$$hb_{ij,t} = \alpha_0 + \alpha_1 cost_{ij,t} + \alpha_2 risk_{j,t} + \varepsilon_{ij,t} \quad (9)$$

where  $hb_{ij,t}$  denotes the bilateral home bias in stock portfolios of country  $i$  vis-à-vis country  $j$  (as a percentage).

**Table 2: Determinants of Home Bias in Intra- and Extra-EMU Investments (2001-2008)**

	EMU control $hb_{ij}$	Non-EMU control $hb_{ij}$
<b><i>cds<sub>j</sub></i></b>	-22.2 (16.3)	-25.8** (0.09)
<b><i>analyst<sub>t</sub></i></b>	-17.1* (9.87)	15.6*** (5.31)
<b><i>tpi<sub>j</sub></i></b>	-4.84*** (1.83)	1.36 (2.22)
<b><i>dist<sub>ij</sub></i></b>	40,3*** (6.57)	11.5*** (1.98)
<b><i>neighbour<sub>ij</sub></i></b>	-21.6* (12.5)	
<b><i>fx<sub>ij</sub></i></b>		65.3** (28.00)
<b>N</b>	720	240
<b>R<sup>2</sup></b>	0.18	0.75

Standard errors in parentheses.

\*\*\* (\*\*) [\*] denote significance at the level of 1% (5%) or [10%].

**Table 2** shows the results for intra-EMU and extra-EMU investments. In the *intra-EMU* case, the coefficients for *dist<sub>ij</sub>*, and *tpi<sub>j</sub>* are significant at the 5% level and have the expected

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<sup>18</sup> Note that the bilateral home bias is defined as  $hb_{ij,t} = 1 - \frac{ptf_{ij,t} / ptf_{i,t}}{kap_{j,t} / kap_{w,t}}$ .

signs. The coefficients for *analyst<sub>j</sub>* and *neighbour<sub>i,j</sub>* are significant at a 10%-level and also show the expected signs. The more distant and the less transparent a country is, the greater is the preference for domestic investments. The closer the investor's home country is located to the seat of a company, the greater is his or her involvement. This relationship probably reflects the ease of collecting information and similarity of institutions in both countries. Sovereign risk measured by the price of credit default swaps for five-year government bonds obviously had no detrimental effect on portfolio holdings during the sample period. This result gives support to the conjecture that solvency risks of EMU partner countries were often neglected before the outbreak of the financial crisis in 2007.<sup>19</sup> The number of analyst reports per company has a slightly significant, positive impact on portfolio holdings within EMU member states. The inclusion of a global risk variable (VIX) did not increase the explanatory power of the estimates presented in this paper, which is probably due to the very limited number of varying values within the dataset. The same is true of exchange rate volatility. For this reason, the variable has been excluded from the regressions. Since there is no exchange rate volatility within the currency union, the respective variable has been omitted in this regression.

For *extra-EMU* investments *tpi<sub>j</sub>* does not have a significant impact and *neighbour<sub>i,j</sub>* is zero throughout as there is no common border between EMU countries and the US, the UK or Japan. The price of credit default swaps, which has so far failed to be significant, now enters the regression with a significantly negative impact on home bias. This somewhat counterintuitive outcome matches with the statement of Lane and Milesi-Ferretti (2010), who have observed a systematic "underpricing" of risk in the stock markets as a secondary effect of excessive profit seeking. The impact of analyst coverage on extra-EMU portfolio holdings is negative and leaves room for speculation that, during the observation period, analysts might have sent disproportionately negative signals from these markets, a hypothesis that will be elaborated further in the next section.<sup>20</sup> In line with the theoretical prediction and the empirical findings of Fidora, Fratzscher and Thimann (2007), the coefficient for exchange rate volatility is positive and significant, implying that higher exchange rate volatility impaired investment of euro area member states in third countries and that the high degree of financial integration within the euro area can partly be traced back to the abolition of exchange rate risks.

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<sup>19</sup> See Lane and Milesi-Ferretti (2010) or Dötz and Fischer (2010).

<sup>20</sup> Neither the inclusion of a liquidity measure for the issuing market nor the use of country or country-pair fixed effects changes the signs or significance of the coefficients presented (except for *tpi<sub>j</sub>* in the intra-EMU case, which turns statistically insignificant when country or country-pair dummies are included).

## VI. Sectoral Characteristics of German Home Bias

### 1. General Developments During the Financial Crisis

Besides the regional provenience of the securities under consideration, portfolio holdings and their reability to shocks may also depend on the sectoral category of both investors and shares. The German securities statistics database maintained by the Deutsche Bundesbank provides a detailed insight into the sectoral and regional structure of securities held in custody accounts at German banks. The data set used for the following analysis comprises quarterly data from the fourth quarter of 2007 to the fourth quarter of 2009. It therefore covers the critical period when the financial crisis has spilled over from US mortgage companies to the worldwide capital markets and the real economy. This section focuses on differences in the behaviour of German investors, depending on the sector and the regional provenience of shares as well as investor category.

In addition to a regional disaggregation, the basic concept of home bias can be broken down into several components, either by the sector of investment or the institutional sector of investors. These measures of sectoral home bias can be aggregated to the general home bias by using the weights of the respective sectors in the national portfolio holdings:

$$\sum_z hb_i^z \frac{ptf_i^z}{ptf_i} = 1 - \sum_z \left[ (1 - hb_i^z) \frac{ptf_i^z}{ptf_i} \right] = 1 - \sum_z \frac{f_{\neq i}^{i,z}}{\tilde{f}_{\neq i}} \frac{ptf_i^z}{ptf_i} = hb_i \quad (7)$$

where  $ptf_i$  is the market value of country  $i$ 's stock portfolio and  $z$  is an index of sectors and can denote both the classification of shares or of investors.

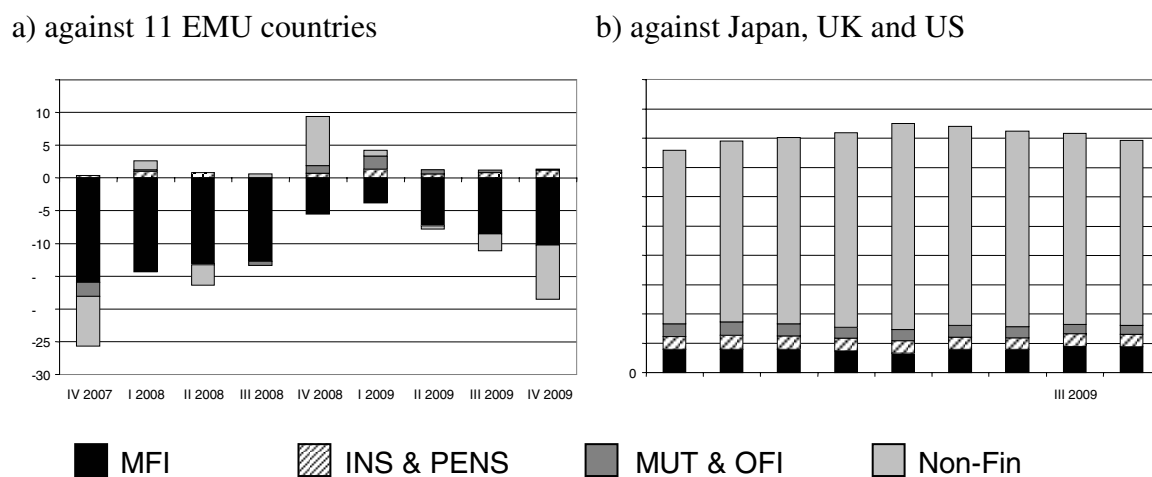
**Figure 3** gives a brief overview of the sectoral composition and the development of home bias in German portfolio holdings since the beginning of the current financial crisis.<sup>21</sup> We distinguish between portfolio investments in monetary financial institutions (MFI), insurance companies and pension funds (INS & PENS), mutual funds and other financial institutions (MUT & OFI), as well as non-financial institutions (Non-Fin). Apparently, general home bias was tending to increase until the fourth quarter of 2008, which was also the preliminary peak of the global financial crisis. Since then, it has been diminishing

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<sup>21</sup> The observed changes in home bias are not necessarily due to portfolio shifts alone, but might also reflect valuation effects. A more than proportionate fall in stock prices of foreign securities relative to the market value of German shares, for instance, results in an increasing (positive) home bias, even if no quantitative adjustments take place. However, if foreign shares are over-represented in German portfolios relative to their weight in the world market portfolio (negative home bias), the relation is reversed.

again. This course can be observed for both, investments inside and outside the euro-area.<sup>22</sup>

**Figure 3: Composition of German Home Bias  
with Regard to Sector of Investment (as a percentage)**



Sources: BIS, Deutsche Bundesbank, ECB, FESE, WFE, own calculations.

Apart from that, however, there are striking differences between portfolio holdings intra and extra-EMU. While German home bias is still substantial against Japan, United Kingdom or the United States, securities of companies domiciled in euro-area countries abroad are even over-represented in German portfolios, when compared with the regional composition of the world market portfolio. This EMU bias, which is represented by a negative bilateral home bias, is due primarily to a clear regional preference in the case of shares issued by monetary financial institutions (MFI). Changes in this sector are also the most important driving force behind the overall development of the euro area bias during the financial crisis, even if the weight of this sector in German portfolio holdings does not exceed 10%.<sup>23</sup> With respect to the three big economies outside EMU, on the other hand,

<sup>22</sup> Home bias indices derived from the German securities statistics database cannot be compared directly with values based on the CPIS, since the former database comprises listed shares without differentiating between portfolio and foreign direct investment, while the latter database accounts for all shares and investment certificates, but does not contain equity holdings that are classified as foreign direct investment.

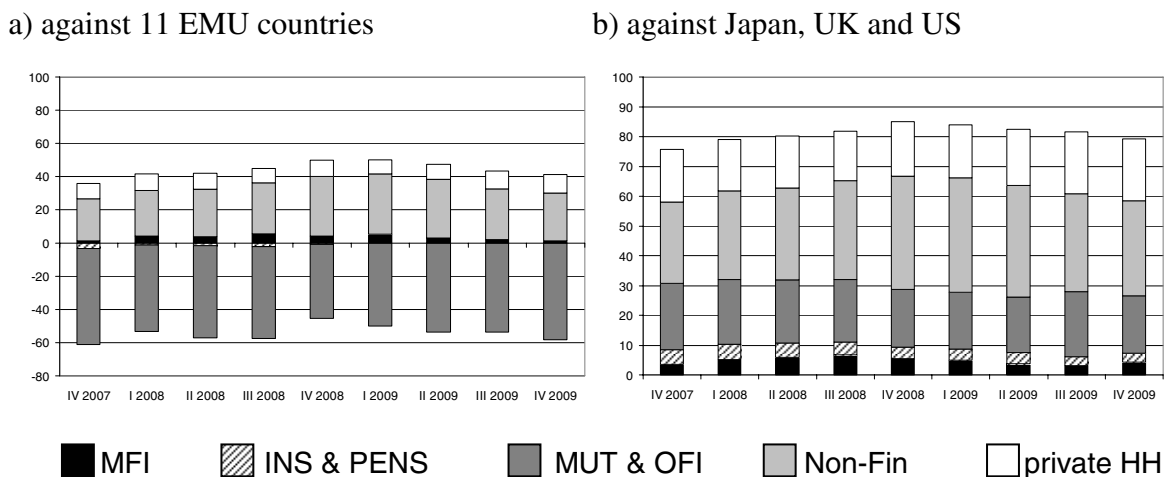
<sup>23</sup> Similar to the dynamics of the overall home bias (see footnote 20), observed changes in sectoral home bias are not necessarily due to portfolio shifts alone. Other things equal, a relative decline in asset prices of a given sector will lower the weight of economies, which are specialised in this sector, in the world market portfolio. As a consequence, the sectoral home bias measured by equation (7) will fall. Since this valuation effect would counteract the impact of a potential capital retreat, the development of sectoral home bias might



the magnitude and the performance of home bias were clearly dominated by investments in non-financial corporations. This impact corresponds to their weight of roughly 80% in German portfolios, while unweighted home bias is not particularly high in this sector, compared with the bilateral home bias of the other sectors depicted in **Figure 3**.

Turning to the institutional categories of portfolio holders, we again distinguish between the four sectors defined above but add households as a fifth important group of investors. **Figure 4** illustrates the various degrees of home bias with respect to investments inside and outside the euro area.

**Figure 4: Composition of German Home Bias with Regard to Type of Investor (as a percentage)**



Sources: BIS, Deutsche Bundesbank, ECB, FESE, WFE, own calculations.

In all sectors, the degree of home bias is definitely higher against Japan, United Kingdom or the United States than against euro-area member states. Interestingly, the EMU bias already identified above is caused by mutual funds and other financial institutions alone. Despite their high exposure to foreign markets, they reduced their positions abroad only marginally and temporarily during the crisis. This might be due to the fact that fund managers have to take note of possible repercussions which arise from their market power or their commitment to given stock market indices. Insurance companies and pension funds, which also had a preference for foreign EMU member states at the beginning of the observation period, have continuously reduced their portfolio investment in these countries,

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underestimate the restructuring in national portfolios. Provided that the impact of sector specific shocks on a country's market capitalisation as a share of the world portfolio is small, the valuation effect is limited.

especially since the beginning of 2009. Non-financial corporations almost exclusively hold German shares, which clearly points to investment motivations other than the Markovitz-type yield-risk optimisation. The regional structure of investment was most volatile in the portfolio holdings of monetary financial institutions, which stood in the centre of the global crisis. Households, by contrast, exhibit a relatively steady and modest degree of home bias.

## 2. German Home Bias Depending on the Sector of Investment

In order to gain a better understanding of the possible determinants of the stylised facts identified so far, and especially the behaviour of investors during the financial crisis, it is useful to analyse whether investors discriminated between developments that occurred in the crisis sectors and developments in industries that were affected only indirectly by the subsequent distortions. As before, *cost* and *risk* denote vectors of variables related to transaction or information costs and the actual or perceived investment risk, respectively. The corresponding regressions are given by

$$hb_{Dj,t}^y = \alpha_0 + \alpha_1 cost_{Dj,t} + \alpha_2 risk_{j,t} + \varepsilon_{j,t} \quad (10)$$

where  $hb_{Dj}^y$  denotes the size of home bias of German investors with respect to stocks of sector  $y$  in country  $j$  (as a percentage).<sup>24</sup>

In **Table 3**, estimates for aggregate investments of German investors (columns 1 and 6) are compared with the parameters stemming from sector-specific estimates. We again distinguish between euro-area and non-euro-area stocks. Apart from  $neighbour_{Dj}$ , which turns out to be insignificant due to a high correlation with  $dist_{Dj}$  and Germany as the only country of reference, we use the same explanatory variables as in the previous section. Obviously, the sovereign risk of the partner country significantly raises the bilateral home bias in stocks, i.e. investors seem to retreat into more familiar domestic areas whenever the general investment climate in the foreign country becomes more uncertain. Within European Monetary Union, this flight into the “home haven” is significant only for equity securities of monetary financial institutions and mutual funds (including other financial institutions), but not for stocks of insurance companies or pension funds and non-financial

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<sup>24</sup> As in the previous section, regression estimates are performed using Stata 11.0 including AR(1) terms. When computing the standard errors and the variance-covariance estimates, disturbances were assumed to be heteroskedastic and contemporaneously correlated across panels. Country fixed effects collect otherwise neglected impact factors.

corporations. This differentiation can probably be attributed to the character of the economic crisis, which is essentially linked to financial institutions with elevated risk positions and the prominent role of government support in managing the crisis. The portfolios of pension funds and insurance companies, which have to observe strict risk preventing rules, were less affected. Spill-over effects to the real economy only emerged with some time lag and were cushioned by unprecedented economic stimulus packages.

**Table 3: Home Bias in German Stock Portfolios Depending on the Sector of Shares (IV/2007 – IV/2000**

	EMU				Non-EMU				
	overall	MFI	INS & PENS	MUT & OFI	Non-Fin	MFI	INS & PENS	MUT & OFI	Non-Fin
$cds_j$	23.9*** (8.66)	29.1** (14.0)	8.38 (13.2)	65.4** (29.6)	-7.71 (8.33)	14.3** (6.67)	3.82 (3.63)	0.67 (21.6)	5.31** (2.52)
$analyst_j$	2.15 (36.4)	69.3 (106)	-89.5* (52.8)	-58.4 (151)	43.6 (40.0)	37.7** (16.7)	-2.75 (9.75)	-95.2* (49.0)	-40.5** (18.4)
$tpj_j$	-13.7 (17.4)	-97.4*** (22.2)	-15.6 (25.2)	79.0 (56.8)	-15.5 (13.3)	-1.03 (9.52)	-14.9*** (4.26)	3.99 (33.5)	-6.08 (4.45)
$dist_{ij}$	11.7 (26.5)	-116*** (33.9)	11.0 (34.3)	139* (77.5)	84.1** (38.6)	14.2*** (3.86)	15.6*** (1.92)	13.0 (9.74)	10.2*** (3.21)
$fx_{ij}$	-	-	-	-	-	31.4 (76.1)	5.96 (41.0)	211 (271)	56.5 (35.0)
$N$	1620	405	405	405	405	135	135	135	135
$R^2$	0.04	0.17	0.19	0.30	0.04	0.53	0.48	0.18	0.33

Standard errors in parentheses.

\*\*\* (\*\*) [\*] denote significance at the level of 1% (5%) or [10%].

For investments outside the EMU, credit default swaps also play a significant role, especially with regard to MFI stocks. Furthermore, a slightly significant impact can be detected for shares issued by non-financial corporations. Like in the general estimates for ten euro-area countries, the number of analyst reports per company contained in the IBES stock index apparently plays a more important role for investments outside the euro area than for intra-euro-area portfolio holdings. A possible explanation might be that, for intra-euro-area investments, other sources of information are also amply available. The negative impact on extra-EMU portfolio holdings stated in section IV is reaffirmed for shares issued by monetary financial institutions, while the effect is positive elsewhere. This specification backs the hypothesis formulated above that negative outlooks of analysts might have aggravated the withdrawal of investors from crisis-ridden sectors and countries. The general level of transparency as attested by *transparency international* proved to be non-significant in most cases, even if there is some evidence of a slight negative impact on the home bias. Contrary to the results of the aggregate estimates, exchange rate risk apparently was not decisive for the segmentation between intra and extra euro area investment during the crisis. Instead, the geographical distance of the country of origin from Germany, which serves as a rough proxy of various transaction and information costs, had a more valuable impact on investment decisions of German security holders.

### 3. German Home Bias Depending on the Type of Investor

While investment behaviour obviously varies according to the sector of equity securities, it may also depend on specific characteristics of the investor. For example, it may be argued that institutional investors are generally better informed than individuals and that non-financial corporations may have different investment principles than financial corporations. In **Table 4**, estimates of portfolio holdings are presented which distinguish, first, between institutional investors of the sectors described above and private investors, as well as, second, investments within European Monetary Union and investments in the United Kingdom, the United States or Japan. Again, we regress the home bias on a set of variables that proxy information and transaction costs as well as on the price of credit default swaps and exchange rate volatility as risk elements. The corresponding regressions are given by

$$hb_{Dj,t}^x = \alpha_0 + \alpha_1 cost_{Dj,t} + \alpha_2 risk_{j,t} + \varepsilon_{j,t} \quad (11)$$

where  $x$  denotes the investing sector in Germany and  $hb_{Dj}^x$  indicates the home bias of German investors belonging to sector  $x$  against stocks of country  $j$ .

**Table 4** reveals that sovereign risk of the host country was the most important driving force of home bias during the observation period. The impact was generally higher for intra-euro-area investments. This elevated sensitivity might be a reaction to the previous negligence of structural differences within monetary union that only became apparent with the outbreak of the financial crisis.<sup>25</sup> However, the estimated reactivity of monetary financial institutions, albeit positive, is not significant in statistical terms. This outcome indicates that the deleveraging process depicted in **Figures 3 and 4** was triggered by inherent risks in the balance sheets of commercial banks rather than by exogenous risk factors. Again, analyst coverage seems to reduce information asymmetry between domestic and foreign investors only for shares stemming from countries outside the euro area, and even there the impact was statistically significant only for investments of MFIs. The transparency index is not able to explain changes in time or differences between sectors or regions. Exchange rate risk, which otherwise was not found to be decisive for German investment decisions, seems to have had a deterrent impact on portfolio investment of non-financial enterprises. However, this sector generally exhibits a very limited willingness to hold foreign securities (**Figure 4**). Distance again seems to collect a number of cost factors, which are relevant for all groups of investors except monetary financial institutions and carry weight especially for investments outside the euro area.

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<sup>25</sup> See Dötz and Fischer (2010), who identify a change of market perception of EMU sovereign bond risk since March 2008. The authors argue that prior to the crisis government bonds of member countries had generally been assessed as homogenous in terms of risk, but that some countries have then lost their former role as a safe haven. See also Lane and Ferretti (2010) for the "underpricing" of risk aspects prior to the financial crisis.

**Table 4: Home Bias in German Stock Portfolios Depending on the Investing Sector (IV/2007 – IV/2009)**

	EMU					Non-EMU					
	overall	MFI	INS & PENS	MUT & OFI	private HH	overall	MFI	INS & PENS	MUT & OFI	private HH	
<i>cds<sub>j</sub></i>	23.9*** (8.66)	15.8 (31.3)	20.6** (8.62)	55.3*** (15.1)	17.8** (7.32)	7.59* (4.42)	9.26 (15.0)	-0.33 (6.15)	13.8* (7.13)	1.54* (0.82)	9.19** (3.68)
<i>analyst<sub>j</sub></i>	2.15 (36.4)	-95.1 (108)	44.1 (68.7)	-3.52 (80.5)	17.5 (30.6)	-22.1* (10.8)	-96.5** (40.7)	-4.31 (12.7)	-14.4 (20.1)	4.47 (3.16)	-7.23 (10.2)
<i>tp<sub>j</sub></i>	-13.7 (17.4)	-51.2 (64.7)	-74.4*** (19.9)	51.1* (27.8)	5.24 (20.4)	-5.64 (6.75)	-8.41 (26.6)	-4.85 (8.86)	-1.71 (11.6)	0.30 (0.83)	-2.63 (4.68)
<i>dist<sub>ij</sub></i>	11.7 (26.5)	-31.5 (88.6)	-84.3*** (31.9)	113*** (41.0)	45.4* (27.4)	14.0*** (2.73)	8.67 (6.08)	15.4** (5.61)	31.7*** (7.01)	2.87*** (0.58)	9.96*** (2.83)
<i>fx<sub>ij</sub></i>	-	-	-	-	-	67.2 (51.6)	194 (229)	62.3 (65.0)	88.8 (90.3)	28.2*** (8.47)	36.2 (42.0)
<i>N</i>	1620	324	324	324	324	540	108	108	108	108	108
<i>F<sup>2</sup></i>	0.04	0.17	0.08	0.09	0.17	0.25	0.07	0.57	0.30	0.98	0.55

Standard errors in parentheses.

\*\*\* (\*\*\*) [\*] denote significance at the level of 1% (5%) or [10%].

## **VII. Conclusion**

Summarising, we find that financial integration is decisively more advanced within European Monetary Union (EMU) than between member countries and countries outside the euro area. This outcome can partially be attributed to the abolition of exchange rate risk. Traditional indicators of information and transaction costs also play a role. Sovereign risks do not seem to have affected investment in equity securities prior to the crisis. The analysis of German deposit statistics reveals a clear impact of the financial crisis on the regional and sectoral structure of German portfolio holdings. Prices of credit default swaps for government bonds of the country of origin proved to be a significant determinant of investors' willingness to hold foreign stocks of this country. The retreat of German investors was more pronounced than that of domestic investors whenever the sovereign risk of a foreign country was rising. This indicates that, besides the well-known flight to a "safe haven", which should be the same for all investors, there also exists a retreat into the familiar "home haven".

Another lesson that might be drawn from the analysis is that the financial sector is still at the centre of the current crisis, and that the shares of financial corporations were affected disproportionately by reshuffling in security portfolios. In addition, monetary financial institutions also played an active role with respect to portfolio restructuring during the crisis. Their reorientation to domestic shares to the detriment of foreign stocks apparently reflects the deleveraging process that was triggered by inherent risks in their balance sheets rather than by exogenous risk factors. Insurance companies and pension funds as well as mutual funds and other financial institutions also reduced their risk exposure, but behaved in a less volatile manner on the whole. One possible explanation for this behaviour may be that fund managers have to take note of possible repercussions which arise from their market power and the restrictive risk-preventing rules that apply to the governance of pension funds and insurance companies.



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