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EUROPEAN CENTRAL BANK

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NO. 553 / NOVEMBER 2005

**ECB-CFS RESEARCH NETWORK ON
CAPITAL MARKETS AND FINANCIAL
INTEGRATION IN EUROPE**

GLOBAL BOND PORTFOLIOS AND EMU

by Philip R. Lane



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Abstract

We examine the bilateral composition of international bond portfolios for the euro area and the individual EMU member countries. We find considerable support for “euro area bias”: EMU member countries disproportionately invest in one another relative to other country pairs. Another striking pattern is the positive connection between trade linkages and financial linkages in explaining asymmetries across EMU member countries in terms of their outward and inward bond investments vis-à-vis external counterparties. At the aggregate level, it is those countries physically closest to the euro area that are both the most important destinations and sources for external bond investment vis-à-vis the euro area. Our empirical results support the notion that financial regionalization is the leading force underlying financial globalization.

Keywords: EMU, bond portfolios, financial integration

JEL classification: E4, F2, F3, F4

Non-technical summary

In this paper, we investigate the bilateral patterns in international bond holdings, with a particular emphasis on European Monetary Union. We ask various questions about EMU. Do EMU members disproportionately invest in other EMU member countries, relative to other destinations? With respect to external destinations, which countries are most heavily weighted in the aggregate euro area bond portfolio? Is there systematic heterogeneity in the external bond portfolios of the individual EMU member countries?

In the other direction, we also examine the determinants of inward investment into the euro area and can ask similar questions. What determines the importance of the aggregate euro area in the international bond portfolios of other international investor nations? Do external investors make systematic distinctions between euro area members? By addressing such questions, the contribution of the paper is to build a profile of the role of the euro area in the global financial system, in terms of its relative weight in international portfolios and its relative importance as a bond holder in various countries and regions.

At an empirical level, we address these questions by exploiting the recent release of the IMF's Coordinated Portfolio Investment Survey (CPIS) that reports the portfolio holdings of 67 investor countries in 220 destination territories. We document the importance of the aggregate euro area in global bond portfolios but highlight that there are substantial asymmetries in the external patterns of outward and inward investment with respect to the individual member countries. In terms of focus, we place a special emphasis on investigating the connections between bilateral financial holdings and various bilateral ties, such as bilateral trade, physical proximity, bilateral macroeconomic correlations and bilateral cultural and institutional similarities. This is in line with recent theoretical contributions that emphasize the importance of such bilateral factors in determining portfolio allocations in a world still characterised by pervasive frictions in both product and financial markets.

Our results strongly indicate that EMU has had a substantial impact on global bond portfolios. A central result is that, in both levels and differences, cross-investment among euro area members is substantially greater than among other country pairs, even controlling for other characteristics that may generate strong investment linkages across the euro area: in this sense, “euro area bias” has superseded “home bias” as a determinant of bond holdings. With respect to the euro area’s external bond positions, our econometric work uncovers a number

of systematic patterns in the data. In particular, in line with some recent theoretical contributions and empirical evidence for international patterns in portfolio equity holdings, trade linkages and informational barriers that are increasing with bilateral distance appear to be influential in determining the cross-country allocation of bond holdings. These results support the notion that international financial integration is an uneven process, with bilateral ties between investors and issuers remaining an important influence on portfolio allocations.

1 Introduction

Financial globalization is a key force that is reshaping the nature of the linkages across the major economic zones in the world economy. One dimension of globalization is the rising share of financial assets and liabilities held by foreign investors.¹ However, it is by no means the case that the pattern of foreign ownership is uniformly globalized in the sense that the national identity of investors has ceased to matter. Rather, the “international investor base” significantly differs across countries and regions, reflecting variation in both aggregate economic fundamentals (i.e. some countries are more attractive than others to all investors) and also bilateral linkages (i.e. the demand by an investor in region i for the financial assets issued by region j may be influenced by bilateral economic variables and also common institutional and cultural ties).

Such heterogeneity in the investor base potentially matters for two reasons. First, the cost of capital and the stability of international demand for the assets issued by a given country or region will depend on the characteristics of its international investor base. Second, the bilateral pattern of investment holdings will in itself influence the transmission of financial shocks, the nature of international risk-sharing and also potentially affect exchange rate regime choices.²

In this paper, we investigate these issues by analyzing the bilateral patterns in international bond holdings, with a particular emphasis on the European Monetary Union. We ask various questions about EMU. Do EMU members disproportionately invest in other EMU member countries, relative to other destinations? With respect to external destinations, which countries are favoured by the aggregate euro area bond portfolio? Is there systematic heterogeneity in the external bond portfolios of the individual EMU member countries?

In the other direction, we also examine the determinants of inward investment into the euro area and can ask similar questions. What determines the importance of the aggregate euro area in the international bond portfolios of other international investor nations? Do external investors make systematic distinctions between euro area members? By addressing such questions, the contribution of the paper is to build a profile of the role of the euro area in the global financial system, in terms of its relative weight in international portfolios and its relative importance as a bond creditor in various countries and regions.

¹See, for instance, Lane and Milesi-Ferretti (2003).

²On the latter, see Devereux and Lane (2003) for some suggestive evidence.

At an empirical level, we address these questions by exploiting the recent release of the IMF's Coordinated Portfolio Investment Survey (CPIS) that reports the portfolio holdings of 67 investor countries in 220 destination territories. The availability of the CPIS dataset represents a considerable advance relative to previous studies that relied on smaller samples and used data on transactions rather than holdings (see, for example, Portes et al 2001).

In terms of focus, we place a special emphasis on investigating the connections between bilateral financial holdings and various bilateral ties, such as bilateral trade, physical proximity, bilateral macroeconomic correlations and bilateral cultural and institutional similarities. This is in line with recent theoretical contributions that emphasize the importance of such bilateral factors in determining portfolio allocations in a world still characterised by pervasive frictions in both product and financial markets.

This work builds on a number of recent contributions. Lane and Milesi-Ferretti (2004) develop a general empirical modelling approach for the study of bilateral investment positions, with an application to the international equity holdings for a large sample of investor nations. In related work, Lane and Milesi-Ferretti (2005) investigate the international equity holdings of euro area investors. In terms of the empirical analysis of bond portfolios, Portes et al (2001) study the geography of gross bond flows between the US and forty partner countries, while Burger and Warnock (2004) analyse the international bond holdings of US investors. Finally, Anderton et al (2004), Baele et al (2004), Geis et al (2004) and Pagano and Von Thadden (2004) each provide useful surveys of recent developments in European financial markets and the growth in euro-denominated securities issued by international participants in global capital markets.

The structure of the rest of the paper is as follows. We briefly discuss the relevant theoretical issues in thinking about the geography of bond portfolios in section 2. Section 3 introduces the Coordinated Portfolio Investment Survey (CPIS) that is the source of the data on international bond holdings and, taking a euro area perspective, describes some broad patterns in the data. A range of empirical questions concerning EMU and the importance of the euro area in international bond holdings are addressed in the econometric analysis in section 4. Section 5 discusses possible extensions and directions for future research. Finally, some concluding remarks are offered in section 6.

2 A Conceptual Framework

In a benchmark finance model (e.g. the ICAPM), investors should hold the bonds of each issuer in proportion to its share of global bond market capitalisation.³ This is the case to the extent that there are no real or financial imperfections that distort international trade in goods or assets, such that the optimal allocation rule is independent of the nationality of the investor. However, the segmentation of product and capital markets, plus informational asymmetries and differences in institutions (such as tax and legal systems) across countries mean that the world is some far distance from this benchmark. The presence of such frictions means that the optimal portfolio allocation strategy plausibly varies with the nationality of the investor.

The incompleteness of financial markets also means that international diversification strategies may vary across countries. In a multi-currency world, hedging against nominal currency risk is costly, such that there may be a preference for bonds issued in the investor's home currency.⁴ Moreover, investors in different countries face different "endowment" risks (e.g. non-diversifiable shocks to labour income or tax rates): the basket of international assets that offers the best hedge against these risks may vary on a bilateral basis.⁵ In addition, to the extent that a group of countries share a common financial infrastructure, this should raise intra-group financial trade relative to other destinations that may involve higher transactions costs (Martin and Rey 2000). These two factors are especially relevant for the euro area, to the extent that the single currency has both eliminated nominal exchange rate risk among the member countries and lowered transactions costs by improving liquidity through a deepening and broadening of the consolidated euro area bond market, relative to the individual national bond markets that operated prior to the launch of EMU.

With regard to the segmentation of product markets, there are several reasons to believe that trading partners should receive a higher weight in portfolios. A basic reason is that the volume of trade is a good predictor of the level of bilateral exchange rate volatility (Devereux and Lane 2003,

³See Lane and Milesi-Ferretti (2004) for a more formal treatment and detailed literature review of international asset allocation, with an application to international investment patterns in equity markets. See also the discussion in Burger and Warnock (2004).

⁴Our data do not permit us to distinguish between the nationality and currency denomination of a bond issue. However, Burger and Warnock (2004) report that local-currency bonds represent 93 percent of total bonds outstanding for developed-country markets and 78 percent of total bonds outstanding for emerging markets.

⁵See Davis et al (2001) for a formal treatment of this point.

Broda and Romalis 2003). As such, currency risk is minimised by preferring the bonds of major trading partners. Along another dimension, Obstfeld and Rogoff (2001) show that the incentive to hold state-contingent foreign assets is increased, the more investors are exposed to consumption risk through fluctuations in the supply of imported goods. At the extreme, a country that just purchases domestic goods is not exposed to external shocks to its level of its consumption and so need not be concerned with hedging against this risk. Lane and Milesi-Ferretti (2004) generalize this argument to an N-country setting, with the prediction that bilateral portfolio shares should be positively related to import shares in order to minimize consumption risk.

Although the focus of these authors was on international equity portfolios, analogous reasoning may apply to bond allocations. For instance, holding the domestic-currency bonds issued by a trading partner provides a natural hedge against bilateral real exchange rate movements: if the relative price of the import good rises, this is offset by the increased real return for the domestic investor from holding the foreign bond.⁶

Finally, much recent research has emphasized that information sets vary greatly across investors. This is a popular rationalisation of home bias in portfolios: the multi-country version of this argument is that bilateral investment patterns should correlate with the strength of informational linkages between different country pairs. Again, it may be argued that the single currency has substantially integrated the financial market of the euro area and thereby improved the information flow among member countries.⁷

We build our empirical specifications in the econometric work in section 4 on the basis of these theoretical arguments that provide some hypotheses as to why the composition of international bond portfolios may deviate on a country-by-country basis.

⁶Whether the hedged return on a foreign bond positively or negatively comoves with the real exchange rate (or the terms of trade) is ambiguous: in general, it depends on the source of the relative price shock and the relative importance of nominal risk versus credit risk in determining the value of the foreign bond. See also a related example in Obstfeld (2004).

⁷See also Baele (2004) for a recent review of the integration of the European financial markets. Pagano and von Thadden (2004) provide an extensive study of recent developments in the euro area bond market.

3 The Coordinated Portfolio Investment Survey (CPIS)

In this section, we first discuss some features of the CPIS, before presenting an overview of the broad patterns in the data on international bond portfolios, with a primary focus on the euro area as a source and destination for cross-border bond investments.

3.1 Data Issues

The source of data on bond holdings is the CPIS, which is organised by the International Monetary Fund. After a smaller survey in 1997, the 2001 survey included 67 source countries and 218 destination territories.⁸ Estimated holdings for 2002 have also been released: however, these data do not reflect benchmark surveys by all participants and rely to some extent on extrapolations from the 2001 survey. For this reason, we mainly focus on the 2001 cross-section in this study.⁹ However, we do also examine the changes in bond portfolios between 1997 and 2001 in seeking to establish the impact of EMU.

While the CPIS represents a major advance in availability of data on bilateral investment positions, Lane and Milesi-Ferretti (2004, 2005) point out that the survey is imperfect. First, holdings are surely under-reported by some countries due to incomplete coverage or the complexities of tax-driven asset management structures.¹⁰ Second, the bilateral data can be distorted by third-party holdings to the extent that final ownership of assets is not properly traced: this is a larger problem for those countries that primarily surveyed custodians rather than end investors. Third, in relation to debt securities, the survey offers relatively little information on the currency denomination of bonds.¹¹ Finally, the CPIS does not report the domestic holdings of investors, such that it does not provide a complete profile of the composition of portfolios but rather only details the geographical breakdown of the cross-border component of investment positions.

⁸The 1997 survey did not include some important investor nations (e.g. Germany) as a source country, severely limiting its usefulness in examining the investment patterns of the aggregate euro area. However, in the next section, we will compare changes in investment patterns between 1997 and 2001 in order to assess whether EMU membership has influenced portfolio allocations.

⁹At any rate, the correlation between the 2001 and 2002 holdings is extremely high.

¹⁰For instance, the German survey did not cover holdings by households.

¹¹See the analysis in Geis et al (2004). Even for those countries that do report the breakdown across the major currencies, these data are provided only in the aggregate, rather than on a destination-by-destination basis.



It is also important to understand that the CPIS reports only aggregate holdings: it does not provide the decomposition in terms of whether securities are issued (or held) by public or private institutions and or the relative holdings of individual investors versus financial intermediaries. Moreover, it does not give details as to the “age profile” of the holdings in terms of whether particular assets were recently acquired or have been held for a long time. For these reasons, the CPIS, while useful, by no means provides a complete profile of the investor base in international bond markets.

3.2 Broad Patterns

We begin in Table 1 by looking at the total international bond holdings of EMU member countries.¹² The euro area aggregate amounts to \$2.36 trillion in cross-border assets, or 38.5 percent of GDP. However, 62.2 percent of the international holdings are invested in other member countries, such that the external bond holdings represent \$890 billion or 14.5 percent of GDP. (To be clear, external bond holdings refer to the securities issued by countries that are not members of the euro area.)

In terms of the holdings of individual member countries, the most striking feature relates to the role played by Luxembourg. Its cross-border holdings amount to nearly 2100 percent of its GDP, with the distribution between intra- and extra-area destinations similar to that for the aggregate. Clearly, this extraordinarily large bond portfolio reflects Luxembourg’s status as a major financial center for European asset management and also highlights that a major proportion of these holdings have not been traced back to the end investor. Albeit to a lesser extent, Ireland also shows up as a major financial center, with a bond portfolio valued at 182.2 percent of its GDP.¹³

At the other end of the distribution, Greece has by far the lowest ratio of international bond assets to GDP at 5.1 percent, with most of the other countries in the 20-40 percent range. Another noteworthy feature is that only Greece and Ireland devote more than 50 percent of their portfolios to territories outside the euro area, with the other countries exhibiting much higher levels of ‘euro area’ bias in the allocation of their international bond holdings.

Table 2 restricts attention to the external component of the euro area’s international bond

¹²Throughout the paper, we focus on the data for long-term debt securities. The CPIS does provide some information on short-term debt securities but there are many more missing observations for this category.

¹³Ireland set up an International Financial Services Center (IFSC) in 1987, which has attracted many international firms to establish both back-end and front-end asset management operations there.

portfolio. The US and UK are by far the two most popular individual destinations, amounting to 55 percent of the aggregate external bond portfolio, with Japan a distant third. The aggregate of other European countries has a 12.5 percent share, with Latin America at 4.6 percent and other Asian countries taking less than 1 percent. These figures for the euro area conceal considerable heterogeneity across individual member countries. Taking the US as a destination, the Netherlands invests 59.9 percent of its external portfolio there, whereas Portugal only commits 18.2 percent. Ireland has a clear special preference for the United Kingdom, with a portfolio share at 28.4 percent that is double the amount for most other member countries. The member countries sharply differ in terms of their exposures to the Japanese bond market: France has a robust 5.7 percent allocated to Japan, whereas Finland, Greece, Portugal and Spain devote less than one percent of their portfolios to Japan.

With respect to the ‘Other Europe’ category, Austria, Germany and Finland each devote more than 20 percent of their external portfolios to these countries. For the latter, this reflects a high level of Finnish investment in Swedish-issued bonds, whereas Austria and Germany have significant exposures to the emerging bond markets of the new member states in Central and Eastern Europe. Finally, the importance of Latin American in the Italian external bond portfolio is exceptional, with a 17.4 percent share (no other country devotes more than 5 percent to Latin America). This reflects large 2001 holdings in Argentina (\$9 billion), Brazil (\$5 billion) and Mexico (\$4 billion).¹⁴

We next compare the geography of the external bond portfolios of the euro area versus the US in Table 3. To ensure comparability, we restrict attention to investment in the top twenty emerging markets (as measured by the distribution of aggregate external investment by the US and the euro area).¹⁵ Table 3 highlights that the patterns in bond holdings are quite different for the two major economic zones. With the striking exception of Argentina, Latin America has a much higher weight for the US than for the euro area. In contrast, countries in ‘emerging’ Europe (e.g. Hungary, Poland and Turkey) are relatively more popular with investors from the euro area. We will return to the regionalisation of portfolio allocations in our empirical work below.

We turn attention to inward bond investment into the euro area in Table 4. External holdings in the euro area amount to \$956 billion, or 15.6 percent of its GDP. This corresponds to 32.8 percent

¹⁴Anecdotally, it is well known that Italian retail investors were among the biggest losers from the Argentinian debt default.

¹⁵Among high-income countries, the US and the euro area are naturally major cross-holders in each other.

of the total external bond holdings of these countries, such that the euro area lies second only to the US in terms of a destination for international bond investors. Among individual investor nations, Japan is the single biggest bond investor in the euro area, responsible for about one-third of total external holdings, with the UK a close second and the US and Switzerland also each contributing more than 10 percent of total inward investment into the euro area. Table 4 also shows that the euro area accounts for 40-55 percent of the external bond portfolios of other European countries such as Denmark, Sweden, the Czech Republic and Malta. From Asia, both Hong Kong and Singapore also devote significant fractions of external holdings to the euro area, at 15.6 percent and 23.7 percent respectively.

Table 5 focuses on differences in the sources of international bond investment in individual EMU member countries. At the aggregate level, the euro area has cross-border bond liabilities of \$2.6 trillion, or 43.2 percent of its GDP. However, 60.6 percent of the bonds issued by member countries are held by investors in other member countries, such that the debt owed to external investors amounts to \$1 trillion (17 percent of GDP). Only the two major financial centers (Luxembourg and Ireland) have majority external shares of cross-border liabilities, with five countries (Austria, Belgium, Greece, Portugal and Spain) relying on other member countries for at least 70 percent of inward bond investment.

Finally, Table 6 shows the major external bond investors in the individual EMU member countries. Japan is the most important investor for seven countries, exceeding 50 percent of total external investment for the offshore centers of Ireland and Luxembourg. The UK is the most important for four other countries, with Switzerland taking the lead role for Austria. The US is the third-ranked investor country in most cases and does not exceed a 20.5 percent share for any EMU member. Beyond these four major source countries (Japan, UK, US and Switzerland), the rest of the world plays a much smaller role (the main exception is Swedish investment in Finland).

This review of the broad patterns in international portfolios show that the euro area is highly important as both a source and destination for international bond investment. While investment within the euro area represents the majority of cross-border holdings, the external component is also highly significant. The descriptive analysis also highlights that there is considerable heterogeneity across the member countries in terms of the geographical patterns of outward and inward investments, with sharp differences in the scale of linkages to bond markets outside the euro area. In the next

section, we attempt to tease out some of the determinants of these various patterns in the relations between the euro area and global bond markets.

4 EMU and Cross-Border Bond Portfolios

We begin this section by analysing whether a “euro area bias” is evident in the data. Subsequently, we investigate the external bond holdings of the euro area both at the aggregate level and on a country-by-country basis, in order to establish the determinants of the euro area’s aggregate external bond holdings and whether there are systematic differences in the external portfolios of the individual EMU member countries. Finally, we investigate the pattern of inward investment into the euro area, both at the aggregate level and in terms of the cross-country heterogeneity among the individual member countries.

4.1 Do EMU Member Countries Invest Disproportionately in Each Other?

Do EMU member countries invest disproportionately in each other? To address this question, we consider a sample of source countries that includes 11 EMU member countries and 11 other high-income countries from outside the euro area, to form a sample of 22 source countries.¹⁶ By contrasting the behavior of members and non-members, we can investigate whether a country pair where both are members of the euro area has a different investment pattern than other country pairs.

Our general specification is

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

where the dependent variable is the level of source country j ’s bond holdings in destination country i . We include a pair-wise dummy $EURO_{ij}$ that takes the value 1 if both the source and destination countries are members of the euro area and 0 otherwise. To the extent that the various control variables capture the natural variation in bilateral bond investment patterns, the pairwise $EURO$ dummy variable will measure the impact of joint membership of the euro area ‘over and above’ the other linkages that tie together the various pairings among EMU member countries. The

¹⁶These are the US, UK, Denmark, Sweden, Switzerland, Norway, Japan, Canada, Iceland, Australia and New Zealand. Luxembourg is excluded as a source country due to its special status as an offshore centre.

inclusion of country dummies for each source and host countries means that we control for all characteristics that determine a country's general propensity to invest externally and to be a recipient of inward investment respectively (see Lane and Milesi-Ferretti 2004 for an extended discussion of this specification).¹⁷ As such, we rather seek to explain portfolio asymmetries: why does country A disproportionately invest in destination X, whereas country B relatively over-weights destination Y?

The inclusion of double fixed effects means that our list of regressors is confined to bilateral variables that vary across country pairs (i, j) . In addition to the volume of imports, we consider in a range of specifications a set of other variables that may proxy for informational linkages, the scope for diversification and institutional similarities between country pairs.

The results are shown in Table 7.¹⁸ In column (1), we just include the *EURO* dummy as the sole bilateral regressor (in addition to the fixed source and host country dummies). The dummy variable is highly significant, both statistically and economically. This basic specification suggests that the level of cross-border bond investment between two members of the euro area is 526 percent higher than between any other country pair in the sample.¹⁹

In column (2), we include those bilateral variables that are most plausibly correlated with the joint membership of the euro area: the volume of bilateral imports; the level of bilateral exchange rate volatility; joint membership of the European Union; and a border dummy. The inclusion of these variables leads to a substantial fall in the coefficient on the euro dummy but it is still significant and implies a 229 percent 'euro bonus' in terms of bilateral bond investment. Moreover, each of the controls has the expected sign and is significant: the level of bilateral bond holdings is larger, the larger the volume of trade, the less volatile is the bilateral nominal exchange rate, among members of the European Union and between bordering countries.

That the euro dummy remains significant even with the inclusion of these regressors tells us

¹⁷If we just restricted the set of source countries to the euro area members, a euro dummy could only be included by dropping the "double fixed effects" specification and employing a panel version of the specification similar to equation (3) below. It turns out that a euro dummy is highly significant in such a specification. However, since it is not possible to include source and host country dummies, this alternative approach cannot rule out that omitted factors correlated with EMU membership is responsible for its significance.

¹⁸Due to its offshoring role, we exclude Luxembourg from this exercise.

¹⁹If the fixed effects are excluded, the estimated value for the *EURO* dummy is 6.26 ($t = 34.3$) and the $adj.R^2 = 0.16$.

that the effect is not simply attributable to the elimination of exchange rate volatility among the member countries, the high level of intra-EMU trade or common membership of the EU. In turn, this indicates the explanation for the euro effect lies in the institutional impact of EMU in terms of the unification of the euro area bond market and the importance of ‘truly zero’ currency risk in determining the composition of bond portfolios.

We expand the specification to include some popular gravity-type variables in column (3): distance, a colonial dummy and a common language dummy. We add the correlation of output growth rates between the source and destination countries and a tax treaty dummy to the specification in column (4). The former is intended to capture the scope for bilateral risk diversification, to the extent that output growth is a good proxy for bond returns.²⁰

Finally, at the cost of a major reduction in sample size (in effect, the set of destination countries now comprises only major industrial and middle-income countries), we include a dummy variable for ‘common legal origin’ in column (5). This variable is intended to capture a basic level of institutional similarity between the source and destination countries and has been found to have some explanatory power for bilateral patterns in equity investments (see Lane and Milesi-Ferretti 2004). Across the broader specifications in columns (3)-(5), the *EURO* dummy remains highly significant. Moreover, although the estimated coefficient does fall in value, the broadest specification in column (5) still indicates that cross-border bond investment is 197 percent larger among euro area member countries than between other country pairs.

With respect to the other explanatory variables, the addition of the gravity-type variables in column (3) induces a loss of individual significance for exchange rate volatility and EU and border dummy variables: these variables are quite correlated with the bilateral distance variable, which is highly significant in this specification. In addition, there is evidence that bilateral bond holdings are boosted by speaking a common language.

The addition of the growth correlation and tax treaty variables in column (4) does not much change this set of results. Finally, the evidence for the more restricted sample in column (5) supports a positive role for institutional linkages: a tax treaty and common legal origin both positively raise the level of bilateral investment. These also exert an economically-large effect on holdings, raising

²⁰See Chen (1991) and Ilmanen (1995). Data on bond returns are only available for a fairly-small subset of the countries in our sample.

holdings by 143 and 175 percent respectively. Moreover, in this smaller sample, exchange rate volatility regains its significance and the border dummy is now significantly negative.

We provide some time-series evidence on this question by looking at changes in portfolio allocation between 1997 and 2001. The number of investor countries is reduced, since the 1997 survey covered a smaller number of countries — from this high-income group, two EMU members (Germany and Greece) and one important non-member (Switzerland) are excluded.²¹ Table 8 shows the growth in foreign bond holdings for each member country between 1997 and 2001. In most cases, the growth in holdings in other member countries far exceeds the growth in the aggregate portfolio: the differential is especially striking for Finland, Italy and Spain.

In order to conduct a more formal investigation, we adopt the specification

$$\Delta \log(BOND_{ij}) = \phi_i + \phi_j + \rho EURO_{ij} + \gamma \Delta \log(IMP_{ij}) + \beta_1 \Delta Z_{ij}^1 + \beta_2 Z_{ij}^2 + \varepsilon_{ij} \quad i = \{HIGH-INC\} \quad (2)$$

where Z^1 is a set of regressors that are entered in first differences and Z^2 are entered in levels.²²

We see in the basic specification that is reported in column (1) of Table 9 that bond holdings indeed grew significantly more quickly between members of the euro area than between other country pairs: the estimated coefficient indicates intra-EMU bilateral holdings grew by an additional 70 percent.²³ It turns out that the inclusion of the other regressors in columns (2)-(5) actually enlarges the effect, with the estimated magnitude in the range of [195, 210] percent.

With regard to the control variables, the growth in imports between 1997 and 2001 is significantly positive only in the smaller sample in column (5). A decline in bilateral exchange rate volatility between 1994-1997 and 1998-2001 is associated with an increase in bilateral bond holdings in columns (2)-(4) but this effect is marginally significant only in column (3). The border dummy is significantly negative across columns (2)-(5): a plausible interpretation is that part of the portfolio adjustment has been to reallocate away from contiguous countries towards fellow members of the euro area. Distance is marginally significant in columns (3) and (4) but not important in column (5). The only other significant result is that countries that share a common legal origin experienced faster growth in bilateral bond holdings, as is shown in column (5).

Overall, the results in Tables 7-9 provide some suggestive evidence that the extent of bilateral

²¹ These countries are still included as destination countries in the survey.

²² We still include the double fixed effects in this specification.

²³ If the fixed effects are excluded, the estimated value of the *EURO* dummy is 1.36 ($t = 14.2$) and the $adj.R^2 = 0.05$.

financial integration is stronger between EMU member countries than between other country pairs. To the extent that the process of portfolio adjustment began before 1997 and was not completed by the 2001, our estimates may actually understate the impact of EMU on bond allocations. Of course, this finding requires more extensive testing by exploring other specifications and econometric techniques, but these initial steps establish a benchmark for such future empirical investigations.²⁴

4.2 Determinants of the Euro Area's External Bond Holdings

In this section, we move on to examining the geographical allocation of the euro area's aggregate external bond holdings. The goal is to understand the nature of the euro area's collective exposure in different destinations. The empirical specification is given by

$$\log(BOND_j^{EURO}) = \alpha + \sigma X_j + \gamma \log(IMP_j^{EURO}) + \beta Z_j^{EURO} + \varepsilon_j \quad (3)$$

where the dependent variable is the aggregate level of external bond holdings by the euro area in destination j , X_j are scaling variables (total international bond issues by country j and the value of GDP_j); IMP_j^{EURO} is the aggregate level of euro-area imports from country and Z_j^{EURO} is a vector of other bilateral variables that may influence the level of euro-area bond investment in destination j .²⁵ Estimation is by OLS with heteroskedasticity-corrected standard errors.²⁶ Following Lane and Milesi-Ferretti (2004, 2005), we exclude external offshore centers from the set of host countries,

²⁴We report one robustness check in Table C.1 by entering distance in a non-linear (quadratic) format. This is done in view of the close geographic proximity of EMU member countries (relative to other country pairs). In general, the results are very similar for the *EURO* dummy. The levels specifications of columns (3)-(5) in Table 7 is extended in columns (1)-(3) of Table C.1; the difference specifications of columns (3)-(5) in Table 9 is extended in columns (4)-(6) of Table C.1. There is some weak evidence that the distance effect is indeed nonlinear in columns (1) and (2) of Table C.1 - the non-linearity is fairly mild, with no reversal in the sign of the distance variable for any country pair in the sample.)

²⁵Strictly speaking, we allow the inclusion of those observations with a zero value for bond holdings and/or imports by estimating the equation for $\log(1+x)$ rather than $\log(x)$. In practice, this makes very little difference. For instance, this increases the sample size by only a single observation in Table 6.

²⁶Some authors argue that the volume of imports may be endogenous to the intensity of bilateral financial linkages (see, for example, Antonin and Courdacier 2004). We are sceptical that this line of causality is important in the case of long-term debt securities. Moreover, it is difficult to identify valid instruments that might provide identification. Lane and Milesi-Ferretti (2004) find that IV estimates are fairly similar to OLS estimates in the case of equity holdings.

since we take the view that these countries do not represent the true final destination for the vast majority of recorded investments in these territories.²⁷ Note that we cannot include fixed host and source country effects in this specification: there is only one source country (the euro area).

As a benchmark, bond holdings are regressed just on the scaling variables in column (1) of Table 10. Two-thirds of the cross-country variation is explained by these variables, with euro-area holdings varying proportionately with differences in the scale of international bond issues by the destination countries.^{28,29} Following the theoretical discussion in section 2 and the empirical approach in the previous section, imports are included as an additional regressor in column (2). In this specification, the import variable is significantly positive: the greater is the reliance on the euro area on imports from a given country, the higher is its bond investment in that destination.

Information-based hypotheses about the geographical composition of portfolios suggest that gravity-type variables such as distance should be included in the specification. Accordingly, the bilateral distance between the euro area and the various destination countries is included in column (3).³⁰ Distance indeed enters with a significantly negative coefficient: proximity increases a host country's attractiveness to euro area bond investors. The inclusion of distance means that imports not only loses significance but changes sign in this specification, while GDP gains importance as a regressor. In addition, overall explanatory power rises from 0.68 to 0.76.

As was discussed in section 2, financial-market incompleteness may mean that factors such as bilateral currency risk and the bilateral correlation of macroeconomic risks may influence the composition of portfolios. We explore this line of reasoning by including the volatility of the bilateral nominal exchange rate vis-a-vis the euro and the correlation in output growth rates in the specification in column (4). However, neither turns out to be significant and their inclusion does not affect the results for the other regressors.

²⁷ See also the discussion in Lane and Milesi-Ferretti (2004). The exclusion of offshore centers is innocuous to the extent that the geographical allocation of investments that are intermediated through offshore centers is the same as that for assets that are held directly in the final destination country.

²⁸ An alternative approach would be to directly scale the dependent variable by expressing the level of euro area bond holdings in a given destination as a (log) ratio of the aggregate bond issues by that country. Given the near-proportionality of the relation between scale and euro area bond holdings, transferring the bond scaling variable to the lefthand side of the regression would not materially affect the other coefficient estimates.

²⁹ It could be argued that domestic bond issues should also be included in the scaling variable: however, this measure is only available for a much smaller number of countries. (The number of observations falls from 62 to 30.)

³⁰ Germany is taken to be the centre of the euro area for the measurement of distance.

We include two further information-related variables in column (5): a dummy for membership of a “broad Europe” and a colonial dummy that marks out those destinations that had a prior colonial relationship with some EMU member country.³¹ The former variable is intended to capture the notion that the euro area shares a generally similar cultural and institutional environment with other inhabitants of the European zone, with the latter included in acknowledgement of the myriad linkages among former colonial partners. While the colonial dummy turns out to be unimportant in the regression, the Europe dummy is significantly positive and, not surprisingly, induces the distance variable to lose significance. (Moreover, the negative coefficient on the import variable attains marginal significance in this expanded specification.) The inclusion of all variables in the final regression in column (6) changes little relative to the simpler specifications.

In summary, Table 10 shows that the distribution of the euro area’s external bond holdings is broadly in proportion to the importance of the individual destination countries in international bond markets. However, relative to that baseline, there is a clear preference for those countries that are geographically closer to the euro area (as measured by the distance variable or the “broad Europe” dummy) and larger in economic size. There is conflicting evidence on the role of import dependence in influencing bond allocations, with all other variables turning out to be individually insignificant.

Clearly, there are other determinants that could be considered. We explored some additional candidate regressors (including speaking a European language, time zone differences, GDP per capita) but none of these added explanatory power. In future work, it would be desirable to explore additional determinants, with a particular focus on identifying features of the legal-financial-political institutional environment that may help to explain the geography of the euro area’s aggregate external bond portfolio.³² However, our main focus in this paper is on exploring differences

³¹The “broad European” zone is defined by inclusion in the European football championship. This includes countries such as Georgia and Israel in addition to those countries more formally attached to political entities such as the European Union. The colonial dummy captures both those destinations that were former colonies of EMU member countries but also the case of the UK that formerly ruled Ireland.

³²Among the candidate variables that may influence the popularity of a destination for aggregate euro area investment are the degree of investor protection offered by its securities laws and the cost of currency hedging. See also Burger and Warnock (2004) for a relevant analysis of the international bond holdings of US investors.

in the external (outward and inward) investment patterns of the individual EMU member countries, relying on a specification that holds constant such country characteristics. This is the main subject matter of the following econometric analysis.

4.3 What Drives Variation in the External Bond Holdings of Individual Member Countries?

In this subsection, we explore heterogeneity across euro-area members in terms of their external bond holdings: the exposure of member countries to external country risk is asymmetric to the extent that such heterogeneities are important. As in Tables 7 and 9, we again employ the ‘double fixed effects’ specification

$$\log(BOND_{ij}) = \phi_i + \phi_j + \gamma \log(IMP_{ij}) + \beta Z_{ij} + \varepsilon_{ij} \quad i \in \{EMU\} \quad (4)$$

The results are reported in Table 11.³³ We begin in column (1) by including just imports as a bilateral regressor. This variable is highly significant: the greater is the import dependence of a member country on a given external destination, the larger is its bond investment in that country.³⁴ We expand the specification to include some popular gravity-type variables in column (2): distance, a colonial dummy and a common language dummy. Distance is only marginally insignificant in this specification: its positive sign is surprising at first glance. However, since the euro area countries are close to one another, differences in the distances to particular external partners are relatively small, such that this variable may simply pick up some idiosyncratic features in the data (such as Italy’s preference for Latin America as a destination).

Both dummy variables are insignificant, with the colony dummy showing the ‘wrong’ sign. It is important to emphasize that the import variable is largely unaffected by the inclusion of these gravity variables, despite their importance in explaining bilateral trade patterns. This suggests that the volume of trade *per se* is important in determining bond investment patterns, as opposed to imports merely proxying for these other informational variables.

³³We exclude Luxembourg as a source country, in view of its predominant role as an offshore center. From Table 2, the external investment pattern for Luxembourg-associated holdings is reasonably similar to the euro area average, with the exception that a lower weight is attached to the UK and a higher weight to ‘other Europe.’ The results are essentially unchanged if Ireland (the other main euro area offshore center) is excluded.

³⁴If the fixed effects are excluded, the estimated import coefficient is (0.56 $t = 26.74$) and the $adj R^2 = 0.39$.

We add the correlation of output growth rates between the source and destination countries to the specification in column (3). This variable is quite significant but has a positive sign: if anything, countries disproportionately invest in countries that have a similar growth cycle, which is not consistent with a simple diversification motivation.³⁵ Once the growth correlation is included, the distance variable now acquires significance but the other variables are unaffected.

We further extend the specification in column (4) by investigating whether a bilateral tax treaty covering securities investments is in effect between the source and destination country: however, this variable turns out to be unimportant and its inclusion does not affect the other results. Finally, at the cost of a major reduction in sample size, we include a dummy variable for ‘common legal origin’ in column (5). This variable is intended to capture a basic level of institutional similarity between the source and destination countries and has been found to have some explanatory power for bilateral patterns in equity investments (see Lane and Milesi-Ferretti 2004). However, it also turns out to be insignificant.

In this smaller sample, the magnitude of the coefficients for imports and distance sharply increases, even if the output correlation variable declines in explanatory power. Moreover, the colonial dummy now has a positive sign and is highly significant: all else equal, the level of bond investment by an EMU member country in a former colonial partner is 400 percent greater than in other countries.³⁶

In summary, the results in Table 11 reveal some systematic patterns in the bilateral variation in the external bond holdings of the individual member countries of the euro area. The evidence is that asymmetries in external portfolios can be traced to differences in import patterns, colonial histories and (perhaps perversely) distances to various destinations.

4.4 Which Countries Invest in the Euro Area?

We next flip the direction of analysis and investigate the origins of the international investors that hold euro area bonds. For this purpose, the specification is

$$\log \left(\frac{BOND_i^{EURO}}{BOND_i^W} \right) = \alpha + \sigma X_j + \gamma \frac{IMP_i^{EURO}}{GDP_i} + \beta Z_{ij} + \varepsilon_{ij} \quad i \in \{NON - EURO\} \quad (5)$$

³⁵ Lane and Milesi-Ferretti (2004) find a similar result for bilateral equity holdings. See also Antonin and Courdacier (2004) in the case of bank assets.

³⁶ The value of $\exp[1.4] = 4.055$

such that we try to explain the relative importance of the euro area in the external bond holdings of source countries from outside the euro area by appealing to a scaling variable ($\log(GDP)$), the importance of the euro area as a source of imports for country i , and a set of other characteristics Z_{ij} .

We adopt this alternative approach, since this set of investor countries differ radically in economic size, such that the variation in the level of bond holdings in the euro area is dominated by the differences in the level of total external bond holdings by these countries.³⁷ It is still important to include a scaling variable (such as domestic GDP), since the share of the euro area in total external holdings will be naturally larger, the bigger is the domestic economy.³⁸

The results are shown in Table 12. We begin in column (1) by just including the import share in addition to the GDP scaling variable. The import share is positive and highly significant: the more important is the euro area as a source of imports, the greater is the portfolio share that is allocated to euro area bonds for this sample of investor countries. Distance is added to the specification in column (2) and is significantly negative, raising the explanatory power of the regression from 0.12 to 0.49: proximity to the euro area raises the portfolio share. The import share remains significant and domestic GDP is also significantly positive in this specification.

We investigate whether other variables add explanatory power in columns (3)-(5). While bilateral exchange rate volatility vis-a-vis the euro is negatively signed in column (3), it is not significant. The correlation in growth rates also turns out to be unimportant in column (3). The inclusion of the dummy variable for membership of a “wider” Europe does slightly raise explanatory power in column (4) but it is not individually significant and also induces a loss of individual significance for the distance variable: the interpretation is that the true effect of distance is non-linear. We also include the colonial dummy in column (4): there is no evidence that external countries with colonial ties to EMU member countries devote a larger bond portfolio share to the euro area.

³⁷We use the log ratio as the dependent variable to maximize comparability with the earlier specifications. However, the results are materially the same if we alternatively use the ratio in levels as the dependent variable.

³⁸Most obviously, the US faces a more restricted menu of international assets than a small economy, since its domestic bond market represents such a large fraction of total global bond market capitalisation. While domestic bond market capitalization might be a preferable scaling variable, data limitations mean that we employ GDP as a widely-available alternative.

The regression with all variables in column (5) renders each individually insignificant, due to the high collinearity among several of the regressors. In summary, the message from Table 12 is that the euro area is most important as a bond investment destination for larger external countries that are geographically close and have important import linkages to the euro area.

4.5 External Bond Investment in EMU Member Countries: Sources of Heterogeneity

In Table 13, we examine which bilateral factors are important in determining asymmetries in the distribution of inward investment across the individual member countries of the euro area.³⁹ For this purpose, we again use a “double fixed effects” specification⁴⁰

$$\log(BOND_{ij}) = \phi_i + \phi_j + \gamma \log(IMP_{ij}) + \beta Z_{ij} + \varepsilon_{ij} \quad j \in \{EMU\} \quad (6)$$

As before, we start in column (1) by just including imports as a regressor, which is significantly positive.⁴¹ Taken together with the results from Table 9, the trade links between a source country and the euro area not only influence its overall level of bond investment but also its distribution across EMU member countries, with investors favouring their most important trading partners. The import variable remains robustly significant across the expanded specifications in columns (2)-(6).

Distance is added in column (2). However, differences in distance between a given source country and the various member countries are not important in explaining the distribution of investment across the euro area. This finding is re-confirmed in columns (3)-(6). The common language and colonial dummies are added in column (3) but are insignificant. The correlation in growth rates is included in column (4). This variable is significant but with a positive sign: external investors focus on those member countries with more similar growth cycles.

The institutional similarity dummies for tax treaties and common legal origin are sequentially added in columns (5) and (6) but neither is significant. The common language dummy acquires marginal significance in the smaller sample in column (6), while the growth correlation loses

³⁹We exclude Luxembourg as a destination country. From Tables 5 and 6, Luxembourg is especially important as a destination for Japan.

⁴⁰Scaling factors are incorporated into the country dummies such that we can return to the log-level specification.

⁴¹If the fixed effects are excluded, the estimated imports coefficient is 0.68 ($t = 10.57$) and the $adj.R^2 = 0.26$.

importance. Overall, the main finding from Table 13 is that there is a robust relation between differences in the intensity of trade linkages between source countries and the various EMU member countries and the distribution of bond investment across the euro area. In addition, there is mixed evidence as to the explanatory power of speaking a common language and the bilateral correlation in growth rates.

4.6 Overall Summary of the Empirical Results

The econometric results in Tables 7-13 present a reasonably consistent pattern in terms of the distribution of international bond holdings among the euro area and its external financial partners. One striking pattern is the positive connection between trade linkages and financial linkages in explaining asymmetries across EMU member countries in terms of their outward and inward bond investments vis-a-vis external counterparties. There is also considerable support for “euro area bias”: EMU member countries disproportionately invest in one another relative to other destinations. At the aggregate level, it is those countries physically closest to the euro area that are both the most important destinations and sources for external bond investment vis-a-vis the euro area.

5 Discussion and Extensions

Our results are strongly indicative that EMU has had a substantial impact on global bond portfolios. In both levels and differences, cross-investment among euro area members is substantially greater than among other country pairs, even controlling for other characteristics that may generate strong investment linkages across the euro area. As a caveat, the biggest source of uncertainty about our results is that the 2001 data are perhaps too premature to establish the full impact of EMU on international bond portfolios, to the extent that holdings are adjusted only gradually over time. To settle this question will require a longer span of data to become available, such that these specifications should be re-estimated as new releases of the CPIS become available.

A second message from our empirical work is that there are significant asymmetries across member countries in terms of the bilateral composition of their bond assets and liabilities. Another extension of this line of research is to push the analysis further by examining the extent to which the observed asymmetries in portfolios across euro area members and between the euro area and the

rest of the world materially contributes to asymmetries in wealth dynamics across these countries and regions. In this regard, the Argentina default provided an interesting localised example (Italian retail investors were the main European financial casualty in that episode.) However, in the event of a more widespread crisis in international financial markets, such asymmetries may pose a more serious problem at both the European and global levels in terms of the optimal design of policy responses.

Following Lane and Milesi-Ferretti (2004, 2005), this study has excluded external offshore centers from the analysis. In future research, it would be interesting to investigate the role played by these various locations in international financial transactions involving the euro area: for instance, how much of Dutch investment in the Cayman Islands is a round-trip deal that has the euro area (or indeed the Netherlands itself) as the final destination? Relative to the results for equity portfolios reported by Lane and Milesi-Ferretti (2005), there is a high degree of similarity between the determinants of the euro area's bond and equity portfolios. However, a noteworthy difference is that the import variable is more highly significant in explaining the composition of the euro area's aggregate external equity portfolio than for its external bond portfolio. This is intuitively sensible in view of the larger role played by risk-related performance factors in determining the returns on equities relative to bonds.

Finally, this study did find that bilateral exchange rate stability was important in explaining the bilateral bond allocations of the group of high-income countries. However, we did not find an important role for bilateral exchange rate stability vis-a-vis the euro in determining the aggregate level of external bond investment in the euro area or the distribution of the euro area's aggregate external bond holdings. This is explained by the fact that the euro area's major financial partners are split between countries that either float or are aligned to the US dollar (e.g. Singapore and Hong Kong) and those countries in the broad European sphere with currencies that fluctuate little against the euro.

A more nuanced analysis of the relation between exchange rates and portfolio structures will again only be possible with a longer span of data. For instance, over time it should be possible to address such questions as whether the emergence of the euro as an important international currency for financial trade has raised the importance of the euro in the currency baskets that are targeted in the monetary policies of emerging market economies.⁴²

6 Conclusions

This paper has exploited the IMF's Coordinated Portfolio Investment Survey to build a profile of the euro area as both a source and destination for international bond investment. We have documented the importance of the aggregate euro area in global bond markets but highlighted that there are substantial asymmetries in the external patterns of outward and inward investment with respect to the individual member countries.

Moreover, our econometric work has generated a number of systematic patterns in the data. In line with some recent theoretical contributions, trade linkages and informational barriers that are increasing with bilateral distance appear to be influential in determining the cross-country allocation of bond holdings. Even taking into account the close real linkages among euro area countries, the high level of intra-area cross-border bond investment provides suggestive evidence that “euro area bias” is a powerful influence in the composition of the international bond holdings of EMU member countries. These results support the notion that financial globalization is not a uniform process and that financial regionalization is, at least at the moment, a relatively stronger force.

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Table 1: International Bond Holdings of EMU Member Countries

	Total Value	Value/ GDP	Intra Share	Extra Share
Euro Area	2356160	38.5	62.3	37.7
Austria	77848	41.0	64.0	36.0
Belgium	163865	71.9	75.5	24.5
France	446914	34.1	60.9	39.1
Germany	394597	21.3	66.2	33.8
Italy	268386	24.6	56.7	43.3
Luxembourg	404364	2098.8	61.9	38.1
Netherlands	242306	63.0	67.4	32.6
Finland	34214	28.3	76.7	23.3
Greece	5993	5.1	36.4	63.6
Ireland	186784	182.2	43.0	57.0
Portugal	30949	28.1	58.6	41.4
Spain	99939	17.1	69.4	30.6
Min	5993	5.1	36.4	23.3
Max	446914	2098.8	76.7	63.6
Range	440921	2093.7	40.2	40.2

Total value is in millions of US dollars.

Table 2: The Major External Destinations for Bond Investments by EMU Member Countries

	US	UK	Japan	Oth. Europe	Oth. Asia	Latin America
Euro Area	37.0	18.2	3.6	12.5	0.9	4.6
Austria	27.8	14.9	2.0	21.6	0.9	4.5
Belgium	46.5	15.6	2.7	15.0	0.7	1.6
France	36.4	19.8	5.7	7.5	1.0	1.8
Germany	26.2	21.0	3.5	20.7	1.0	4.3
Italy	30.6	14.8	1.6	7.8	0.6	17.4
Luxembourg	39.3	13.8	4.2	17.3	1.3	3.2
Netherlands	59.9	14.2	3.2	10.3	0.9	2.5
Finland	39.9	19.4	0.1	29.5	0.01	-
Greece	26.3	21.0	0.1	9.6	0.1	0.3
Ireland	43.1	28.4	4.4	6.7	0.6	0.7
Portugal	18.2	13.6	0.1	15.4	0.3	4.4
Spain	25.3	13.9	0.7	9.6	0.5	4.0
Min	18.2	13.6	0.1	6.7	0.01	-
Max	59.9	28.4	5.7	29.5	1.3	17.4
Range	41.7	14.7	5.7	22.8	1.3	17.4

The numbers refer to share of each country or region in the external bond portfolios of the euro area and the individual member countries.

Table 3: External Bond Holdings in Emerging Markets: A Comparison of the US and Euro Area

	Euro Area	US
Mexico	10.5	25.6
Brazil	14.2	13.2
Argentina	14.2	4.1
Russia	6.4	6.4
Hungary	9.0	0.4
Korea	4.0	5.6
Turkey	7.7	1.4
Israel	0.6	8.1
Poland	4.8	2.2
Venezuela	3.0	3.8
Chile	0.4	4.2
Philippines	1.5	3.0
Colombia	1.5	3.0
South Africa	2.1	1.3
Hong Kong	1.2	2.2

The numbers refer to share of each country or region in the external bond portfolios of the euro area and the individual member countries.

Table 4: The Major External Bond Investors in the Euro Area

	Total Liab.	Liab./GDP	Euro Share	Euro Composition
Euro Area	956074	15.63	32.8	100
Japan	312667	5.11	32.5	32.7
UK	268529	4.39	41.9	28.1
US	135147	2.21	27.6	14.1
Switzerland	103980	1.70	46.3	10.9
Norway	24928	0.41	42.8	2.6
Denmark	18418	0.30	52.6	1.9
Sweden	17474	0.29	45.2	1.8
Hong Kong	12440	0.20	15.6	1.3
Singapore	10183	0.17	23.7	1.1
Canada	2178	0.04	12.9	0.2
Australia	1739	0.03	12.1	0.2
Czech Rep.	1475	0.02	53.9	0.2
Bahrain	1456	0.02	14.4	0.2
Malta	1096	0.02	40.3	0.1

Total liabilities are in millions of US dollars. Liab./GDP measures liabilities relative to the GDP of the Euro Area. Euro Share refers to the share of the euro area in the total international bond portfolio of the reporting country. Euro Composition refers to the share of each reporting country in the total bond liabilities of the Euro Area.

Table 5: International Bond Investment in EMU Member Countries

	Total Value	Value/ GDP	Intra Share	Extra Share
Euro Area	2644717	43.2	60.6	39.4
Austria	105252	55.5	70.5	29.5
Belgium	96677	42.4	79.3	20.7
France	330614	25.2	52.9	47.1
Germany	802951	43.3	54.8	45.2
Italy	427682	39.1	67.9	32.1
Luxembourg	133313	692.0	40.5	59.5
Netherlands	372619	96.9	62.2	37.8
Finland	37731	31.2	56.4	43.6
Greece	61182	52.2	75.6	24.4
Ireland	67471	65.8	39.2	60.8
Portugal	44379	40.3	80.5	19.5
Spain	164846	28.2	75.1	24.9

Total value is in millions of US dollars.

Table 6: Major External Bond Investors in EMU Member Countries

	Japan	UK	US	Switz.	Other
Austria	21.5	15.3	7.4	41.4	14.4
Belgium	28.7	26.5	18.3	10.5	16.1
France	38.0	23.4	17.8	9.5	11.2
Germany	33.0	25.1	13.6	11.5	16.9
Italy	23.7	50.5	9.6	3.1	13.2
Luxembourg	51.8	16.0	10.3	10.9	11.0
Netherlands	25.5	26.5	20.5	17.3	10.3
Finland	26.5	19.4	20.1	10.7	23.3
Greece	14.4	61.7	11.2	1.5	11.2
Ireland	57.5	21.9	7.1	4.0	9.6
Portugal	16.6	48.8	6.0	3.0	25.6
Spain	26.7	26.0	17.6	4.3	25.4
Max	57.5	61.7	20.5	41.4	25.6
Min	14.4	15.3	6.0	1.5	9.6
Range	43.1	46.4	14.4	39.9	16.0

The numbers refer to the share of each country or region in the total external liabilities of the EMU member countries.

Table 7: Is there a Euro Bias?

	(1)	(2)	(3)	(4)	(5)
Euro Dummy	1.66 (8.61)***	0.83 (3.95)***	0.97 (4.68)***	1.01 (4.88)***	0.68 (3.09)***
Log(Imports)		0.18 (6.25)***	0.11 (3.7)***	0.14 (4.47)***	0.18 (2.61)***
VOL(ER)		-0.18 (3.69)***	-0.06 (1.17)	-0.06 (1.18)	-0.25 (2.62)***
EU Dummy		0.45 (2.11)**	0.2 (.94)	0.21 (1.0)	-0.08 (.33)
Border		0.53 (2.64)***	-0.004 (.02)	-0.004 (.02)	-0.4 (1.86)*
Log(Distance)			-0.50 (5.21)***	-0.47 (4.93)***	-0.47 (3.6)***
Colony			-0.07 (.4)	-0.08 (.42)	0.22 (.86)
Common Language			0.2 (2.03)**	0.20 (1.94)*	0.01 (.05)
Correl(Growth Rates)				-0.19 (1.56)	-0.43 (1.95)**
Tax Treaty				0.02 (.18)	0.36 (2.19)**
Common Legal Origin					0.56 (5.1)***
Number of observations	2730	2057	2057	2004	822
Number of sources	22	22	22	22	21
Number of destinations	182	158	158	153	48
Adj R2	0.83	0.87	0.87	0.87	0.87

Estimation is by pooled least squares, with “double fixed effects.” Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. See Appendix B for the definitions and data sources for the variables.

Table 8: Changes in Holdings for EMU Member Countries 1997 to 2001

	World	Euro Area
Austria	103.7	170.6
Belgium	90.5	138.7
France	124.4	192.7
Germany		
Italy	78.6	349.4
Luxembourg		
Netherlands	112.0	106.4
Finland	344.6	1064.0
Greece		
Ireland	216.8	219.4
Portugal	124.6	196.8
Spain	317.4	914.7

Percentage growth in each country's international bond holdings: aggregate and in other euro area countries.

Table 9: Is there a Euro Bias? Changes in Holdings, 1997 to 2001

	(1)	(2)	(3)	(4)	(5)
Euro Dummy	0.53 (3.61)***	0.69 (3.78)***	0.69 (3.8)***	0.67 (3.61)***	0.74 (3.32)***
Log(Imports)		0.03 (1.18)	0.02 (1.01)	0.02 (.99)	0.09 (2.92)***
VOL(ER)		-0.11 (1.8)*	-0.09 (1.48)	-0.1 (1.53)	0.1 (.01)
EU Dummy		-0.15 (.87)	-0.27 (1.34)	-0.27 (1.31)	-0.18 (.75)
Border		-0.37 (2.3)**	-0.58 (3.07)***	-0.56 (2.91)***	-0.43 (2.21)**
Log(Distance)			-0.13 (1.87)*	-0.13 (1.75)*	0.03 (.32)
Colony			0.01 (.08)	-0.03 (.17)	-0.24 (.97)
Common Language			0.08 (.9)	0.10 (1.02)	-0.03 (.17)
Correl(Growth Rates)				0.05 (.43)	-0.13 (.64)
Tax Treaty				0.07 (.82)	0.22 (1.42)
Common Legal Origin					0.34 (3.22)***
Number of observations	2283	1633	1633	1591	663
Number of sources	19	19	19	19	18
Number of destinations	182	158	158	153	48
Adj R2	0.23	0.29	0.29	0.28	0.33

Estimation is by pooled least squares, with “double fixed effects.” Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. See Appendix B for the definitions and data sources for the variables.

Table 10: The Distribution of the Euro Area's External Bond Holdings

	(1)	(2)	(3)	(4)	(5)	(6)
Log(Bond Scale)	1.01 (4.32)***	0.96 (4.55)***	0.93 (4.71)***	0.96 (4.52)***	0.86 (4.6)***	0.89 (4.35)***
Log(GDP)	0.34 (1.32)	0.05 (.18)	0.66 (2.31)**	0.66 (2.24)**	0.78 (2.86)***	0.78 (2.68)***
Log(Imports)		0.41 (2.37)**	-0.18 (1.27)	-0.18 (1.29)	-0.28 (1.75)*	-0.28 (1.74)*
Log(Distance)			-0.99 (5.26)***	-1.05 (4.6)***	-0.49 (1.54)	-0.54 (1.65)
VOL(ER)				6.1 (.4)		3.4 (.21)
Cor(Growth)				-0.46 (.59)		-0.41 (.54)
Europe					1.41 (1.86)*	1.36 (1.77)*
Colony					-0.03 (.07)	-0.04 (.08)
#OBS	62	62	62	62	62	62
Adj R2	0.66	0.68	0.76	0.76	0.76	0.76

Estimation is by least squares. Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. See Appendix B for the definitions and data sources for the variables.

Table 11: Heterogeneity in the External Bond Portfolios of EMU Member Countries

	(1)	(2)	(3)	(4)	(5)
Log(Imports)	0.22 (7.29)***	0.21 (6.97)***	0.22 (6.85)***	0.22 (6.84)***	0.31 (2.36)**
Log(Distance)		0.08 (1.64)	0.11 (1.87)*	0.1 (1.7)*	0.32 (2.44)**
Colony		-0.18 (.81)	-0.16 (.65)	-0.16 (.66)	1.4 (2.71)***
ComLang		0.12 (.85)	0.14 (.88)	0.15 (.93)	-0.25 (.32)
Cor(Growth)			0.25 (2.32)**	0.25 (2.32)**	0.39 (1.42)
Tax Treaty				-0.1 (1.18)	0.11 (.53)
CLO					0.23 (1.0)
#OBS	2037	1537	1413	1413	305
#Sources	11	11	11	11	11
#Destinations	190	183	183	183	38
Adj R2	0.75	0.76	0.76	0.76	0.84

Estimation is by pooled least squares, with “double fixed effects.” Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively.

See Appendix B for the definitions and data sources for the variables.

Table 12: The Sources of External Bond Investment in the Euro Area

	(1)	(2)	(3)	(4)	(5)
Log(GDP)	0.02 (1.41)	0.02 (2.38)**	0.03 (1.79)*	0.025 (2.69)**	0.03 (1.55)
Import Share	0.13 (5.05)***	0.08 (2.1)**	0.08 (1.93)*	0.07 (1.63)	0.07 (1.55)
Log(Distance)		-0.08 (5.88)***	-0.08 (4.14)***	-0.03 (0.96)	-0.04 (.96)
VOL(ER)			-0.57 (.31)		-0.68 (.32)
Cor(Growth)			-0.04 (.44)		-0.04 (.33)
Europe				0.13 (1.44)	0.12 (1.3)
Colony				-0.005 (.16)	0.003 (.06)
#OBS	38	38	38	38	38
Adj R2	0.11	0.49	0.46	0.50	0.47

Estimation is by least squares. Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. See Appendix B for the definitions and data sources for the variables.

Table 13: External Bond Investment in EMU Member Countries: Sources of Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)
Log(Imports)	0.34 (3.77)***	0.29 (2.81)***	0.25 (2.52)**	0.28 (2.49)**	0.28 (2.45)**	0.26 (2.0)**
Log(Distance)		-0.32 (1.39)	-0.26 (1.11)	-0.29 (1.27)	-0.28 (1.16)	0.10 (.36)
ComLang			0.4 (1.19)	0.33 (1.07)	0.32 (1.06)	0.69 (1.72)*
Colony			0.24 (.55)	0.21 (.46)	0.23 (.49)	0.7 (1.28)
Cor(Growth)				0.77 (2.07)**	0.76 (2.03)**	0.31 (.68)
Tax Treaty					-0.07 (.27)	-0.18 (.55)
CLO						0.02 (.12)
#OBS	404	403	381	381	381	291
#Sources	48	48	45	45	45	36
#Destinations	11	11	11	11	11	11
Adj R2	0.84	0.84	0.84	0.85	0.85	0.87

Estimation is by pooled least squares, with “double fixed effects.” Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. See Appendix B for the definitions and data sources for the variables.

Appendix

A Countries and regions participating in the 2001 Coordinated Portfolio Investment Survey

Argentina, Aruba, Australia, Austria, the Bahamas, Bahrain, Belgium, Bermuda, Brazil, Bulgaria, Canada, Cayman Islands, Chile, Colombia, Costa Rica, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Guernsey, Hong Kong SAR of China, Hungary, Iceland, Indonesia, Ireland, Isle of Man, Israel, Italy, Japan, Jersey, Kazakhstan, Republic of Korea, Lebanon, Luxembourg, Macao SAR of China, Malaysia, Malta, Mauritius, Netherlands, Netherlands Antilles, New Zealand, Norway, Panama, Philippines, Poland, Portugal, Romania, Russian Federation, Singapore, Slovak Republic, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Kingdom, United States, Uruguay, Vanuatu, Venezuela.

B Data Sources

This paper largely draws upon the databank constructed by Lane and Milesi-Ferretti (2004).

Long-term debt securities: issued by host country residents and held by source country residents.

Source: 2001 Coordinated Portfolio Investment Survey.

Total international bond issues. Source: BIS.

Source-country imports: Imports of goods by source countries from host countries (average 1997-2001). Source, International Monetary Fund, Direction of Trade Statistics. For external source countries, imports from the euro area is the sum of imports from the individual member countries.

Distance: logarithm of Great Circle distance in miles between the capital cities of source and host country. Source: Rose and Spiegel (2004).

Correlation in growth rates: correlation between the GDP growth rate in the source and host country. Source: authors' calculations based on World Bank, World Development Indicators.

Common legal origin: Dummy variable taking the value of 1 if source and host countries have a legal system with a common origin (common law, French, German, or Scandinavian). Source: authors' elaborations based on La Porta, López de Silanes, and Shleifer (2003).

Exchange Rate Volatility. Exchange rate data are from IFS. Measured as standard deviation of monthly log difference in the bilateral nominal exchange rate over 1998-2001.

Tax treaty: dummy variable taking the value of 1 if the source and host country have a tax treaty enacted prior to 1999. Source: authors' elaborations based on treaty data taken from www.unctad.org.

Common Language: dummy taking the value of 1 if source and host country share a common language. For aggregate euro area, this takes value 1 if the partner shares a common language with any EMU member country. Source: Rose and Spiegel (2004).

Colony dummy: dummy taking the value of 1 if source and host country ever had a colonial relationship. For aggregate euro area, this takes value 1 if the partner shares a colonial history with any EMU member country. Source: Rose and Spiegel (2004).

Europe dummy: dummy taking the value of 1 if the country is a member of 'broad Europe', defined by inclusion in the European football championship.

Euro dummy: takes the value 1 if both source and host countries are members of the euro area.

EU dummy: takes the value 1 if both source and host countries are members of the European Union.

C Robustness Check

Table C.1 allows distance to enter in a non-linear format. The levels specifications of columns (3)-(5) in Table 7 is extended in columns (1)-(3) of Table C.1; the difference specifications of columns (3)-(5) in Table 9 is extended in columns (4)-(6) of Table C.1.

Table C.1: Is there a Euro Bias? Check for Non-Linear Distance Effect

	(1)	(2)	(3)	(4)	(5)	(6)
Euro Dummy	0.97 (4.67)***	1.01 (4.83)***	0.67 (3.07)***	0.7 (3.84)***	0.68 (3.63)***	0.73 (3.27)***
Log(Imports)	0.11 (3.83)***	0.14 (4.59)***	0.17 (2.48)***	0.02 (.89)	0.02 (.84)	0.09 (3.04)***
VOL(ER)	-0.06 (1.2)	-0.06 (1.21)	-0.26 (2.7)***	-0.08 (1.35)	-0.09 (1.39)	-1.15 (.12)
EU Dummy	0.18 (.81)	0.19 (.88)	-0.08 (.32)	-0.3 (1.46)	-0.3 (1.45)	-0.17 (.73)
Border	-0.29 (1.04)	-0.28 (1.02)	-0.32 (1.32)	-0.76 (3.08)***	-0.77 (3.07)***	-0.32 (1.52)**
Log(Distance)	-2.14 (2.58)***	-2.12 (2.53)**	0.03 (.03)	-1.16 (1.48)	-1.32 (1.67)*	0.63 (.83)
Log(Distance) ²	0.11 (1.98)**	0.11 (1.96)**	-0.03 (.54)	0.07 (1.35)	0.08 (.92)	-0.04 (.79)
Colony	-0.07 (.4)	-0.08 (.45)	0.21 (.86)	0.01 (.08)	-0.03 (.19)	-0.24 (.97)
Common Language	0.19 (1.88)*	0.18 (1.77)*	0.01 (.08)	0.08 (.83)	0.09 (.92)	-0.03 (.17)
Correl(Growth Rates)		-0.18 (1.43)	-0.43 (1.97)**		0.06 (.54)	-0.13 (.65)
Tax Treaty		0.04 (.46)	0.35 (2.06)**		0.09 (1.09)	0.21 (1.29)
Common Legal Origin			0.56 (5.1)***			0.35 (3.23)***
Number of observations	2057	2004	822	1633	1591	663
Number of sources	22	22	21	19	19	18
Number of destinations	158	153	48	158	153	48
Adj R2	0.87	0.87	0.87	0.29	0.28	0.33

Estimation is by pooled least squares, with “double fixed effects.” Heteroskedasticity-corrected t-statistics are in parentheses. ***, **, * refer to 1, 5 and 10 percent significance levels respectively. Columns (1)-(3) report levels specification; columns (4)-(6) report the differences specification. See Appendix B for the definitions and data sources for the variables.

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