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Philip R. Lane

IIS and Economics Department, TCD

CEPR

Gian Maria Milesi-Ferretti

International Monetary Fund

CEPR



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Gian Maria Milesi-Ferretti

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The International Equity Holdings of Euro Area Investors *

Philip R. Lane
IIIS and Economics Department, TCD;
and CEPR

Gian Maria Milesi-Ferretti
International Monetary Fund and CEPR

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Abstract

We provide a systematic analysis of bilateral, source and host factors driving portfolio equity investment by euro-area countries, using newly-released data on international equity holdings at the end of 2001. We find that bilateral equity holdings are strongly linked to bilateral trade in goods and services and are also associated with proxies for informational proximity. We further document that there exists a significant “euro-area bias”, with euro-area countries investing in other euro-area countries over and above the amount predicted by underlying fundamentals.

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I. INTRODUCTION

The integration of euro-area financial markets since the launch of the euro in 1999 has been at the center of attention in the policy debate and academic literature. This paper complements this much-explored line of research by examining a subject that has attracted much less attention—namely, the characteristics of the euro area’s external portfolio investment, and particularly the geographical allocation of the international equity portfolios held by euro area investors.¹

The geography of the euro area’s external equity holdings is important for several reasons. First, the level of holdings in each international market is a direct determinant of the euro area’s exposure to external financial shocks. Second, it is also useful to assess whether international investment provides diversification against internal risks. Third, differences in the composition of international portfolios between the euro area and other major economic blocs (e.g. the United States and Japan) may generate asymmetric responses to international financial crises or global shocks, that in turn may pose a challenge for coordinated management of the international financial system.

Our empirical work is made possible by the release of the International Monetary Fund’s Coordinated Portfolio Investment Survey (CPIS). This dataset, described more in detail in Section II, provides a unique perspective on the geographical patterns of international portfolio holdings for most major international investors, including the entire euro area.

We analyze the international equity holdings of euro area investors from several different perspectives. We examine the external holdings of the aggregate euro area, as well as those of individual euro area members. We first ask the question of whether (all else equal) euro area members are more likely to invest in each other, and then investigate whether member countries have significantly different investment patterns in terms of extra-euro area holdings. The former exercise is a simple test of whether the move to a single currency has led (at least so far) to increased intra-union equity market integration; if the latter reveals substantial heterogeneity across member nations, this may be a source of asymmetric wealth dynamics across the euro area.

Our main findings can be summarized as follows. At the end of 2001, the euro area was already a major portfolio equity investor—larger than the United States, if intra-euro area equity holdings are not netted out. With regard to bilateral investment holdings, some interesting patterns emerge: in particular, the importance of Luxembourg as both as an international portfolio investor and the recipient of significant portfolio equity investment from some euro-area countries (such as Belgium, Germany, and Italy).

¹ See Baele et al. (2004) on the current state of financial integration within the euro area and Anderton et al. (2004) for a general review of the euro area’s external financial linkages.

Holdings by euro-area countries outside the euro area appear to be associated with host countries' stock market size, bilateral trade links, and proxies for 'cultural proximity'. We also find evidence that, in comparison with other OECD countries, euro-area countries tend to invest in each other substantially more than underlying trade patterns and other fundamentals would suggest.

As is discussed later in the paper, this contribution applies underlying conceptual and empirical frameworks developed by Lane and Milesi-Ferretti (2004). A number of other recent papers have also examined the pattern of bilateral portfolio equity investment. For example, Yildirim (2003) focuses on the role of various corporate governance indicators in explaining bilateral investment patterns. Bertaut and Kole (2004) underline in particular the fact that most countries are 'underweight' in their holdings of U.S. stocks, as compared to other international asset holdings, while Aviat and Coeurdacier (2004) jointly study trade in goods and assets in a simultaneous equations framework, using bilateral data on bank loans as well as portfolio holdings. Finally, Vlachos (2004) explores the importance of regulatory harmonization for bilateral patterns in portfolio holdings.

Some other papers have focused more specifically on the bilateral investment patterns of individual countries: the United States (Ahearne, Grier, and Warnock (2004), Mann and Meade (2002); Dahlquist, Pinkowitz, Stulz, and Williamson (2003)) and Ireland (Honohan and Lane (2000)). We discuss their findings in Section IV, when presenting the results for the determinants of bilateral investment patterns for the euro area as a whole.

The structure of the rest of the paper is as follows. Section II reviews the theoretical literature. Section III briefly describes the dataset, and section IV provides some stylized facts on the geographical distribution of international portfolio equity holdings. Section V presents the empirical analysis, focusing first on the geographical allocation of aggregate euro-area holdings, and subsequently on the determinants of bilateral portfolio equity holdings by euro-area countries outside the euro area, as well as on the determinants of equity holdings by the entire set of OECD countries. Section VI provides some concluding remarks.

II. THEORETICAL FRAMEWORK

In laying out a theoretical framework, we follow the analysis in Lane and Milesi-Ferretti (2004). We first discuss an approach that highlights frictions in product markets rather than capital markets in explaining asymmetric portfolios, before turning to theories that rather attribute heterogeneous portfolios to financial and informational frictions.

Regarding the former, Obstfeld and Rogoff (2001) construct a two-country model showing that the existence of trading costs (or, equivalently, heterogeneous preferences) in product markets naturally generates a home bias in equity positions, even if global financial markets are complete. Subsequently, Lane and Milesi-Ferretti (2004) have extended this model to an N-country setting. The intuition is that such trade frictions in product markets generate differences in consumption patterns across countries which, in turn, imply that investors face

heterogeneous country-specific risk profiles: an investor in country A cares much more about a productivity shock in country B than in country C, if her consumption relies on imports from country B but not on imports from country C. Moreover, under certain conditions, the optimal hedge is to tilt national portfolios towards those countries that feature most prominently in the basket of imports.

In terms of frictions in asset markets, Cooper and Kaplanis (1986) and Martin and Rey (2004) develop models in which investment costs vary on a bilateral basis.² A natural interpretation is that such cost variation is generated by informational barriers that vary across country pairs, due to differences in factors such as language, cultural linkages and institutional commonalities.

Another form of asset market imperfection relates to the inability to hedge all types of risk. Davis, Nalewaik and Willen (2001) focus on domestic labor income as a form of endowment risk that cannot be directly laid off in financial markets. In such an environment, differences in the pattern of labor income risk across countries imply that investors will optimally select different international portfolios, since the covariances between domestic income and the returns on the various international stockmarkets will be a key determinant of portfolios.

These theoretical contributions provide a guide to our empirical work. Overall, they suggest that bilateral equity holdings should be related to the size of source-country imports from the destination country, to proxies for informational and institutional barriers to bilateral asset trade, and to the pattern of covariances between source-country income and stock market returns in the destination countries.

III. THE COORDINATED PORTFOLIO INVESTMENT SURVEY

A. The Dataset

Our data on asset holdings are drawn from the Coordinated Portfolio Investment Survey (CPIS) that is managed by the International Monetary Fund.³ This dataset reports portfolio holdings for 1997, 2001 and 2002 for each participating country, with the geographical decomposition across 218 destination countries/territories. We focus on the 2001 data, since the 1997 survey was based on a narrower set of investor nations, while the 2002 data are in some cases derived from an extrapolation of the 2001 benchmark survey data rather than representing truly 'new' data.

² See also the application in Martin and Rey (2000). The working paper version of Ahearne et al (2004) provides a useful account of the model originally developed by Cooper and Kaplanis (1986).

³ The data are available at <http://www.imf.org/external/np/sta/pi/datars1.htm>.

While the CPIS represents a major advance in availability of data on bilateral investment positions, Lane and Milesi-Ferretti (2004) highlight a number of limitations that are relevant for the euro area. First, there may be under-reporting of assets by CPIS participants. For example, the German survey did not cover holdings by households. As a result, the portfolio assets reported in the CPIS survey (US\$800 billion), are over US\$200 billion lower than those reported in the International Investment Position (which are estimated making use of flow data, and therefore include household holdings as well). Under-reporting is also likely to occur, more generally, for assets held in offshore centers for tax shelter reasons. Second, the bilateral data can be distorted by third-party holdings, by which a resident in country A holds securities in country B through an institution residing in country C. This intermediation is filtered out of the data if the end investors are surveyed; however, there will be mis-measurement if the surveys are based on custodians. Third, the CPIS is still in its infancy and it is surely the case that not all countries have successfully implemented best-practice collection methods.

B. The Major Investor Nations

Table 1 lists the largest foreign investors as reported by the 2001 survey, as well as some estimates of portfolio equity holdings at end-2003. Focusing first on the 2001 data, the total recorded level of portfolio equity investment in the CPIS was US\$5.16 trillion. If intra-euro area holdings are included, the total portfolio equity holdings of the euro area exceed those of the United States. If we exclude intra-euro area holdings (over US\$800 billion) the euro area becomes the second largest foreign portfolio equity investor, with portfolio equity assets equal to about 15 percent of euro-area GDP (as opposed to 16 percent of GDP in the United States).

As shown in the second column of Table 1, these general patterns also apply to the stocks of aggregate portfolio equity holdings at the end of 2003 (as captured in the International Investment Positions data)—once again, total euro-area equity assets are larger than U.S. holdings if intra-euro area holdings are not netted out, and are equivalent to around 30 percent of the area's GDP.

C. Portfolio equity holdings by euro-area countries

The total holdings of individual euro area countries are listed in the first column of Table 2. In particular, the size of Luxembourg's portfolio equity holdings, associated with this country's role as a financial center, is remarkable—they are the second largest in the euro area and the fourth largest among all world's reporting countries. The second column in Table 2 shows average per-capita values for international portfolio equity investment: for the euro area as a whole, the average per capita value is \$5,700. However, this obscures a considerable range, from a maximum of \$725,000 for Luxembourg to a minimum of just \$100 in Greece. The last two columns shows the allocation of international equity holdings between fellow euro-area members and extra-euro area destinations. The extent of 'euro area bias' is considerable: 48 percent of cross-border equity investments by euro area members

are in other member countries. Again, there is considerable cross-country heterogeneity: the euro area bias is 79 percent for Belgium but only 25 percent for Ireland.

When studying the geographical allocation of portfolio equity investment of individual euro-area countries, it is important to keep one key factor in mind—namely, the remarkable importance of investment in small financial centers, particularly Luxembourg. For example, assets held in offshore and financial centers are over 40 percent of total portfolio equity assets for Belgium and Italy, and over 25 percent in Germany (almost entirely reflecting holdings in Luxembourg).⁴ Clearly these centers are not the ultimate destination of investment; rather, they serve as intermediaries. It follows that the measured geographical allocation of portfolio equity investment by countries investing heavily in financial centers is unavoidably distorted. Interestingly, Belgium, Germany, and Italy emerge from Table 2 as countries with a strong ‘euro-area bias’, while Luxembourg’s investment is skewed towards countries outside the euro area. This suggests that part of the intra-euro area portfolio equity investment by Belgian, German, and Italian residents may actually have countries outside the euro area as the ultimate destination. More generally, devising methods to allocate, albeit roughly, equity investment in offshore centers to their ultimate destination is an important, if difficult, research objective.

D. Portfolio equity investment, country size, and stock market capitalization

Table 3 (reproduced from Lane and Milesi-Ferretti (2004)) provides a brief summary of the size of economies, their stock markets, and the share of domestic stocks owned by non residents for major international investors. A couple of interesting stylized facts emerge from this table. First, at end-2001 exchange rates and prices, the United Kingdom and the United States’ stock market capitalization largely exceeded their aggregate weight in world GDP, while for the euro area its aggregate weight in world GDP exceeded its relative stock market capitalization. Second, the fraction of the domestic stock market held by non-resident portfolio investors was substantially higher in the euro area and the United Kingdom (over a third) than in the United States and Japan (13 and 17 percent, respectively).⁵

Table 4, also reproduced from Lane and Milesi-Ferretti (2004), summarizes the geographical distribution of portfolio equity investment among the main advanced economies by comparing the share of foreign equity investment in the host country with the share of the host country’s stock market capitalization in the rest of the world’s stock market capitalization. We use the latter as a simple predictive benchmark for the allocation of foreign portfolio equity investment. Japan’s foreign equity investment is the most closely

⁴ Indeed, Luxembourg is the *primary* destination for portfolio equity investment undertaken by Belgian, German, Greek, Italian, and Portuguese residents.

⁵ Note that Table 4 only reports domestic shares owned by portfolio equity investors (who by definition hold participations below 10 percent). Adding the shares held by direct investors would increase the measured size of non-resident ownership of domestic shares.

aligned with the benchmark, while the least closely aligned is the United Kingdom, which invests much more in the euro area than in the United States. The euro area has higher than predicted investment in the rest of the world and especially in the United Kingdom, and lower than predicted investment in Japan and the United States. Finally, the United States is “overweight” in the United Kingdom and the rest of the world, and underweight in the euro area and especially in Japan.

E. Geographical allocation of euro area portfolio equity investment

Tables 5 and 6 focus on portfolio equity assets held by euro-area residents outside the euro area. Table 5 presents the geographical allocation across major regions. Relative to the shares in non-euro area aggregate stock market capitalization (the final row in the table), the portfolios of euro area members show considerable deviations. For the aggregate euro area, there is under-investment (relative to the benchmark) in the United States, Japan and the rest of Asia and over-investment in the United Kingdom and Latin America. The Netherlands is closest to the benchmark allocation but Greece, Ireland, and Spain have heavily skewed portfolios, with these countries in particular over-weighting the United Kingdom. It is also noteworthy that the Iberian countries are the heaviest investors in Latin America.

A more detailed breakdown of the destination of the euro area’s external investments, which includes all countries with at least 0.1 percent of the aggregate euro area portfolio of extra-euro area holdings, is provided in Table 6. This table highlights the strong bilateral variation in the data. For instance, Sweden accounts for portfolio shares that range from 0.6 percent (Greece) to a remarkable 29.6 percent (Finland), while the Swiss share ranges from 3.9 percent (Ireland) to 14.0 percent (Germany). Among the emerging market destinations, Portuguese holdings in Brazil and South Africa are especially high at 6.8 percent and 4.2 percent respectively of its total external portfolio, while Austria is heavily invested in Central and Eastern Europe.⁶

Taken together, the patterns highlighted so far demonstrate that the composition of the euro area’s international portfolio cannot be simply explained by the cross-country distribution of stock market capitalizations. Moreover, it is clear that there is considerable heterogeneity in the international portfolios of the individual euro area member countries. In the next section, we investigate the determinants of these spatial patterns using regression analysis.

IV. ECONOMETRIC ANALYSIS

We focus on a single cross-sectional observation for the structure of external equity portfolios for the year 2001.⁷

⁶ See also Bertaut and Kole (2004) on the Austrian data.

⁷ As noted in the introduction, the 1997 survey refers to a much smaller set of source countries; the newly-released results for end-2002 are highly correlated with the end-2001 positions.

A. Determinants of the International Equity Holdings of the Aggregate Euro area

We begin the empirical analysis by investigating the determinants of the spatial pattern in the international equity holdings of the aggregate euro area. The empirical specification is given by

$$\log(x_j^{euro}) = \alpha + \sigma \log(IMP_j^{euro}) + \gamma F_j^{euro} + \varepsilon_j^{euro} \quad (1)$$

where x_j^{euro} is the aggregate level of equity investment by euro-area countries in destination country j , IMP_j^{euro} is the aggregate level of euro-area imports from country j and F_j^{euro} is a vector of other country characteristics that influences the level of euro-area investment in country j . As discussed in Section II, Lane and Milesi-Ferretti (2004) develop a framework in which the level of bilateral trade plays an important role in the design of optimal portfolios; trade also plays a role as an informational variable. The vector F_j^{euro} comprises a set of variables that may proxy for financial and informational frictions.

The results are given in Table 7. As a benchmark, the specification in column (1) just includes stock market capitalization as a regressor: if spatial allocations just reflected each country's share in global market capitalization, this variable should enter with a unitary coefficient and have complete explanatory power. In this simple regression, it turns out the simple elasticity of bilateral holdings with respect to market capitalization is indeed unitary, highly significant, and with substantial explanatory power—the adjusted R^2 is 0.82.⁸

Regressions in column (2)-(5) add additional controls that may help explain the remaining proportion of the cross-sectional variation. In column (2), the volume of euro area imports from the destination country is added to the specification. Bilateral trade may matter for a variety of reasons. Following the theoretical discussion in section II, purchasing the equity of a trading partner may act as a hedge against consumption risk emanating to shocks to imports from that country. However, more generally, trade linkages may also increase familiarity with a given destination, influencing portfolio decisions for informational reasons. The estimates in column (2) indeed show that imports are significant in explaining the spatial allocation of euro-area investment; the inclusion of imports also leads to a reduction in the point estimate and significance level for the stock market capitalization variable. These results remain stable in the broader specifications in columns (3)-(5).⁹

⁸ The results are essentially unchanged if the largest destination country (the United States) is dropped from the sample.

⁹ The estimated coefficient is in the range (0.95-0.99) in columns (2)-(5), which is close to the unitary coefficient predicted by the model of Lane and Milesi-Ferretti (2004).

The specification is further extended in column (3) to include two informational proxies (distance and a “Euro Culture” dummy), plus a dummy for financial center destinations.¹⁰ The “Euro Culture” dummy takes the value 1 if a major European language is in widespread use in the destination country and/or if the destination was a colonial relationship with a European country, and 0 otherwise. The results in column (3) show that the financial center dummy is quite significant, but neither distance nor “Euro Culture” dummy variables individually significant. The results for these variables are broadly similar in columns (4) and (5).

Column (4) adds the Sharpe ratio for the destination country to the specification: if returns are expected to persist, a history of a high return-risk ratio may boost inward investment. Indeed, the estimates in both columns (4) and (5) support this notion, with the Sharpe variable turning out to be significant. Finally, the correlation in output growth rates and the correlation in stock market returns between the destination country and Germany (as a proxy for the euro area) are also included in the specification in column (5).¹¹ Allocations that are driven by a diversification motive should be reflected in a negative sign on these correlation variables: while the stock market correlation variable enters negatively, the output correlation is significantly positive (but neither is individually significant).

Overall, Table 7 does a good job in explaining the spatial pattern in the aggregate euro area’s portfolio of external equity holdings, capturing 90 percent of the variation. In particular, deviations from the cross-country distribution of stock market capitalization are largely explained by trade linkages, a destination’s status as a financial center, and the Sharpe ratio.¹²

Other papers focusing on a single-country portfolio holdings have used somewhat different specifications. For example, Ahearne et al. (2004) use as dependent variable the degree of home bias, defined as one minus the ratio of the share of foreign equities in the United States’ and world portfolios. They find that the portion of a country’s portfolio that is listed in the U.S. is a key determinant of that country’s weight in U.S. portfolios. Dahlquist et al. (2003) find instead that the share of a country’s equity in the U.S. portfolio is much more

¹⁰ We also investigated two further distance-related variables: a dummy for European Union membership (i.e. picking up Denmark, Sweden and the United Kingdom) and the difference in time zones (i.e. the time difference between the destination and Central European time). Neither variable was significant and their inclusion did not alter any of the other results.

¹¹ We also tried the correlation between the foreign stock market return and the German output growth rate: this was insignificant and did not affect the results for the other regressors.

¹² Other potential regressors (capital controls; restrictions on foreign ownership; financial trading costs) were found not to be important. Such variables are likely highly correlated with the level of stock market capitalization that is included in all specifications.

strongly correlated with that country's weight in the world "float" portfolio (shares available to investors who are not controlling shareholders) than with the weight in the standard "world" portfolio.¹³ Finally, Honohan and Lane (2001) show that the geographical pattern of Ireland's international portfolio investment matches Irish trade patterns more closely than the destination countries' financial market size.

B. International Holdings by Individual Euro-Area Countries

We turn next to the exploration of possible heterogeneity across euro-area members in terms of their external investment patterns. To this end, we employ the specification developed by Lane and Milesi-Ferretti (2004):

$$\log(x_{ij}) = \phi_i + \phi_j + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \quad (2)$$

where the set of source countries $\{i\}$ is restricted to the euro-area member countries. Relative to the previous section, the panel nature of this setup allows us to include a double set of fixed effects (source- and host-country dummies), in addition to variables that vary along the bilateral dimension. The inclusion of source dummies means that we are not trying to explain why euro-area member countries may vary in the aggregate scale of their external holdings; we only focus on the geographical distribution of such holdings. The host dummies control instead for those characteristics of the destination countries that make a given country more or less generally attractive to all investors, regardless of origin. As such, this "double fixed effects" specification targets the reasons why particular bilateral portfolio shares may vary across the euro area. Since this specification means that only explanatory variables that have variation along both sample dimensions can be included in the regression, the effect of variables such as stock market capitalization, income per capita, country size are soaked up by the source and host country dummy variables.

All regressions in this and later sections exclude source and host offshore and small financial centers.¹⁴ These centers act primarily or exclusively as intermediaries, rather than being true sources or final destinations of investment. Ideally, we would wish to "re-allocate" the funds

¹³ In common with the Ahearne et al (2004) study, these authors study the US portfolio in 1997. We do not have updated data on the "free float" market capitalization for the countries in our study.

¹⁴ Among the euro-area source countries, we exclude Luxembourg. According to a decomposition by the Irish Central Statistical Office, a sizable fraction of Irish portfolio investment (close to 80 percent in 2001) is also undertaken in the International Financial Services Center. Excluding Ireland as well among source countries yields very similar results. A complete data appendix with a list of host countries and territories for each sample is available from the authors upon request.

invested by source economies in financial centers to their ultimate destination. However, this type of exercise is fraught with uncertainty, also given the limited available information on the pattern of investment of these centers.¹⁵ Nevertheless, to the extent that every dollar invested by a source country in a financial center is invested by the financial center in the same way as the average dollar invested abroad by the source country, the exclusion of such centers has no implications for the empirical analysis. This is the case since re-allocating holdings in offshore centers to their ultimate destinations would affect bilateral holdings only up to a common factor of proportionality. Given that the regressions are run in log form, this factor of proportionality would be soaked up by the fixed source-country effects. Be as it may, the exclusion of several financial centers is unavoidable, given the lack of data on macroeconomic variables, bilateral trade, and stock market capitalization and returns.

Table 8 displays the regression results. Panel least squares estimates are reported in columns (1) and (2); the results from the Tobit estimator are shown in columns (3) and (4). The Tobit estimates are included, since many of the observed bilateral observations are equal to zero and we want to allow for the possibility that these zero values reflect censoring. The specification in columns (1) and (3) includes the following bilateral variables: the level of imports by the source country from the host country; distance between the two countries; a common language dummy; a colony dummy; a tax treaty dummy; and the correlation in output growth rates.¹⁶

The specification in columns (2) and (4) is expanded to include some bilateral financial correlations (the correlation in stock market returns and the correlation between output growth in the source country and the stock market return in the destination country), plus a dummy variable that scores one if source and host countries share legal systems with common origins and zero otherwise. This broader specification comes at the price of a substantial decline in the number of available observations: restrictions on data availability mean that the number of these countries drops from 146 to 31 (and observations from 1035 to 285) with the addition of the financial correlation variables in columns (2) and (4). However, as shown in Table 9, the substantial reduction in sample size entails only a very modest reduction in the total size of equity holdings in the regression sample (less than 1 percent)—close to 600 of the 750 lost observations feature equity holdings equal to zero.

A number of patterns are evident across the specifications in columns (1)-(4) of Table 5. First, the variation in portfolio allocations by euro area member countries is significantly

¹⁵ An exception is Luxembourg, which reports in detail its international equity holdings.

¹⁶ See Lane and Milesi-Ferretti (2004) for a detailed discussion of this choice of explanatory variables. Relative to the specification in that paper, we do not include the time zone difference between source and destination countries, since there is very little difference in time zones across euro area member countries. We also drop a currency union dummy since there are no available observations for those destination countries that are in monetary unions with euro area member countries.

correlated with the relative importance of the various destination countries as trading partners: euro-area members systematically hold larger equity stakes in those extra-union countries that supply a lot of imports to them. This holds true even though a number of gravity-type variables are included in the regression, which are highly collinear with the pattern of bilateral trade.

Second, there is general support for the notion that informational variables are also important. Beyond the familiarity interpretation for the role of trade in determining portfolio decisions, the information hypothesis is also supported by the significantly negative effect of distance (in columns (1) and (3)) and especially the positive effect of the colony dummy, which is statistically and economically significant in all specifications.¹⁷ However, neither the common language dummy nor the tax treaty dummy offer any additional explanatory power.

Among the bilateral correlation variables, only the stock market correlation is significant. However, it is in fact significantly positive, which goes against a diversification motive for the determination of portfolio allocations. The evidence tends therefore to suggest that countries invest in hosts that have a more similar economic structure. The coefficient on the common legal origin dummy is not estimated precisely, and is statistically insignificant.¹⁸

In summary, the results in Table 8 show that the heterogeneity in the international portfolio allocations by euro area member countries can be related to structural differences in the relations between individual member countries and the various destination countries. A robust pattern is that financial linkages are positively associated with trade linkages, with additional explanatory power provided by informational variables (distance, colonial history).

C. Do Euro Area Members Invest Disproportionately in Each Other?

In order to address this question, we expand the sample in two directions. First, we include all industrial countries in the set of source countries $\{i\}$. Second, we include all available country pairs in the specification: that is, cross-border investments within the euro area in addition to extra-euro area holdings. In addition, we slightly adapt our specification

¹⁷ The fact that distance is significantly negative only in the wider sample, where over half of the total observations are zero, suggests that distance helps explain whether euro-area countries invest or not in a specific destination, but is less helpful in explaining the amount of investment.

¹⁸ The coefficient on common legal origin increases in size and becomes statistically significant if Ireland is excluded from the sample.

$$\log(x_{ij}) = \phi_i + \phi_j + \beta \text{EURODUM}_{ij} + \sigma \log(\text{IMP}_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \quad (3)$$

where EURODUM_{ij} is a dummy variable that takes the value 1 if both source and destination countries are members of the euro area and 0 otherwise. If this dummy turns out to be significant, it will indicate that (controlling for the other factors in the regression) euro area members indeed invest disproportionately in each other.

Table 10 reports the results for this specification, as adapted from the original estimates in Lane and Milesi-Ferretti (2004). As in Table 5, we report panel OLS regressions with fixed source and host effects in columns (1)-(2), while columns (3)-(4) report Tobit regressions. (In fact, it turns out that the choice of estimator makes little difference in terms of the significance and value of the euro area dummy variable.) As was the case for the sample in Table 8, adding stock market correlations and the index of legal origin curtail the sample size considerably, with the number of host countries dropping from 157 to 42 and over 1400 lost observations. However, as shown in Table 11 most of the lost observations have equity holdings equal to zero (over 1000) and the cumulative value of equity holdings in the other lost observations is tiny (less than 1 percent) compared to total equity holdings in the sample.

The results show that euro area dummy variable is not significant in the broader sample in columns (1) and (3) but that it is quite significant in the regressions in columns (2) and (4). The difference is not attributable to the inclusion of extra regressors: rather, it is the reduction in sample size that is important. Since it is that smaller destination countries that are excluded from the regressions in columns (2) and (4) by virtue of not having stock market data, it may be argued that it is these results that are relatively more interesting.

The point estimate for the euro area dummy in both columns (2) and (4) is 0.48. This is a quantitatively large effect: it implies that equity investment in a euro area partner country is 62 percent larger than in a non-euro area partner country, controlling for the other factors in the regression. This is a striking result in view of the fact that the regression includes many variables (such as trade and distance) that might be expected to mop up the euro area effect.

One issue we have not discussed so far is the possible endogeneity of product trade to the degree of bilateral financial integration. In Lane and Milesi-Ferretti (2004) we present estimation results using instrumental variables, treating the level of imports; the correlation of GDP growth rates; the correlation of stock returns; and the correlation between domestic GDP growth and the foreign stock return as endogenous variables.¹⁹ Results still show a

¹⁹ Our instrument list consists of: distance; the time difference; a border dummy; the lagged correlation in GDP growth rates; the lagged correlation in stock returns; and the lagged correlation between domestic GDP growth and the foreign stock return. In related work (but using a different empirical specification), Aviat and Coeurdacier (2004) find that the causality between bilateral asset holdings and trade in goods runs in both directions, with statistically and economically significant effects.

strong and statistically significant effect of imports on equity holdings, with the colony dummy also retaining a statistically and economically significant coefficient.

V. CONCLUDING REMARKS

This paper has provided a number of stylized facts concerning the size and geographical distribution of euro-zone portfolio equity holdings. It has shown that the euro area is a major portfolio equity investor, with aggregate holdings second only to those of the United States, and even larger if intra-euro area holdings are not netted out.

For euro area countries, about half of international portfolio equity investment occurs outside the euro area and, relative to stock market capitalization, is particularly high in the United Kingdom. Some other interesting geographical patterns emerge—namely, the large portfolio equity investment by Austria in Central and Eastern Europe, and the significant share of Iberian investment that is allocated to Latin America. We also showed the remarkable importance of investment in financial centers—particularly Luxembourg—for a number of euro-area countries.

More formal econometric analysis shows the pattern of investment of equity holdings for the euro area is strongly related to the size of host country characteristics such as stock market capitalization, bilateral trade ties and its status as a financial center. With regard to bilateral equity holdings of individual euro-area countries with destinations outside the euro area, again we find a strong link with trade ties and a common culture. Finally, in a sample of OECD investor countries we find evidence that intra-euro area equity investment is larger than what would be predicted on the basis of ‘fundamentals’ such as trade ties, distance, and co-movements in key macroeconomic variables. As data become available for later periods, it will be interesting to examine whether the intra-euro area equity holdings are rising more than proportionately relative to external holdings.

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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. Variables: sources and definitions

Bilateral portfolio equity holdings: Portfolio equity instruments issued by host country residents and held by source country residents. Source: 2001 Coordinated Portfolio Survey.

Source-country imports: Imports of goods by source countries from host countries (average 1997-2001). Source, International Monetary Fund, Direction of Trade Statistics.

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

Correlation of stock returns: Correlation between the stock market returns of the host and source country, expressed in US dollars. Source; authors' calculations based on returns data from Datastream and Morgan Stanley Capital International.

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.

Log domestic stock market capitalization: log of the domestic stock market capitalization in US dollars as of end-2001. Sources: Datastream, Morgan Stanley Capital International, national sources.

Financial center dummy: Dummy variable taking the value of 1 if the country or territory is a 'large' international financial center.

Sharpe ratio: average excess return of the country stock market relative to world returns, divided by the standard deviation of the excess return's variability. Source: authors' calculations based on Datastream and Morgan Stanley Capital International.

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).

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. Source: Rose and Spiegel (2004).

Colony dummy: dummy taking the value of 1 if source and host country ever had a colonial relationship. Source: Rose and Spiegel (2004).

Correlation growth-stock return: correlation between GDP growth in the source country and real stock returns in the host country, 1980-99. Source: authors' calculations based on Datastream, Morgan Stanley Capital International, and World Development Indicators.

Table 1. The Largest Portfolio Equity Investors*
(US\$ billion)

	CPIS 2001	Estimates 2003
Euro area (including intra-area holdings)	1,739	2,486
United States	1,613	1,972
Euro area (external holdings)	894	1,332
United Kingdom	558	750
Switzerland	247	294
Japan	227	274
Canada	201	306
<u>Total reported holdings</u>	<u>5,169</u>	<u>....</u>

* Sources: IMF, Coordinated Portfolio Investment Survey, and Lane and Milesi-Ferretti (2005).

Table 2. The Euro Area's International Equity Holdings at end-2001*

	Total Value (\$bn)	Per Capita Value (\$000)	Intra- Euro area	Extra- Euro area
Euro area	1739	5.7	48.6	51.4
Austria	31	3.9	53.5	46.5
Belgium	106	10.3	78.9	21.1
France	202	3.4	51.1	48.9
Germany	381	4.6	59.7	40.3
Italy	239	4.1	64.4	35.6
Luxembourg	319	725.2	37.1	62.9
Netherlands	235	14.7	26.5	73.5
Finland	20	3.9	31.1	68.9
Greece	1	0.1	50.1	49.9
Ireland	136	35.3	25.5	74.5
Portugal	8	0.8	66.0	34.0
Spain	59	1.4	54.2	45.8
Max	381	725.2	25.5	74.5
Min	1.4	0.1	78.9	21.1
Range	380	725.1	46.6	53.4

* Source: IMF, Coordinated Portfolio Investment Survey.

Note: End-2001 equity holdings in billions of US dollars. Intra-euro area refers to fraction of total holdings that is allocated to other members of the euro area. Extra-euro area is the fraction that is allocated to non-euro area countries.

Table 3. Summary statistics on stock market size and foreign ownership (2001)

Country \ Variable	Domestic stock market cap. in percent of world stock market cap.	Percent of domestic stock market cap. owned by foreign portfolio investors	Domestic GDP in percent of world GDP
Euro area	15.9	37.4	19.6
Japan	9.3	16.7	13.4
United Kingdom	8.9	35.6	4.6
United States	48.9	12.9	32.3
Other	17	N.A.	30.1

Note: reproduced and updated from Lane and Milesi-Ferretti (2004). World stock market capitalization is calculated as the sum of stock market capitalization of 71 countries in the sample. In this calculation, holdings of shares by residents of one euro area country in another are considered domestic holdings.

Table 4. Foreign portfolio equity investment: actual and predicted shares *

Source country \ Host country		Euro area	Japan	United Kingdom	United States
		Euro area			
Euro area	Theor. share		17.5%	17.5%	31.1%
	Actual share		16.8%	43.5%	28.6%
Japan	Theor. share	11.0%		10.2%	18.1%
	Actual share	7.4%		9.9%	10.6%
United Kingdom	Theor. share	10.6%	9.8%		17.4%
	Actual share	22.4%	13.0%		21.7%
United States	Theor. share	58.1%	53.8%	53.6%	
	Actual share	45.8%	54.4%	24.3%	
Rest of the world	Theor. share	20.3%	18.8%	18.7%	33.4%
	Actual share	24.5%	15.8%	22.3%	39.1%

* Reproduced and updated from Lane and Milesi-Ferretti (2004). Predicted share: ratio of host country's stock market capitalization to the stock market capitalization of the world minus the source country. Actual share: ratio of source country's equity investment in host country to total source country foreign equity investment

Table 5. Regional Allocation of Extra-Euro Area Holdings

	United States	United Kingdom	Japan	Asia	Latin America
Euro area	45.8	22.4	7.4	5.2	1.6
Austria	48.2	18.8	5.9	2.2	0.3
Belgium	44.8	24.5	7.0	2.9	1.4
France	42.5	25.9	7.4	2.3	0.6
Germany	45.5	28.9	3.8	2.0	0.8
Italy	44.8	19.0	12.1	5.2	3.3
Luxembourg	42.7	15.3	10.3	7.6	2.9
Netherlands	54.6	16.9	5.2	9.3	0.6
Finland	31.8	16.9	5.4	1.2	0.0
Greece	40.0	34.4	1.5	0.9	1.8
Ireland	46.8	31.7	6.1	4.5	0.6
Portugal	41.3	19.0	3.1	2.1	7.9
Spain	32.4	39.7	13.1	0.2	4.7
Max	54.6	39.7	13.1	9.3	7.9
Min	31.8	15.3	1.5	0.2	0.0
Range	22.8	24.4	11.6	9.1	7.9
Mkt Cap	58.1	10.6	11.0	7.0	1.8

Note: Allocation shares of extra-euro area holdings. Mkt Cap is the share of each country/ region in extra-euro area aggregate stock market capitalization (based on Datastream indices). Asia is the sum of holdings in China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Pakistan, Singapore, Sri Lanka, Taiwan province of China, and Thailand. Latin America is the sum of holdings in Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela.

Table 6. Extra-Euro area Holdings: Country Details

	Mkt Cap	Euro area	Max	Min	Range
United States	58.08	45.5	54.6	29.6	25.0
United Kingdom	10.57	22.2	39.5	15.3	24.1
Switzerland	2.96	8.2	14.0	3.9	10.1
Japan	11.04	7.4	13.0	1.5	11.5
Hong Kong SAR of China	2.27	2.3	6.7	0.0	6.7
Sweden	1.07	2.2	29.6	0.6	29.0
Australia	1.07	0.9	1.6	0.0	1.6
Korea, Republic of	0.91	0.9	1.6	0.0	1.6
Brazil	0.77	0.7	6.9	0.0	6.9
Canada	2.68	0.6	1.1	-0.3	1.4
Taiwan Prov. of China	1.15	0.5	1.3	0.0	1.3
Mexico	0.59	0.5	1.0	0.0	1.0
Denmark	0.39	0.5	3.1	0.0	3.1
Singapore	0.52	0.4	0.7	0.0	0.7
India	0.54	0.4	0.8	0.0	0.8
Norway	0.31	0.3	1.3	0.1	1.2
Russian Federation	0.35	0.3	0.6	0.0	0.6
South Africa	0.35	0.3	4.3	0.0	4.3
Malaysia	0.44	0.2	0.4	0.0	0.4
Israel	0.28	0.2	0.4	0.0	0.4
Hungary	0.05	0.2	2.5	0.0	2.5
Poland	0.12	0.2	1.6	0.0	1.6
Thailand	0.13	0.2	0.6	0.0	0.6
China, P.R.	0.80	0.2	0.3	0.0	0.3
Turkey	0.20	0.1	0.7	0.0	0.7
Venezuela	0.01	0.1	0.5	0.0	0.5
Argentina	0.09	0.1	1.1	0.0	1.1

Note: Allocation shares of extra-euro area holdings. Mkt Cap is the share of each country in extra-euro area aggregate stock market capitalization (based on Datastream indices).

Table 7. Determinants of the Euro Area's International Equity Holdings

	(1)	(2)	(3)	(4)	(5)
Stock market capitaliz.	1.0 (10.9)***	0.67 (7.2)***	0.56 (4.2)***	0.6 (4.78)***	0.57 (3.29)***
Imports		0.69 (2.9)***	0.8 (2.74)***	0.78 (2.74)**	0.77 (2.6)**
Distance			0.17 (0.92)	0.1 (0.58)	0.09 (0.46)
Euro_Culture			0.59 (1.57)	0.37 (1.2)	0.54 (1.49)
Financial Center			0.8 (2.55)***	0.8 (2.4)**	0.94 (2.73)**
Sharpe				3.34 (2.69)**	2.87 (2.22)**
Correl. in growth rates					0.78 (1.1)
Correl. in stock returns					-0.98 (1.23)
Observations	38	38	38	36	36
Adjusted R ²	0.82	0.88	0.90	0.90	0.91

Note: The dependent variable is log of portfolio equity holdings of the source country in the host country. t-statistics reported in parenthesis. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent confidence levels, respectively.

Table 8. International Equity Holdings by Euro-Area Member Countries

	(1)	(2)	(3)	(4)
	Panel FE	Panel FE	Tobit	Tobit
Avg. imports, 1997-2001	0.17 (4.80)**	0.24 (2.24)*	0.39 (5.23)**	0.24 (2.38)*
Log distance	-0.85 (5.78)**	-0.25 (0.91)	-0.88 (3.82)**	-0.21 (0.83)
Common language	0.16 (1.33)	0.33 (1.20)	0.32 (1.30)	0.28 (1.11)
Colony dummy	0.50 (2.77)**	1.16 (2.82)**	1.06 (3.14)**	1.20 (3.16)**
Tax treaty	-0.03 (0.35)	-0.22 (1.03)	0.04 (0.20)	-0.25 (1.29)
Correl. in growth rates	0.22 (1.30)	0.27 (0.65)	0.51 (1.47)	0.28 (0.71)
Correl. in stock returns		2.29 (2.68)**		2.47 (3.08)**
Correl. growth-stock ret.		0.07 (0.18)		-0.04 (0.11)
Common legal origin		0.15 (0.89)		0.24 (1.49)
Observations	1035	285	1035	285
No. of host countries	146	31	146	31
No. of source countries	11	11	11	11
Adjusted R ²	0.86	0.86		

Note: The dependent variable is log of 1+portfolio equity holdings of the source country in the host country. Regressions include fixed source and host country effects. t-statistics reported in parenthesis. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent confidence level, respectively.

Table 9. Investment by euro-area countries outside the euro area
Summary statistics

	Total holdings (billions US\$)	Source	Host	Total observations	Observations = 0
Total	894	12	223	1657	981
excluding Luxembourg	687	11	223	1451	890
in regressions (1) and (3)	668	11	146	1036	595
in regressions (2) and (4)	663	11	31	286	11

Table 10. Bilateral portfolio equity holdings.

	(1)	(2)	(3)	(4)
	Panel FE	Panel FE	Tobit	Tobit
Euro area dummy	0.14 (1.01)	0.41 (2.61)**	0.00 (0.01)	0.39 (2.57)**
Avg. imports, 1997-2001	0.17 (7.38)***	0.24 (4.71)***	0.34 (7.84)***	0.26 (5.04)***
Log distance	-0.40 (6.32)***	-0.07 (0.69)	-0.40 (3.93)***	-0.05 (0.48)
Time difference	0.04 (3.02)***	-0.03 (1.72)*	0.03 (1.35)	-0.04 (1.91)*
Common language	0.22 (3.05)***	0.27 (2.20)**	0.44 (3.39)***	0.27 (2.26)**
Colony dummy	0.33 (2.81)***	0.25 (1.34)	0.60 (3.11)***	0.27 (1.46)
Tax treaty	-0.05 (0.74)	-0.27 (2.48)**	0.03 (0.32)	-0.25 (2.29)**
Correl. in growth rates	0.22 (2.59)**	0.10 (0.61)	0.35 (2.12)**	0.03 (0.22)
Correl. in stock returns		0.78 (1.68)		0.79 (1.72)*
Correl. growth-stock ret.		-0.06 (0.37)		-0.15 (0.92)
Common legal origin		0.18 (2.05)**		0.20 (2.37)**
Observations	2426	790	2426	790
No. of host countries	157	42	157	42
No. of source countries	23	22	23	22
Adjusted R ²	0.89	0.89		

Note: Reproduced from Lane and Milesi-Ferretti (2004). The dependent variable is log of 1+portfolio equity holdings of the source country in the host country. Regressions include fixed source and host country effects. t-statistics reported in parenthesis. *, **, *** indicate statistical significance at the 10 percent, 5 percent, and 1 percent confidence level, respectively.

Table 11. Portfolio equity investment of OECD countries
Summary statistics

Sample	Total holdings (billions US\$)	Source	Host	Total observations	Observations = 0
Total	4781	24	223	3541	2017
Excluding offshore countries (Table 10, regressions (1)-(3))	3847	23	157	2426	1291
No offshore countries (Table 10, regressions (2)-(4))	3820	23	42	792	27