International Investment Patterns*

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Abstract

We provide a systematic analysis of bilateral, source and host factors driving portfolio equity investment across countries, using newly-released data on international equity holdings at the end of 2001. We develop a model that links bilateral equity holdings to bilateral trade in goods and services and find that the data strongly support such a correlation. Larger bilateral positions are also associated with proxies for informational proximity. We further document that the scale of aggregate foreign equity asset and liability holdings is larger for richer countries and countries with more developed stock markets.

I. INTRODUCTION

This paper is motivated by the idea that understanding the geography of international investment provides insights into the globalization process. In a fully-integrated global economy without frictions in product or asset markets, benchmark economic theory suggests that investors should hold identical portfolios, regardless of nationality. Documenting and explaining deviations from this benchmark position potentially reveals the nature of the current limitations on global economic integration. For instance, how do frictions in product markets affect the structure of international financial trade? Are cultural/informational factors important in explaining the bilateral structure of international portfolios? What is the connection between domestic and international financial development? Answers to these questions are of interest for several fields in economics, including international macroeconomics and international finance, portfolio analysis, and behavioral finance.

An especially intriguing feature in international equity investment patterns is the presence of strong bilateral variation in portfolio allocations, in that different source countries attach sharply different weights across various host (destination) countries. Identifying the bilateral factors that explain these portfolio asymmetries is a major focus of our work. Moreover, the determinants of bilateral holdings also combine to affect aggregate positions: a financially-remote country will receive less inward investment and faces a higher cost of equity capital. Asymmetries in the geography of international investment can also have important implications for other international economic linkages. Most obviously, a negative shock in host country C will have a larger negative wealth effect on investor country A than investor country B, if country A's portfolio is more heavily weighted towards C. In a related fashion, the geography of investment positions also shapes international risk-sharing patterns.

Interest in these linkages has been heightened by the increase in international portfolio diversification over the past few years, as well as by evidence of increased co-movements between the main economic and financial variables of the world's largest economies, over and above what could be explained by trade. The pattern of bilateral financial linkages may influence the matrix of correlations in asset prices (Forbes and Chinn 2004) and the degree of business cycle synchronization (Imbs 2004a, 2004b). It may also affect the covariance of real exchange rates: if countries A and B have extensive bilateral financial cross-holdings whereas country C is financially isolated, then we may expect larger real exchange rate movements between countries A and C than between countries A and B.

Although some authors have previously considered aspects of the geography of international investment, data limitations have meant that these contributions have been narrowly focused: for example, only considering a single source country (most often, the U.S.). In this paper we use a new dataset on international portfolio positions in order to comprehensively explore this topic. The data provide a geographical breakdown of international portfolio holdings at end-2001 by 67 source countries, including virtually all major international investors.

In our empirical work we highlight the connections between the geography of product trade and the geography of equity portfolios, but also explore the roles played by financial and

informational frictions. In addition to highlighting the role of bilateral factors in explaining the geography of countries' equity holdings, we also explore how country characteristics explain the overall size of aggregate foreign equity asset and liability positions.

The rapidly increasing literature trying to explain bilateral international investment patterns has used empirical methods borrowed from the traditional gravity models of international trade, and has focused on direct investment (FDI) and bank lending, for which data is readily available (from the OECD and BIS, respectively). Studies on the geography of FDI include Wei (2000) and Stein and Daude (2003), among many others. Studies on bank lending include Buch (2002, 2003); Buch et al (2004); and Kawai and Liu (2001). Ghosh and Wolf (2001) and Sarisoy (2003) conduct a comparative analysis of the impact of spatial factors on different international investment categories, as do, for the United States, Portes et al. (2001).

A number of papers have also focused more specifically on the pattern of bilateral equity investment. For example, Portes and Rey (2005) use portfolio equity flows from Capital Data and show that proxies for informational asymmetries, together with the size of host countries' stock markets, are key determinants of the pattern of international equity flows. Other studies on the geography of equity investment have focused on a single source country: the United States (Ahearne, Griever, and Warnock (2003), Mann and Meade (2002); Dahlquist, Pinkowitz, Stulz, and Williamson (2003)) and Ireland (Honohan and Lane (2000)).[1] An exception is a recent paper by Yildirim (2003) that also uses the 2001 CPIS data, employing a methodology different from ours. She examines the role of various corporate governance indicators in determining investment patterns, employing a subset of the CPIS data (23 source countries, 49 host countries) for which such data are available. Subsequent to the circulation of our paper, two new studies have used the CPIS data. Vlachos (2004) finds that similarity in the financial regulatory environment raises bilateral portfolio holdings, while Aviat and Coeurdacier (2004) find evidence of two-way causality between bilateral portfolio investment and trade patterns, but argue that the effect of financial holdings on trade is weak.

Several of these studies are related to the voluminous literature on home bias. This literature is relevant: however, our approach is substantially different in focus, in that we also place heavy emphasis on explaining the structure of the international component of portfolios rather than the split between domestic and foreign allocations.[2]

Relative to the existing literature, this project innovates by developing a "double fixed effects" empirical specification that provides a coherent framework for analyzing bilateral equity holdings jointly with aggregate positions. Our most striking empirical finding is the

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[1] Coval and Moskowitz (1999) and Huberman (2001) explore regional investment patterns within the US.

[2] Pinkowitz et al. (2002) treat the domestic allocation of US investors as being symmetric to the foreign allocation: however, some sources of home bias plausibly imply that the determinants of domestic investment are not identical to those for overseas investment.

strongly positive association between bilateral patterns in product trade and bilateral portfolio allocations, even controlling for a host of gravity-type variables. Although open to several interpretations, this pattern is consistent with the consumption hedging model that we lay out in the Appendix. In addition, we also find that bilateral portfolio holdings are significantly correlated with informational/cultural linkages, such as a common language and common legal origins. At the multilateral level, we find a positive association between the depth of the domestic financial market and the scale of both outward and inward equity investment, suggesting that trade in domestic assets is complementary to trade in foreign assets.

The structure of the rest of the paper is as follows. Section II and the Appendix develop a theoretical framework, and Section III the empirical strategy. Section IV describes the data and discusses interpretation issues. Econometric results are reported in Section V. Some preliminary conclusions and directions for future research are outlined in Section VI.

II. THEORETICAL ISSUES

We can identify three main theoretical approaches to modeling bilateral equity positions, illustrated by Martin and Rey (2004), Davis, Nalewaik, and Willen (2001), and Obstfeld and Rogoff (2001), respectively. Martin and Rey (2004) focus on transactional frictions in asset markets.[3] Their framework postulates incomplete asset markets, iceberg costs in financial markets, and endogenous asset creation: larger countries will have deeper domestic equity markets and a reduction in financial trade costs leads to more international asset trade. This approach generates a bilateral equation for equity positions as a function of the cost of bilateral financial trade and the endogenously-determined market capitalization levels. These authors broadly interpret financial frictions to include informational asymmetries.

Davis, Nalewaik and Willen (2001) also focus on financial market incompleteness. In their setup, a domestic agent faces a risky labor income stream, and has access to a riskless and a risky domestic asset. The ability to diversify risk at home depends on the correlation between labor income and the return on the risky asset. The degree to which the availability of a second risky asset (an international equity fund) improves risk allocation depends on its correlation with domestic labor income, in addition to its correlation with the domestic risky asset. The authors develop a procedure to assess the gains to international financial trade in risky assets that depends on these correlations. Importantly, agents from different countries will hold different combinations of risky assets, since differences in labor income streams mean that the "mutual fund separation theorem" does not hold—returns on the various risky assets will have different correlations with domestic labor income streams across countries.

In a two-country setting, Obstfeld and Rogoff (2001) show that the existence of frictions in product markets generates a home bias in equity positions, even if global financial markets

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[3] See also the application in Martin and Rey (2000). The working paper version of Ahearne at al (2004) generate a similar reduced form, employing the portfolio model with country-specific proportional investment costs originally developed by Cooper and Kaplanis (1986).

are complete. In Appendix A, we develop an N-country generalization of this model and derive its implications for bilateral portfolio holdings. The model predicts perfect covariation between the bilateral pattern of imports and portfolio allocations. The intuition for this result is that consumption risk derives from shocks to a country's domestic production and output of its trading partners—a resident in country *A* is fully insulated from shocks to production in country *B* if it imports nothing from country *B*. In contrast, a natural hedge against output shocks in country *C* (from which it imports) is to hold equity in that country: fluctuations in the price of imports from *C* will be offset by compensating dividend yields.

In what follows, we develop a general empirical specification that highlights the potential for bilateral goods trade to explain bilateral asset holdings but also allows for a host of proxies for informational and financial frictions to also influence portfolio allocations.

III. EMPIRICAL STRATEGY

We focus on a single cross-sectional observation for external equity portfolios for the year 2001 (as discussed in more detail in Section IV). In line with the theoretical framework developed in Appendix A, our empirical strategy is to isolate the relative contributions of (i) bilateral factors; (ii) source-country factors; and (iii) host-country factors. Bilateral factors may explain the heterogeneity in the geographical composition of the asset portfolios of source countries and the investor bases of host countries. Controlling for these bilateral considerations, source-country factors help us to explain cross-country differences in the propensity to invest overseas while host-country factors are potentially important in determining variation in the attractiveness of different destinations for overseas investors.

A. Specification

We adopt a "double fixed effects" specification in guiding the empirical work

$$\log(x_{ij}) = \phi_i + \phi_j + \beta Z_{ij} + \varepsilon_{ij} \tag{1}$$

where x_{ij} is the level of equity investment in host country i by source country j, ϕ_i, ϕ_j are dummy variables for each host and source country, Z_{ij} is a vector of explanatory variables and ε_{ij} is a residual term. The host fixed effect controls for national characteristics that explain why some countries are more attractive than others to all investors; conversely, the source fixed effect controls for features that explain why some countries generally hold larger outward investment positions than others. The inclusion of these fixed effects means that we only include in Z_{ij} factors that vary across country pairs and hence can help explain why the same destination attracts different levels of investment from different sources.

We augment this specification with equations that seek to explain the fixed effects ϕ_i and ϕ_j

$$\phi_i = \rho_1 H_i + u_i \tag{2}$$

$$\phi_j = \rho_2 S_j + u_j \qquad (3)$$

where H_i, S_j are vectors of country characteristics that explain variation in the aggregate portfolio holdings for host and source countries respectively. Most existing empirical work on the geographical allocation of equity holdings, such as Ahearne et al (2004) and Pinkowitz et al (2002), considers a single source country and cannot control for host-country fixed effects. Our broader data set allows us to adopt this more general approach.

B. Bilateral Factors

The model developed in Appendix A suggests that bilateral portfolio positions are related to bilateral trade and to various informational and financial frictions. We therefore include in our empirical specification an array of gravity-type variables to proxy for information costs: distance; time zone difference; and dummies for common language, colonial relationship, currency union, bilateral investment tax treaties, and common origins to the legal system (as a proxy for institutional similarity). Since trade is directly included in the regression, these variables should exert an independent influence on portfolio positions only to the extent that they proxy for informational or other financial frictions. Also, their inclusion ensures that the estimated import effect is not driven by omitted variable bias, since these variables are highly correlated with trade but may yet exert an independent influence on bilateral equity holdings.

In some specifications (at the cost of a major reduction in sample size), we also include bilateral financial correlations that may influence asset holdings under incomplete markets: the correlation in stock market returns; the correlation in GDP growth rates; and, following Davis et al (2001), the correlation between host-country stock returns and source-country GDP growth. The latter takes into account the role of the host-country stock market in potentially hedging against source-country output fluctuations. In all cases, correlations are calculated using historical data: since most foreign portfolio equity investment took place since the mid-1990s, the endogeneity of financial correlations to the level of bilateral holdings is not a major concern. However, as a robustness check, we also report instrumental variable estimates that allow for the potential endogeneity of a number of regressors.

C. Source and Host Country Factors

Our theoretical framework suggests that larger economies will have correspondingly larger international equity asset and liability positions. However, the size-holdings relation may be less than proportional: the gains to international risk-sharing may larger for a smaller country, due to the lesser scope for domestic diversification. In addition to economic size, according to the logic of our benchmark model, measures of aggregate trade openness should also be important in explaining aggregate international investment activity.

In previous work, we have argued that a number of other characteristics can help explain variation in the levels of cross-border asset holdings (Lane and Milesi-Ferretti 2001a, 2001b,

2003).[4] For instance, with fixed costs to overseas investment and risk aversion decreasing in wealth, we may expect richer countries to invest more overseas. Moreover, a well-developed financial sector may also encourage overseas investment through various channels. First, it facilitates international risk sharing by enabling the issuing of liabilities to foreign investors. Second, larger domestic financial assets and liabilities may increase the need to diversify overseas to reduce exposure to domestic risk. Third, the sophistication of the domestic financial system may reduce barriers to international investment. On the other hand, domestic investors may be more prone to invest overseas if a shallow domestic financial market offers scarce investment opportunities—hence, for given economic development, a shallower domestic financial market may be associated with higher asset holdings overseas.

On the liability side, the size of the domestic financial market is a basic constraint on the scale of foreign portfolio liabilities: foreign portfolio equity investment in domestic public companies cannot exceed domestic stock market capitalization.

A country's history with capital controls may limit equity holdings abroad: a country with a 'natural' potential to invest overseas may have an artificially small foreign asset position if capital controls are currently in place or have been in the recent past. We also include a financial center dummy, to allow for the possibility that some holdings by intermediaries (rather than the ultimate owners) are included in the data. Finally, we also include past measures of stock market risk and return that may help explain the extent of home bias, if return-chasing is a driver of portfolio decisions. By this line of reasoning, investor in a country that historically offered a favorable domestic return-risk tradeoff may be less prone to invest overseas and may be a more popular destination for inward equity investment.

IV. DATA: DESCRIPTION AND ISSUES

The dataset combines data on aggregate and bilateral international portfolio equity holdings. For bilateral data, we rely on the Coordinated Portfolio Investment Survey (CPIS) that is released by the International Monetary Fund. For each participating country, the CPIS reports data on foreign portfolio asset holdings (divided into equity, long-term debt, and short-term debt) by residence of the issuer. The first CPIS reported data for end-1997 for 29 source countries (IMF, 2000), but some major investing nations (such as Germany) did not participate. We rely on data from the second CPIS, reporting holdings at end-2001.[5] This survey, much broader than the earlier one, covers 67 source countries, including several offshore and financial centers. For each source, the survey reports holdings in up to 218 destination countries/territories. The survey is now annual, with data now also available for end-2002 and end-2003. However, in contrast to the 2001 survey, the 2002 and 2003 data are not derived from benchmark surveys in all countries – for instance, the United States did not

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[4] Lane and Milesi-Ferretti (2003) consider the determinants of the sum of equity assets and liabilities, as a measure of general international financial integration.

[5] The data are available at http://www.imf.org/external/np/sta/pi/datarsl.htm.

conduct a comprehensive survey in those years. In any event, the bilateral patterns are highly correlated across 2001-2003 such that we opted to focus on the cross-section dimension.[6]

Problems with the CPIS data can arise for several reasons:

- *Incomplete country coverage*. Among the countries/territories that did not participate to the CPIS, the likely largest holders of portfolio equity assets are the British Virgin Islands, China, Kuwait, Saudi Arabia, Taiwan, and the United Arab Emirates.

- *Under-reporting of assets*. Under-reporting can be due to incomplete institutional coverage of the survey. For example, the Cayman Islands reported only the holdings of its banking sector (but not those of its sizable mutual fund industry); the Bahamas also reported exclusively bank holdings, and the German survey did not cover holdings by households.[7] Under-reporting is also likely to occur for countries that experienced substantial capital flight in the past (such as several Latin American countries) and, more generally, for assets held in offshore centers for tax shelter reasons.

- *Third-party holdings.* Third party holdings refer to securities issued by country B and held by a resident of country A in an institution residing in country C. Such holdings do not pose a measurement problem when using end-investor surveys, but can lead to mismeasurement if the surveys are based on custodians (typically domestic ones, therefore missing assets held by foreign custodians on behalf of domestic residents). The United States uses a mix of both methods of survey.[8]

- *Problems in collection methods*. For many countries this is the first participation to the CPIS, and therefore collection methods may still be inadequate.

These shortfalls notwithstanding, the CPIS provides a unique perspective on cross-country equity positions that warrants a detailed analysis.

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[6] A log-log regression of 2003 equity positions on 2001 equity positions gives an elasticity of 0.94 and an overall R^2 of 0.86. For those countries that participated in both 1997 and 2001 surveys, there is also strong persistence in bilateral equity holdings—a log-log regression of 2001 equity positions on 1997 positions gives an elasticity of 0.86 and an overall R^2 of 0.70.

[7] For the Cayman Islands, its derived liabilities (themselves likely to be underestimated) exceed its reported assets by close to US$350 billion. For Germany, 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).

[8] Griever, Lee, and Warnock (2001) discuss the methodology of US surveys and Warnock and Cleaver (2002) highlight the measurement problems posed by third-party holdings.

A. Stylized facts of the 2001 CPIS: aggregate investment

The total recorded level of portfolio equity investment in the CPIS was over $5 trillion. Table 1 lists the 10 largest foreign investors, both in absolute terms and as ratios of domestic GDP. The largest foreign investors are the main OECD economies plus Luxembourg, a very small economy with a large financial center. According to the CPIS, "external" equity holdings of the euro area amount to $893 billion, and intra-euro area holdings over $800 billion. As noted above, CPIS equity holdings for Germany (and hence for the euro area) are below those reported in the International Investment Position (IIP). When scaling equity holdings by GDP, financial and offshore centers dominate the picture, with total assets amounting to multiples of their domestic output. Reported portfolio equity holdings by offshore centers and small economies with financial centers (including in the latter category Ireland, Hong Kong, Luxembourg, and Singapore, but excluding Switzerland) were over $700 billion, notwithstanding the incomplete coverage of the survey.

Table 2 lists the ten largest geographical destinations for portfolio equity investment, derived from the asset claims of the countries that participated in the CPIS survey. Given the non-universal coverage of the survey, the first column reports in brackets the portfolio equity liabilities reported by countries in their IIP. The overall pattern is similar to the one for assets—the largest OECD economies are the main destination countries for equity holdings. In terms of ratios to GDP, small economies with financial centers dominate the picture. These centers are very important in absolute terms as well, as highlighted by the presence of Luxembourg and Bermuda among the main destination countries. The derived equity liabilities of offshore centers and small economies with financial centers are $870 billion— larger than reported offshore center assets, even though holdings in offshore centers by foreign residents are clearly under-reported. There are two reasons for this finding. First, not all offshore centers participated in the CPIS; and second, the derived equity liabilities of these centers often represent shares in mutual funds, that may invest these funds in portfolio debt instruments, and not exclusively in equities.

B. Stylized facts of the 2001 CPIS: bilateral investment patterns

Table 3 provides a brief summary of the size of economies, their stock markets, and the share of domestic stocks owned by non residents. 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. 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). [9]

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[9] Note that Table 3 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.

Table 4 summarizes the geography of portfolio equity investment among the main economies by comparing the share of foreign equity investment in the host country with the share of the host'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 holdings. Japan's foreign equity investment is the most closely 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.

Figure 1 summarizes the degree of "foreign bias" for a sample of OECD host and source countries, as well as for the whole sample. The foreign bias measures the deviation of a source country's equity holdings in a given host from an international benchmark, and is defined as FORBIAS=[1- (equity holdings ratio/market value ratio)]. The market value ratio is the ratio of host country's stock market capitalization to world stock market capitalization net of the source country, while the equity holdings ratio is the ratio of equity holdings by the source country in the host country to total equity holdings of the source country. If source country holdings in the host country simply reflect the relative weight of the host country in the world's stock market capitalization, the bias is equal to zero. If equity holdings are higher than the market ratio, the bias is positive, and viceversa.[10] The Figure shows the percentage of total observations for which the bias falls within a given range. The degree of dispersion is substantial, especially for the whole sample. While for some advanced economies the equity holdings ratio lines up closely with the market value ratio, this dispersion warrants a closer look at other determinants of bilateral equity holdings.

V. EMPIRICAL ANALYSIS

We focus on portfolio equity positions at end-2001, and report results for three different dependent variables: bilateral positions; aggregate asset positions; and aggregate liability positions. We consider a wide range of explanatory variables in our empirical analysis. The data appendix describes the data sources and construction methods for these variables.

A. Determinants of Bilateral Equity Holdings: Specification and Estimation

In Tables 5-7, we present results of panel regressions of equity holdings for three samples: all countries, OECD source countries, and emerging market source countries. The entire set of available host countries is used in each case, subject to the restrictions discussed below.[11]

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[10] Ahearne et al (2004) study a BIAS variable which scales portfolio shares by market capitalization shares. The difference is that our measure excludes domestic holdings of domestic stocks, restricting attention to the foreign component of equity portfolios.

[11] Results for restricted sets of destination countries (e.g. only OECD destinations; only emerging market destinations) are available from the authors upon request.

The dependent variable is specified as log(1+equity), so as to include the large number of observations equal to zero.[12] All regressions include fixed source and host effects: hence the only included explanatory variables are those that vary along both sample dimensions.[13] Because of the log specification of the regressions, adopted in line with the literature on gravity models, the effect of variables such as the (log) product of host and source country area, population, GDP, etc. are automatically soaked up by the fixed host and source effects.

All regressions exclude source and host offshore and small financial centers.[14] These act as intermediaries, and are neither true sources nor final destinations of investment. Ideally, the funds invested in offshore centers should be 're-allocated' to their ultimate destination, but this is hindered by the limited available information on the pattern of investment of certain offshore centers. Nevertheless, to the extent that every dollar invested by a source country in an offshore center is invested by the center in the same way as the average dollar invested abroad by the source country, the exclusion of offshore centers is of no consequence to 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, which in the log regressions would be captured by the fixed source effects.

In each table, columns (1)-(3) report panel OLS regressions with fixed source and host effects; column (4) reports IV estimates; and columns (5)-(7) Tobit regressions. We are generally skeptical that reverse causation from equity holdings to the regressors is an important problem—the bulk of equity holdings were accumulated only over the last decade and remain comparatively small, whereas import patterns (for instance) are quite persistent. Be that as it may, IV estimates are also included to guard against possible reverse causation running from financial holdings to a number of regressors. The Tobit estimates are included in light of the fact that a large number of bilateral observations is equal to zero and allow for

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[12] Table A1 presents summary statistics on available observations for equity holdings and number of observations equal to zero. Since holdings are measured in dollars, adding 1 dollar to the equity position is trivially not distortionary: it just allows us to include the zero observations in the regressions in the log specification.

[13] The tables report both the overall adjusted R^2 (which includes the explanatory power of the source and host country dummies) and the bilateral R^2 (which measures the marginal explanatory power of the bilateral variables). While the host and source country dummies are very important, the bilateral variables also contribute considerable explanatory power. In the broadest specification (column (3) in Tables 5-7), the bilateral R^2 is in the range (0.23-0.33).

[14] Among the source countries, these are Aruba, the Bahamas, Bahrain, Bermuda, Cayman Islands, Cyprus, Guernsey, Isle of Man, Jersey, Lebanon, Luxembourg, Macao SAR, Malta, Mauritius, the Netherlands Antilles, Panama, and Vanuatu. A complete data appendix with a list of countries and territories for each sample is available from the authors upon request.

the possibility that the observed distribution of equity holdings is censored at zero.[15] Such censoring is plausible, given the restrictions on shorting equity holdings in many countries.

Columns (1) and (5) present results using only source-country imports from the host country, measured as log(1+imports), as an explanatory variable. This partial specification allows the use of the widest possible sample: 50 sources and 172 hosts. Columns (2) and (6) add to the explanatory variables a number of proxies for information barriers and 'cultural' distance that have been widely used in gravity models of trade and capital flows.[16] These include: the log of geographical distance; the time difference (to proxy for the difficulties of communication when the overlap between office hours is limited, as suggested by Portes and Rey (2005) and Stein and Daude (2003)); a dummy for countries that have been in a colonial relation; a dummy for countries in a strict currency union; a dummy for a common language; and a dummy for countries with a tax treaty established prior to 1999. In addition, columns (2) and (6) also include the correlation in GDP growth rates between the source and host country, as a widely-available proxy for the gains from bilateral diversification, along the lines of Davis et al (2001). As highlighted in Table A1, the addition of these variables reduces the full sample size by about 20 percent (15 host countries are dropped), with the large majority of the dropped observations reflect equity holdings equal to zero.

Finally, regressions (3), (4) and (7) also add the correlation between stock market returns in the source and host country (measured in US dollars); the correlation between source-country GDP and host-country equity returns (following Davis et al (2001)); and a dummy for common legal origin. The first two variables are further proxies for the gains to bilateral diversification, while the latter variable is a general proxy for similarity in institutions. Adding these variables reduces the number of observations substantially—data for the whole sample now cover 37 sources and 48 hosts, and two thirds of the observations are dropped with respect to the specification of columns (2)-(5). However, once again the majority of the dropped observations reflect equity holdings equal to zero, and the size of total equity assets included in the regressions drops by a trivial amount (less than 1 percent).

In the IV estimation for the full sample and the OECD sub-sample (Tables 5-6, column 4), we treat as potentially endogenous variables: the level of imports; the correlation of GDP growth rates; the correlation of stock returns; and the correlation between domestic GDP growth and foreign stock returns. Our instrument list consists of: distance; time difference; a border dummy; the lagged correlations in GDP growth rates and in stock returns; and the

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[15] Tobit panel estimation with fixed effects can give rise to biased and inconsistent estimates, due to the incidental parameters problem. However, Greene (2003) shows that Tobit estimates in practice are more reliable than least-squares estimates if censoring is a significant data problem. We do not attempt to estimate an IV-Tobit specification, in view of the stringent assumptions required to implement such a procedure (Honore and Hu 2003).

[16] See, for example, Frankel and Rose (2002). On the application of gravity models to capital flows see, among others, Portes and Rey (2005) and Rose and Spiegel (2004).

lagged correlation between domestic GDP growth and foreign stock returns.[17] For the emerging market sub-sample (Table 7), including lagged stock returns would lead to a sharp drop in data availability (as many stock markets become active only in the mid-1990s). Hence, we only treat the import level and the correlation of GDP growth rates as potentially endogenous and drop the lagged correlation in stock returns and the lagged correlation between domestic GDP growth and foreign stock returns from the list of instruments.[18]

Note that, in the IV specification, we drop distance and the time difference from the list of independent variables in the main regression and allow these variables to influence bilateral equity holdings through their effect on the endogenous regressors. The excludability of distance from the main regression is based on the OLS results for the comparable specification in column (3): although distance is significant at the 5 percent level in the full sample, it is not significant in the OECD or the emerging market sub-samples. While the time difference variable is significant at the 1 percent level for the emerging market sub-sample in column (3) of Table 7, it is not significant for the OECD sub-sample and significant only at the 10 percent level for the full sample.

B.   Determinants of Bilateral equity Holdings: Empirical Results

Across Tables 5-7, the most striking result is the strong link between bilateral imports and bilateral investment holdings (columns (1) and (5)) which, not surprisingly, shows up with a much higher coefficient in the Tobit regressions.[19] That the point estimate is below the value of unity predicted by the model in the Appendix can be attributed to a number of factors. First, measurement error in imports imparts a downward bias to the coefficient estimate. Second, holding destination X's equity is not the only route to gain exposure to import-related risk: a complementary route would be to invest in domestic firms with overseas operations in those markets (Cai and Warnock 2004). Third, the composition of host X's stock market index may not perfectly reflect import risk (it may include domestically-orientated firms). Fourth, in some cases, imports from country X may consist of generic commodities for which country X's stock market would not be the appropriate hedging mechanism. Finally, if several host countries produce close substitutes, the correspondence between bilateral import levels and equity holdings need not be proportionate: an investment in financially-sophisticated host *A* may be a good proxy for an investment in financially-restricted host *B*, to the extent that growth and stock markets of *A* and *B* move together.

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[17] We assume that the correlations between growth rates prior to 1990 and between stock returns prior to 1995 are exogenous with respect to 2001 equity holdings, which reflect to a substantial degree the large flows of the period 1995-2001. We therefore use as instruments lagged correlations, which have an "exogenous" overlap with the instrumented variables.

[18] The results are little changed if use a smaller sample and run the same IV specification as for the full sample and the OECD sample.

[19] Figure 2 shows the scatter plot of equity positions against imports. The simple pooled regression generates an elasticity of 0.39 (t-statistic of 22.2), with an R-squared of 0.18.

The level of imports may simply proxy for bilateral information flows, rather than reflecting the risk-sharing mechanism outlined in our theoretical model. However, the variable remains very significant (although its point estimate is reduced), once gravity-related regressors that may proxy for informational linkages are included in the specification. Moreover, if the informational role for trade is dominant, exports should play a similar role in explaining equity holdings: however, holding fixed bilateral imports, bilateral exports have no additional explanatory power for the whole sample and emerging markets, and an economically weaker and statistically less significant impact than imports for the OECD sample.

The importance of trade here stands in contrast to the evidence of Ahearne et al (2004) for the US pattern of overseas investment: using 1997 data, they find no role for bilateral trade in explaining bilateral equity holdings of US investors.[20] The imports variable loses significance only for the emerging-market sub-sample when financial correlations are included (columns (3) and (7) in Table 7). These regressions have a much smaller set of observations and, even for this specification, imports remain highly significant in the IV estimation in column (4).

The results also highlight the role of informational linkages in explaining bilateral asset holdings: several cultural and physical proximity variables are statistically and economically significant. Speaking a common language raises equity holdings by about 40 percent.[21] The colony dummy, which is positive and significant for both the OECD and emerging market sub-samples, is particularly large for the latter group, where a common colonial history is associated with a quadrupling of equity positions. Distance is generally significant in the 'larger' samples (columns 2 and 6), with the OLS estimate in col. (2) of Table 5 indicating that, all else equal, doubling the physical distance reduces equity holdings by 61 percent.

The coefficient on the currency union dummy is large and very significant for the full sample in the OLS panel regression, but not in the remaining sub-samples and the Tobit regressions. This suggests that the variable is useful in distinguishing between zero and nonzero observations for equity holdings in the full sample, but has no independent explanatory power in explaining the size of equity holdings. In the broad sample, the tax treaty variable is significantly positive only in the Tobit estimates for the emerging market sample. The correlation between GDP growth rates is significantly positive for both the full sample and

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[20] Their dependent variable is US equity investment in a country scaled by that country's market capitalization. If a country trades a lot with the US but even more with other countries, US equity holdings may be relatively low due to the competing claims of other trading partners – with a single source country, They cannot control for this 'multilateral resistance' effect by including the required set of country dummies. They measure trade as a ratio to the host country's GDP, potentially confounding trade and scale effects.

[21] Yildirim (2003) reports similar findings for distance and language, in a specification without country and host fixed effects. She also considers a variety of corporate governance indicators, whose effects in our specification are soaked up by the source and host dummies.

the OECD subsample, under both estimation procedures. To the extent that this correlation is a proxy for the gains from diversification, its positive sign is unexpected: it suggests instead that investors hold equity in destinations with similar business cycles.

When stock market variables and the common legal origin dummy are added to the regressions (col. (3), (4), and (7) in Tables 5-7), there is a notable change in some results, related primarily to the change in sample size.[22] In particular, the coefficient on distance is dramatically reduced in size and loses statistical significance in the OECD and emerging market sub-samples. Since the main difference between the samples in column (2) and (3) are observations with equity holdings close to or equal to zero, this suggests that—once we control for trade—distance helps predict whether a given source country is going to invest in a given host, rather than the investment size. The results on the distance variable differ from those in Portes and Rey (2005): one interpretation is that the information frictions captured by distance may matter more for turnover than for equity holdings.[23][24]

A second difference is that currency union dummy is now quite significant for the OECD subsample: according to the OLS estimates, a source country tends to invest 60 percent more in a host which participates in the same currency union. Also, the tax treaty dummy is now significantly negative for the OECD and full samples (but not in the Tobit case for the latter), while remaining significantly positive at the 10 percent level for the emerging market sub-sample in column (7) of Table 7. As emphasized by Blonigen and Davies (2002) in the context of foreign direct investment, the expected sign of the tax treaty variable is a priori ambiguous: while on the one side a tax treaty reduces the likelihood of double taxation, and hence encourages foreign equity investment, on the other it makes it more difficult to evade taxes on equity returns and hence may discourage investment.

For the full sample, the evidence from this smaller set of observations also suggests that source countries tend to invest in hosts with similar characteristics, rather than in hosts yielding more risk diversification—for the full sample, the coefficients on the correlation

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[22] Results for the regression specification in columns (2)-(5) for the same sample as (3)-(6) are very similar to those reported in (3)-(6), and are available from the authors upon request.

[23] The correlation between bilateral equity holdings and equity flows is significantly positive at 0.55 for the 14 country sample studied by Portes and Rey (2005) (we thank the authors and Capital Data for providing us with their data.) Following Portes and Rey (2005), we also included bilateral telephone traffic in the regressions, but found it to be insignificant once trade is included as a regressor. We also tried the share of immigrants from the host country in the source country's population but this variable was also insignificant.

[24] Distance remains statistically significant in the Tobit regression for emerging markets (column (6)), albeit not in the OLS panel regression. This suggests that for emerging markets sources it has more power to discriminate between positive equity holdings than between zero and nonzero holdings, contrary to what happens for OECD sources.

between growth rates, the correlation of stock returns, and the correlation between growth and stock returns are all positive and significant in the OLS, IV and Tobit regressions.[25] Finally, institutional similarity appears to be important for bilateral equity investment: for both OLS and Tobit specifications (albeit not for the IV regressions), countries invest 30-40 percent more in hosts with a similar legal background—a common result across samples.

In sum, the geography of bilateral portfolio equity holdings is strongly related to bilateral trade, but also to proxies for informational asymmetries and cultural-institutional proximity, such as a common language and a common legal origin. The impact of distance variables is weakened once we the sample is restricted to the major equity sources and destinations. Among OECD countries, a common currency, which captures primarily the effects of EMU, is associated with higher equity investment. Importantly, bilateral equity investment takes place primarily between countries with similar characteristics, including coordinated business cycles and correlated stock returns, against the predictions of standard diversification models.

C. Aggregate Asset Positions

Results on the factors explaining the overall size of countries' portfolio investment holdings are presented in Table 9. From the initial sample of 67 sources we exclude the 17 financial centers (see sub-section A). Column (1) includes a minimum set of explanatory variables— the size of the domestic economy, its GDP per capita, exports of goods and services, domestic stock market capitalization, an index of capital controls, and a dummy for financial centers.[26] This set of variables restricts our sample size further to 48 countries.

In columns (1)-(3), the dependent variable is the fixed source-country effect estimated from a multi-variate regression of bilateral equity holdings on bilateral explanatory variables (Table 5, col. 2), in line with our theoretical approach (eq. (3) in Section II.A). To check robustness, column (4)-(6) show results using as dependent variable the maximum between the stock of portfolio equity assets reported in the 2001 CPIS and the one reported in the IIP.

Overall, results using either dependent variable are similar: the dominant factors explaining equity asset positions are clearly GDP per capita and the size of the domestic stock market. For the former, the elasticity is just below one using the fixed effect specification, and higher in the regression using actual equity holdings, which does not incorporate the role of bilateral

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[25] Portes and Rey (2005) find that the covariance of stock returns has a positive impact on bilateral equity flows if distance is excluded from the regression, but turns negative once distance is included. However, in our case, the correlation remains positive even if distance is held fixed. (The results are similar whether we use covariances or correlations. A similar picture applies when we consider real local returns, rather than real dollar returns.)

[26] Financial centers in the sample are Hong Kong S.A.R, Ireland, Singapore, Switzerland, and the United Kingdom. In addition to acting as financial centers, these countries have domestic stock markets which are 'final' destinations for foreign portfolio investment.

factors. For the latter, the elasticity is consistently estimated at around ½ . The importance of domestic stock market development in explaining foreign equity investment is in line with the findings of di Giovanni (2005), who finds that countries with more developed domestic financial market are more likely to engage in mergers and acquisitions operations abroad.

While the capital controls index has a strong negative correlation with equity holdings, it loses significance in the multivariate regression, particularly on account of its strong collinearity with GDP per capita.[27] The financial center dummy, while consistently positive, is always statistically insignificant, suggesting that the features of financial centers relevant for overall asset holdings are already captured by other explanatory variables. Columns (2) and (5) add to the explanatory variables the domestic stock market's Sharpe ratio, calculated over 1980-1996. Its coefficient is statistically insignificant. Columns (3) and (6) add instead the country's "beta" vis-à-vis the MSCI world return index, together with the standard deviation of the residual from the beta regression as a measure of stock return volatility. While beta is not statistically significant, there is evidence that higher volatility of *domestic* stock returns reduces outward equity investment.

In sum, our results suggest that the overall level of development and the depth of the domestic financial market, as reflected by stock market capitalization and low volatility, are reflected in increased external diversification—richer countries and those with a stronger "equity culture" hold larger gross foreign equity positions.

D. Aggregate Liability Positions

In order to explain what makes countries attractive as a destination for foreign portfolio investors, we use a similar set of explanatory variables as those used for asset holdings. One addition is a dummy for Middle-Eastern countries, added because the largest holders of equity assets in the region (Kuwait, Saudi Arabia, United Arab Emirates) did not participate in the CPIS. If we assume that proximity matters for equity investment (either through trade connections or for informational reasons), the derived liabilities for countries in the Middle-Eastern region are likely to substantially under-estimate their total external equity liabilities.

The overall sample size is constrained by the availability of stock market capitalization data, which reduces the initial sample of 218 countries/territories to 65.[28] As the dependent variable, in regressions (1)-(3) we use the fixed host-country effect estimated from the regression of log bilateral equity shares on log source imports, in line with our theoretical approach (see equation (2) in Section II.A). To check robustness, in columns (4)-(6), we present instead results using as dependent variable the overall stock of equity liabilities, taken

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[27] The controls variable is the 1996-2001 average of an index of restrictions on capital market securities constructed by Johnston and Tamirisa (1998) and Johnston and others (1999).

[28] In addition to the 48 countries in the sample used for equity assets, we have data on derived liabilities for 17 countries/territories that did not participate in the 2001 CPIS.

to be the highest between the one reported in the 2001 CPIS survey and the one reported in the IIP. Unlike assets, liabilities are not measured directly by the CPIS, but can be derived by summing the asset holdings that participating countries report in each destination country.

Results are presented in Table 10, and identify the size of the host's stock market as the key correlate of equity liabilities, albeit with an elasticity well below unity—a 10 percent increase in the size of the domestic stock market is accompanied by a 5 to 7 percent increase in foreign equity liabilities. Also, the financial center and Middle-Eastern dummies are highly significant, with the expected sign. For example, ceteris paribus, the liabilities of financial centers are twice as large as in other countries. GDP per capita is significant in regressions (4)-(6), but not in the fixed effect regressions, suggesting that its impact is captured by the variables explaining bilateral holdings. Controls on capital inflows are strongly negatively correlated with equity liabilities but statistically insignificant in all multivariate regressions. This result is probably related to the difficulty in measuring restrictions on foreign equity investment and to the collinearity of this variable with stock market development and GDP per capita. The Sharpe ratio (col. (2) and (5)) and the domestic stock market beta and volatility are all statistically insignificant, even when calculated over 1995-2001.

For columns (4)-(6), the last row of the Table reports the fit of the regression when the dependent variable is the log share of the domestic stock market owned by foreigners.[29] As for asset regressions, we also added a host of other potential explanatory variables, including inflation and real exchange rate volatility, other measures of capital controls (from Quinn (1997)), transaction costs on domestic stock markets (from Elkins-McSherry), and indicators of securities' laws (from La Porta et al. (2003)). While all these variables are correlated with equity liabilities, they are not significant in multivariate regressions.

E. Summary and Discussion of Empirical Results

Tables 5-9 provide a comprehensive set of results concerning the drivers of international investment patterns. When the pure bilateral element in portfolios is isolated through the inclusion of double fixed effects, we find a robust positive relation between bilateral imports and bilateral equity holdings. In addition, other bilateral linkages (e.g. a common language) are also important, illustrating the influence of information barriers on investment patterns.

Of course, as illustrated by the gap between the adjusted and bilateral R^2 values in Tables 5-7, aggregate factors play an even larger role in determining overall portfolio positions. The most important sources and destinations of international equity investment are countries with high GDP per capita and domestic stock market capitalization, and financial centers which intermediate high levels of equity investment. Comparing estimated coefficients across Tables 8-9, an increase in market capitalization seems to be associated with a roughly equal increase in both foreign equity assets and liabilities, whereas an increase in GDP per capita is

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[29] In these regressions, the estimated coefficients for stock market cap. are one minus the point estimates from the baseline specifications, and are all significant at the 5 percent level.

associated with an increase in the net foreign equity position. This latter result is consistent with the analysis of international balance sheets in Lane and Milesi-Ferretti (2005), showing that countries such as the U.S. and the U.K. have substantially positive net equity holdings.

VI. CONCLUDING REMARKS

This paper uses a new dataset on bilateral portfolio equity investment, covering the largest portfolio equity investor countries, including offshore centers. It develops an empirical framework that identifies the key correlates of bilateral equity holdings and of aggregate portfolio equity assets and liabilities. The most striking result is that bilateral equity holdings are strongly correlated with the bilateral trade in goods. Informational links, such as a common language and common legal origins, are also important. The size of equity holdings abroad is increasing in the level of development and domestic financial depth—richer countries and those with a stronger "equity culture" hold larger foreign equity positions. The size of the host country's stock market is the key correlate of aggregate equity liabilities.

There are several directions for future research. One important issue is the role of offshore centers. Table A2 offers a 'geographical' perspective on the size of investment in offshore and financial centers: it lists, for the main international investors, equity asset holdings in offshore and financial centers, and derived liabilities to these centers. 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). Devising methods to allocate, albeit roughly, equity investment in offshore centers to their ultimate destination is an important, if difficult, research objective.

Another avenue for research consists in developing the economic implications of the asymmetries in the geographical portfolio allocations that this paper has highlighted. For instance, these data may be employed to calculate the differential wealth impact across source countries of a financial shock such as a decline in the U.S. stock market: those countries with greater exposures to the U.S. clearly suffer a greater loss. Asymmetries in investment positions have also implications for the exchange rate behavior: the bilateral exchange rate response to a given shock should be affected by the degree of bilateral financial integration. More broadly, these data can help examine whether bilateral financial integration affects other bilateral economic relations (see Imbs 2004a, 2004b). Of course, establishing lines of causality between financial and other linkages is a challenging task.

Further, a comparative analysis across different asset classes, including portfolio debt allocations; bank loans and deposits; and FDI positions, would provide a more comprehensive account of the various components of the geography of international investment positions and gain further insight into the 'external capital structure' of nations.

At a more speculative level, it is also worth exploring whether the bilateral pattern of investment also influences aggregate economic variables: for instance, does 'financial remoteness' or the composition of the investor base affect the level of aggregate investment, the cost of capital and the stability of capital flows?

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Appendix

A. Theoretical Model

In the N-country generalization of the Obstfeld-Rogoff model, the share of country i's equity that is held by country j is: (a) a decreasing function of the bilateral trading cost between i and j, *relative to the average trading costs between country i and all other countries*; and (b) an increasing function of the relative importance of good i in country j's consumption preferences. The relative statement is important, as shown by Anderson and van Wincoop (2003) in respect of "multilateral resistance" in product trade.

The setup is as follows. There are N countries, each with a random endowment of a distinct perishable good: there is a symmetric joint distribution across $(Y_1...Y_N)$. A complete set of Arrow-Debreu securities are available. We consider a one-period portfolio problem. An individual agent in country j seeks to maximize the expected utility from consumption

$$EU_j = E\left\{ \frac{1}{1-\rho} \left[\left(\sum_{i=1}^{i=N} \omega_{ij} C_{ij}^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}} \right]^{1-\rho} \right\} = E\frac{C_j^{1-\rho}}{1-\rho} \tag{A1}$$

where ω_{ij} is the relative preference by consumers in country j for good i, C_j is the index of total real consumption, θ is the elasticity of substitution between any two goods and ρ is the coefficient of relative risk aversion. There are iceberg shipping costs: only a fraction $(1-\tau_{ij})$ of a unit of a good shipped from country i to country j survives the journey. We normalize $\omega_{jj} = 1$, $\tau_{jj} = 0 \quad \forall j$.

We assume competitive product markets such that

$$P_{ii} = (1-\tau_{ij})P_{ij} \tag{A2}$$

where P_{ii}, P_{ij} denotes the prices of good i in countries i and j respectively.

Free trade in Arrow-Debreu securities implies that the ratio of marginal utilities of consumption for good i between agents in countries i and j must reflect the relative price of good i between countries i and j:

$$\frac{1}{P_{ii}} \frac{\partial U}{\partial C_{ii}} = \frac{1}{P_{ij}} \frac{\partial U}{\partial C_{ij}} \qquad \forall i,j \tag{A3}$$

or

$$C_{ii}^{-1/\theta} C_i^{1/\theta-\rho} = (1-\tau_{ij})\omega_{ij} C_{ij}^{-1/\theta} C_j^{1/\theta-\rho} \tag{A4}$$

Under the simplifying assumption that $\rho = 1/\theta$, this further reduces to

$$[1 - \tau_{ij}]^{\theta} \omega_{ij}^{\theta} C_{ii} = C_{ij} \tag{A5}$$

In the goods market, output clearing requires that

$$Y_i = \sum_{j=1}^{N} \left[\frac{C_{ij}}{(1 - \tau_{ij})} \right] \tag{A6}$$

Hence the portfolio allocations required for equilibrium consumption shares are

$$x_{ij}^* = \left\{ \frac{(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta}}{\sum_{j=1}^{N} \left[(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta} \right]} \right\} Y_i \tag{A7}$$

Under the simplifying assumption that $\rho = 1/\theta$, this allocation can be achieved under equity trade alone. The allocation means that country j holds a larger share in country i's equity, the lower is the transport cost between i and j relative to the average transport cost between i and all other countries; and the greater is the relevant importance attached to good i in country j's consumption preferences. The log of this expression yields

$$\log(x_{ij}^*) = (\theta - 1)\log(1 - \tau_{ij}) + \theta \log(\omega_{ij}) - \log(\sum_{j=1}^{N} \left[(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta} \right]) + \log Y_i \tag{A8}$$

The latter two terms are constant for fixed i across all pairs (i, j) and so can be represented by a country-i constant. This allows us to simplify the expression to

$$\log(x_{ij}^*) = \alpha_i + (\theta - 1)\log(1 - \tau_{ij}) + \theta \log(\omega_{ij}) \tag{A9}$$

The above analysis assumes symmetry across countries (i.e. identical shares in consumption in the absence of transport costs or heterogeneity in preferences). It is straightforward to allow for differences across countries (e.g. in relative country sizes). In fact, this delivers a revised version of the portfolio allocation equation

$$x_{ij}^* = \left\{ \frac{(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta}}{\left(\sum_{j=1}^{N} (1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta} \right)} \right\} Y_i \left[\frac{W_j}{\sum_{j=1}^{N} W_j} \right] \tag{A10}$$

where the last term is the share of country j in global wealth. In the log transformation, this term can be represented by a country-j constant

$$\log\left(x_{ij}^*\right) = \alpha_i + \alpha_j + (\theta - 1)\log(1 - \tau_{ij}) + \theta\log(\omega_{ij}) + v_{ij} \tag{A11}$$

Empirically, transport costs and consumer preferences are not directly observable. One approach would be to develop proxies for these variables. However, in the model, the volume of imports of country j from country i perfectly captures their impact. Indeed, the theoretical correspondence between equity holdings and imports is one-to-one

$$\log(x_{ij}) = \log(IMP_{ij}) \tag{A12}$$

The intuition for this perfect covariation between the bilateral pattern of imports and bilateral portfolio allocations is that consumption risk derives from shocks to a country's domestic production and output of its trading partners. A country A resident is fully insulated from shocks to production in country B if it imports nothing from B. In contrast, a hedge against output shocks in country C (from which it imports) is to hold equity in that country: fluctuations in the price of imports from C will be offset by dividend yields.

Of course, this is a highly stylized model (complete markets, perfect symmetry, each country uniquely specialized in production), and we do not expect the proportionate relation between equity positions and imports to hold exactly in the data. While (A10) gives the benchmark allocation, frictions in financial markets, information asymmetries or behavioral-finance factors may induce deviations from this benchmark. A simple way to account for these factors is the following.

$$\log(x_{ij}) - \log\left(x_{ij}^*\right) = \phi_i + \phi_j + \gamma F_{ij} + \eta_{ij} \tag{A13}$$

where ϕ_i, ϕ_j denote "aggregate" financial frictions that apply at the level of the source and host countries and F_{ij} denotes a set of factors that generate financial frictions at the bilateral level. In combination with equation (10), this gives a new equation

$$\log(x_{ij}) = \phi_i + \phi_j + \sigma\log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \tag{A14}$$

where we allow for a non-unitary coefficient on the trade variable in view of the possibility that bilateral trade may partly operate as an information variable that reduces bilateral financial frictions.[30] (Of course, measurement error in the import variable is another reason to expect the coefficient estimate to deviate from unity.)

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[30] The appropriate specification for a regression explaining bilateral equity holdings should include both source- and host-country fixed effects. Anderson and van Wincoop (2004) also emphasize the importance of including country dummies in gravity trade models, for analogous reasons. See also Baltagi et al (2003). Anderson and van Wincoop (2003) implement a nonlinear estimation method, while Rose and van Wincoop (2002) rely instead on country dummies.

B. Countries and territories 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.

C. Variables: sources and definitions

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

Total portfolio equity holdings, CPIS: Total portfolio equity holdings held by source country residents as reported in the 2001 CPIS.

Total portfolio equity assets and liabilities, IIP: Total portfolio equity assets and liabilities. Source: International Monetary Fund, International Financial Statistics and national sources.

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).

Time difference: absolute value of time difference between source and host country (ranging from 1 to 12). Source:

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).

Strict Currency Union: dummy taking the value of 1 if source and host country are in a currency union. Source: Rose and Spiegel (2004).

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 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 et al. (2003).

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 (MSCI).

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, MSCI, and World Bank, World Development Indicators (WDI).

Correlation in growth rates: correlation between GDP growth in the source and host countries. Source: authors' calculations based on World Bank, WDI.

Real exchange rate volatility Volatility of the bilateral real exchange rate index between the source and the host country for the period . Source: authors' calculations based on International Monetary Fund, Information Notice System.

Log GDP: Log of 2001 GDP level in current US dollars. Source: World Bank, WDI.

Log GDP per capita: Log of 2001 GDP per capita level in current US dollars. Source: World Bank, WDI.

Log domestic stock market capitalization: log of domestic stock market capitalization in US dollars as of end-2001. Sources: Datastream, MSCI, and national sources.

Capital controls (equity assets): Index of restrictions on transactions in capital market securities, 1996-2001. Source: Johnston and Tamirisa (1998); Johnston and others (1999).

Capital controls (equity liabilities): Index of restrictions on capital inflows, 1996-2001. Source: Johnston and Tamirisa (1998) and Johnston and others (1999).

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. Source: authors' calculations based on Datastream and MSCI.

Beta: coefficient on regression of real US$ stock returns on world stock returns for the period 1980-1996. Source: authors' calculations based on Datastream and MSCI.

SD of beta residual: Standard deviation of the residual from the beta regression of stock returns. Source: authors' calculations based on Datastream and MSCI.

Table 1. Largest holders of portfolio equity assets*

Largest asset holdings (US$ billion)		Largest asset holdings (ratio of GDP)	
United States	1613	Luxembourg	16.6
United Kingdom	558	Jersey	14.8
Germany	381	Guernsey	13.5
Luxembourg	319	Isle of Man	9.6
Switzerland	247	Bermuda	8.6
Italy	239	Netherlands Antilles	2.2
Netherlands	235	Ireland	1.3
Japan	227	Bahamas	1.1
France	202	Switzerland	1.0
Canada	199	Netherlands	0.6

* The euro area's portfolio equity assets (calculated from the CPIS survey) amount to US$893 billion.

Table 2. Largest holders of portfolio equity liabilities*

Largest derived liabilities US$ billion (reported IIP equity liabilities in brackets)		Largest derived liabilities (ratio of GDP)	
United States	1000 (1533)	Cayman Islands	78.5
United Kingdom	711 (768)	Bermuda	43.7
France	387 (416)	Virgin Islands, British	28.7
Luxembourg	376 (N.A.)	Luxembourg	19.5
Japan	330 (376)	Netherlands Antilles	8.3
Netherlands	287 (284)	Guernsey	4.3
Germany	273 (296)	Jersey	2.2
Switzerland	201 (322)	Dominica	1.7
Bermuda	157 (n.a.)	Bahamas	1.1
Italy	119 (35)	Gibraltar	1.0

* The numbers in brackets in the first column are the total portfolio equity liabilities as reported by countries in their International Investment Position (IIP). The 2001 equity liabilities of the euro area reported in their IIP amounted to US$1411 billion.

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

Variable / Country	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	36.5	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	17.0	N.A.	30.1

Note: 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 *

Host country	Source country	Euro area	Japan	United Kingdom	United States
Euro area	Theor. share		17.5%	17.5%	31.1%
	Actual share		16.8%	43.7%	28.6%
Japan	Theor. share	11.0%		10.2%	18.1%
	Actual share	7.3%		9.9%	10.6%
United Kingdom	Theor. share	10.6%	9.8%		17.4%
	Actual share	22.2%	13.0%		21.7%
United States	Theor. share	58.1%	53.8%	53.6%	
	Actual share	45.2%	54.3%	24.3%	
Rest of the world	Theor. share	20.3%	18.8%	18.7%	33.4%
	Actual share	25.4%	15.9%	22.0%	39.1%

*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. Bilateral portfolio equity holdings, all countries:
panel regressions with fixed source and host effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel FE	Panel FE	Panel FE	IV	Tobit	Tobit	Tobit
Avg. imports, 1997-2001	0.32	0.22	0.21	0.52	0.73	0.36	0.28
	(17.93)**	(8.42)**	(3.58)**	(5.13)**	(21.82)**	(8.24)**	(4.81)**
Log distance		-0.61	-0.22			-0.75	-0.14
		(9.17)**	(2.13)*			(8.04)**	(1.43)
Time difference		0.06	-0.04			0.04	-0.07
		(4.52)**	(1.88)†			(1.83)†	(3.42)**
Common language		0.33	0.33	0.20		0.64	0.44
		(3.63)**	(2.54)*	(1.43)		(4.82)**	(3.44)**
Colony dummy		0.19	0.30	0.21		0.50	0.26
		(1.21)	(1.39)	(0.92)		(2.43)*	(1.24)
Currency union dummy		1.33	0.33	0.61		0.12	0.19
		(7.64)**	(1.82)†	(2.73)**		(0.56)	(1.06)
Tax treaty		-0.10	-0.24	-0.25		0.19	-0.03
		(1.36)	(2.05)*	(1.86)†		(1.72)†	(0.24)
Correl. in growth rates		0.17	0.61	0.59		0.65	0.63
		(1.80)†	(3.66)**	(2.00)*		(4.26)**	(3.76)**
Correl. in stock returns			2.08	2.23			1.50
			(4.52)**	(2.46)*			(3.16)**
Correl. growth-stock ret.			0.49	1.07			0.28
			(3.00)**	(1.80)†			(1.65)†
Common legal origin			0.28	0.09			0.32
			(2.93)**	(0.80)			(3.43)**
Observations	4340	3306	1129	927	4340	3306	1129
No. of host countries	50	50	37	33	50	50	37
No. of source countries	172	157	42	36	172	157	42
Adjusted R^2	0.60	0.70	0.76				
Bilateral R^2	0.07	0.16	0.33				
Pseudo R^2				0.89	0.46	0.45	0.45

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. Bilateral R^2 is the marginal explanatory power of the bilateral
regressors, over and above the explanatory power of the host and source country fixed effects and
is measured as one minus the squared residual standard error divided by the squared residual
standard error of a regression on the fixed effects alone.
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Table 6. Bilateral portfolio equity holdings, OECD source countries:
panel regressions with fixed source and host effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel FE	Panel FE	Panel FE	IV	Tobit	Tobit	Tobit
Avg. imports, 1997-2001	0.25	0.18	0.26	0.46	0.53	0.37	0.30
	(13.06)**	(7.36)**	(4.77)**	(4.59)**	(14.99)**	(8.07)**	(5.51)**
Log distance		-0.43	-0.12			-0.47	-0.09
		(6.15)**	(1.18)			(4.35)**	(0.91)
Time difference		0.05	-0.02			0.05	-0.02
		(3.36)**	(0.83)			(2.07)*	(0.82)
Common language		0.25	0.26	0.16		0.47	0.26
		(3.05)**	(2.04)*	(1.11)		(3.45)**	(2.07)*
Colony dummy		0.31	0.21	0.30		0.57	0.23
		(2.39)*	(1.03)	(1.38)		(2.83)**	(1.15)
Currency union dummy		0.12	0.48	0.61		0.03	0.48
		(0.82)	(2.87)**	(2.69)**		(0.14)	(2.96)**
Tax treaty		-0.08	-0.27	-0.25		0.03	-0.23
		(1.18)	(2.25)*	(1.87)†		(0.28)	(1.93)†
Correl. in growth rates		0.26	0.11	0.51		0.36	0.04
		(2.72)**	(0.64)	(1.78)†		(2.09)*	(0.22)
Correl. in stock returns			0.19	-0.01			0.11
			(0.37)	(0.01)			(0.21)
Correl. growth-stock ret.			-0.12	0.59			-0.30
			(0.71)	(1.03)			(1.72)†
Common legal origin			0.25	0.15			0.28
			(2.70)**	(1.40)			(3.05)**
Observations	2528	2324	788	700	2528	2324	788
No. of host countries	172	57	42	36	172	57	42
No. of source countries	23	23	22	22	23	23	22
Adjusted R^2	0.86	0.87	0.87				
Bilateral R^2	0.07	0.11	0.23				
Pseudo R^2				0.91	0.51	0.51	0.50

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. Bilateral R^2 is the marginal explanatory power of the bilateral regressors, over and above the explanatory power of the host and source country fixed effects and is measured as one minus the squared residual standard error divided by the squared residual standard error of a regression on the fixed effects alone.

Table 7. Bilateral portfolio equity holdings, emerging market source countries:
panel regressions with fixed source and host effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel FE	Panel FE	Panel FE	IV	Tobit	Tobit	Tobit
Avg. imports, 1997-2001	0.19	0.18	0.23	0.81	0.71	0.23	0.24
	(12.12)**	(4.73)**	(1.68)	(5.19)**	(14.81)**	(3.18)**	(1.55)
Log distance		-0.08	-0.04			-0.59	-0.69
		(0.99)	(0.15)			(4.18)**	(2.30)*
Time difference		-0.10	-0.11			-0.07	-0.08
		(5.02)**	(2.62)**			(2.44)*	(1.86)†
Common lang.		0.24	0.06	-0.18		0.55	0.51
		(1.77)	(0.23)	(0.66)		(2.71)**	(1.87)†
Colony dummy		1.42	1.55	1.21		1.38	0.98
		(4.88)**	(2.98)**	(2.26)*		(3.67)**	(1.90)†
Tax treaty		-0.02	0.10	0.08		0.42	0.44
		(0.22)	(0.41)	(0.34)		(2.46)*	(1.71)†
Correl. in growth rates		-0.07	0.40	0.70		0.12	0.20
		(0.52)	(1.01)	(1.09)		(0.53)	(0.47)
Correl. in stock returns			0.42	-0.06			0.62
			(0.40)	(0.06)			(0.53)
Correl. growth-stock ret.			0.07	0.17			-0.05
			(0.19)	(0.44)			(0.11)
Common legal origin			0.35	0.26			0.50
			(1.94)†	(1.40)			(2.56)*
Observations	1812	982	341	341	1812	982	341
No. of host countries	172	157	42	42	172	157	42
No. of source countries	27	27	15	15	27	27	15
Adjusted R^2	0.35	0.41	0.51				
Bilateral R^2	0.08	0.24	0.28				
Pseudo R^2				0.77	0.49	0.45	0.40

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. Bilateral R^2 is the marginal explanatory power of the bilateral regressors, over and above the explanatory power of the host and source country fixed effects and is measured as one minus the squared residual standard error divided by the squared residual standard error of a regression on the fixed effects alone.

Table 8. Determinants of aggregate portfolio equity assets
(2001 end-of-period stock)

	(1) CPIS (fixed effect)	(2) CPIS (fixed effect)	(3) CPIS (fixed effect)	(4) Max (CPIS, IIP)	(5) Max (CPIS, IIP)	(6) Max (CPIS, IIP)
Log GDP	-0.24	-0.29	-0.16	0.32	-0.01	0.20
	(1.14)	(1.48)	(0.77)	(0.96)	(0.02)	(0.61)
Log GDP per capita	0.58	0.90	0.87	1.35	1.41	1.44
	(2.90)**	(4.74)**	(4.25)**	(4.35)**	(4.51)**	(4.45)**
Log domestic stock mkt cap	0.56	0.47	0.35	0.58	0.65	0.45
	(3.20)**	(2.98)**	(2.09)*	(2.11)*	(2.51)*	(1.73)†
Log exports	0.03	0.10	0.10	-0.00	0.01	0.07
	(0.27)	(1.16)	(1.18)	(0.01)	(0.08)	(0.52)
Capital controls	-0.41	0.25	0.54	-0.83	-1.48	-0.25
	(0.63)	(0.43)	(0.77)	(0.83)	(1.52)	(0.23)
Financial center	0.43	0.33	0.44	0.51	0.04	0.45
	(0.85)	(0.76)	(1.04)	(0.65)	(0.06)	(0.68)
Sharpe ratio		-0.67			1.40	
		(0.41)			(0.52)	
Beta (1980-1996)			-0.02			-0.58
			(0.06)			(1.13)
SD of "beta residual" (1980-96)			-6.48			-11.49
			(1.94) †			(2.18)*
Constant	-12.19	-10.48	-5.40	-13.17	-9.52	-2.12
	(4.20)**	(3.47)**	(1.72)	(4.35)**	(3.23)**	(0.68)
Observations	48	40	40	48	40	40
Adjusted R^2	0.76	0.81	0.82	0.83	0.83	0.86

Note: The dependent variable in columns (1)-(3) is the fixed source country effect obtained from a panel regression of log bilateral equity holdings on log source country imports and other macroeconomic and structural variables (see Table 5, column (2)). The dependent variable in columns (4)-(6) is the log of the maximum stock of portfolio equity assets between the one reported in the CPIS and the one reported in the country's International Investment Position. t-statistics in parenthesis. †, *, ** indicate statistical significance at the 10 percent, 5 percent, and 1 percent confidence level, respectively. CPIS indicates the stock derived from the 2001 Portfolio Survey; IIP indicates the stock reported in the International Investment Position.

Table 9. Determinants of aggregate portfolio equity liabilities
(2001 end-of-period stock)

	(1) CPIS (fixed effect)	(2) CPIS (fixed effect)	(3) CPIS (fixed effect)	(4) Max (CPIS, IIP)	(5) Max (CPIS, IIP)	(6) Max (CPIS, IIP)
Log GDP	0.12 (0.85)	0.16 (1.22)	0.12 (0.76)	-0.00 (0.02)	0.11 (0.60)	0.19 (0.90)
Log GDP per capita	0.08 (0.84)	0.11 (1.10)	0.10 (0.96)	0.27 (1.90)†	0.33 (2.36)*	0.31 (2.12)*
Log domestic stock mkt cap	0.46 (5.18)**	0.48 (5.14)**	0.53 (4.93)**	0.71 (5.20)**	0.66 (5.12)**	0.63 (4.23)**
Log imports	0.12 (0.72)	0.02 (0.11)	0.00 (0.00)	0.45 (1.86) †	0.21 (1.02)	0.14 (0.68)
Capital controls	-0.22 (0.49)	0.17 (0.35)	0.09 (0.18)	-0.43 (0.63)	-0.00 (0.01)	0.01 (0.01)
Financial center dummy	0.63 (2.20)*	0.67 (2.73)**	0.65 (2.57)*	0.59 (1.34)	0.75 (2.23)*	0.82 (2.35)*
Middle East dummy	-1.23 (4.95)**	-1.04 (2.88)**	-0.97 (2.60)*	-1.73 (4.53)**	-1.99 (4.00)**	-1.93 (3.81)**
Sharpe ratio (1980-1996)		0.77 (1.13)			0.56 (0.60)	
Beta (1980-1996)			0.05 (0.32)			0.21 (1.02)
SD of "beta residual" (1980-96)			1.92 (0.94)			-1.02 (0.37)
Constant	-1.75 (1.80) †	-1.74 (1.51)	-1.69 (1.44)	-5.54 (3.71)**	-4.27 (2.69)*	-3.96 (2.46)*
Observations	65	47	47	65	47	47
Adjusted R^2	0.90	0.90	0.90	0.91	0.93	0.93
R^2 when dep. var. is log (equity/mkt cap)				0.44	0.54	0.53

* Dependent variable in columns (1)-(3) is the fixed host country effect obtained from a panel regression of log bilateral equity holdings on a set of macroeconomic and structural variables (see Table 5, column (2)). Dependent variable in columns (4)-(6) is the log of the maximum stock of portfolio equity liabilities between the one reported in the CPIS and the one reported in the country's International Investment Position. t-statistics in parenthesis. CPIS indicates the stock derived from the 2001 Portfolio Survey; IIP indicates the stock reported in the International Investment Position. †, *, ** indicate statistical significance at the 10 percent, 5 percent, and 1 percent confidence level, respectively.

Table A1. Sample size, number of observations=0, and total equity holdings

All countries

Sample	# source	# host	# observations		total source equity holdings	
			total	=0	US $ billion	% of no offshore with trade
Full	67	223	7069	4293	5163	
No offshore, with trade	50	172	4340	2715	3956	100%
add macro variables	50	157	3126	1579	3952	99.9%
add stock mkt variables	42	48	1459	239	3947	99.8%
add CLO	37	42	1129	132	3917	99.0%

OECD

Sample	# source	# host	# observations		total source equity holdings	
			total	=0	US $ billion	% of no offshore with trade
Full	24	223	3779	1885	4921	
No offshore, with trade	23	172	2528	1398	3840	100.0%
add macro variables	23	157	2171	1086	3836	99.9%
add stock mkt variables	23	48	897	46	3832	99.8%
add CLO	23	42	788	38	3809	99.2%

European Union sample

Sample	# source	# host	# observations		total source equity holdings	
			total	=0	US $ billion	% of no offshore with trade
Full	15	223	2171	1127	2449	
No offshore, with trade	23	172	1528	806	1773	100.0%
add macro variables	23	157	1316	628	1771	99.9%
add stock mkt variables	23	48	582	29	1769	99.8%
add CLO	23	42	510	24	1759	99.2%

Emerging market sample

| Sample	# source	# host	# observations		total source equity holdings	
			total	=0	US $ billion	% of no offshore with trade
Full	43	223	3224	2408	224.1	
No offshore, with trade	27	172	1812	1317	116.2	100.0%
add macro variables	27	157	955	493	115.6	99.5%
add stock mkt variables	19	48	562	193	114.6	98.6%
add CLO	14	42	341	94	107.6	92.6%

Total equity holdings: sum of portfolio equity holdings of source countries included in the sample.
% of no offshore with trade: total equity holdings divided by equity holdings for the sample excluding offshore centers, with trade.

Table A2. Portfolio equity investment: the role of financial and offshore centers

Largest portfolio equity asset holdings in offshore and financial centers			Largest derived equity liabilities to offshore and financial centers		
	US$ billion	Share of total portf. equity assets		US$ billion	Share of derived portfolio equity liabs.
United States	197.0	12.3%	United States	167.3	16.8%
Germany	104.4	27.4%	United Kingdom	77.0	10.9%
Italy	103.7	43.3%	Germany	41.4	15.3%
Switzerland	73.0	29.5%	France	38.2	9.8%
Belgium	49.8	46.9%	Japan	29.0	8.7%
Hong Kong	42.9	45.3%	Netherlands	22.4	7.8%
France	26.6	14.4%	Switzerland	18.9	9.4%
United Kingdom	19.3	3.5%	Italy	17.7	14.8%
Japan	18.3	8.1%	Cayman Islands	15.2	16.6%
Luxembourg	13.2	4.1%	Luxembourg	12.5	3.4%

Figure 1. Degree of foreign equity bias

OECD source and host countries
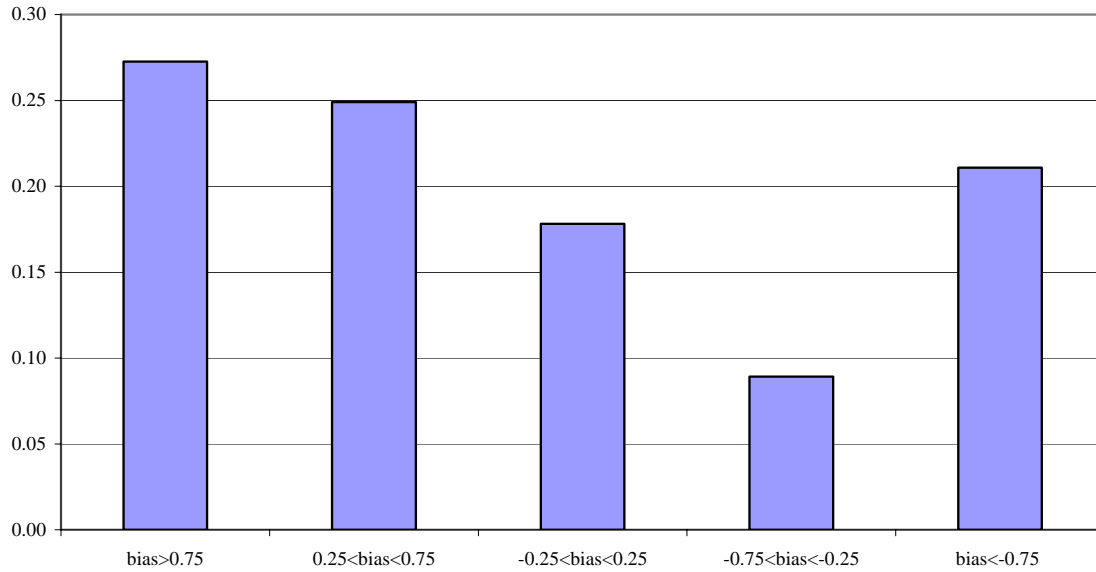
Full sample
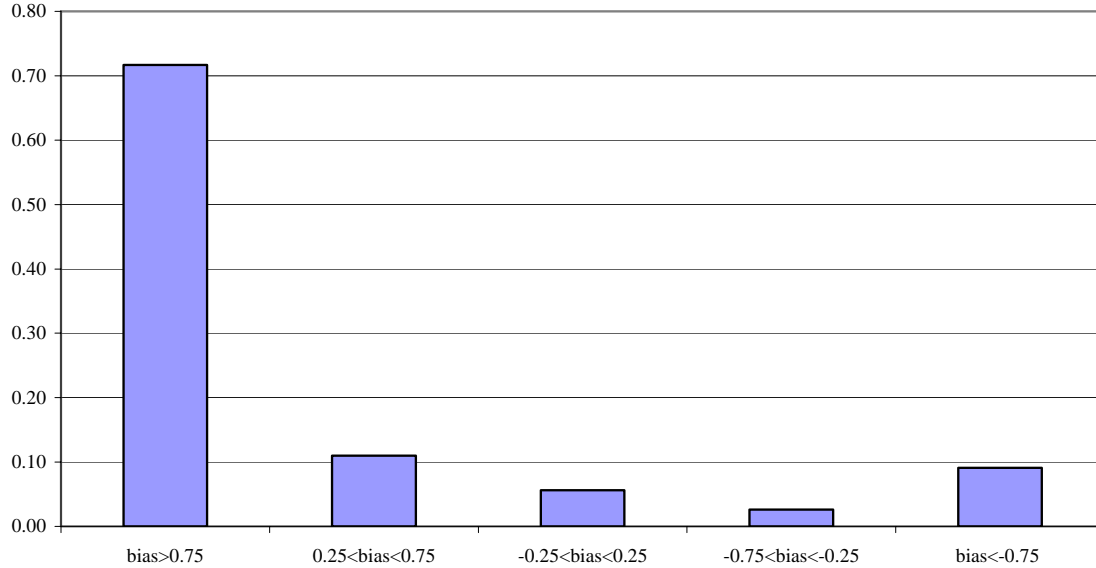
The histogram measures the fraction of total observations for which the foreign equity bias falls within given bounds. The foreign equity bias is defined as 1 – (equity holdings ratio/market cap ratio) where the equity holdings ratio equals source country holdings in the host country divided by total equity holdings by the source country, and the market cap ratio equals market capitalization in the host country divided by world stock market capitalization.

Figure 2. Scatter of 2001 Equity Holdings versus 2001 Imports