

## **International Investment Patterns: Evidence Using A New Dataset**

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# **International Investment Patterns: Evidence Using A New Dataset\***

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## **Abstract**

This paper examines the bilateral, source and host factors driving portfolio equity investment across countries, using International Monetary Fund's new dataset on international equity holdings at the end of 1997, 2001 and 2002. This paper illustrates a model that links bilateral equity holdings to bilateral trade in goods and services.

This paper finds that the bilateral equity investment is strongly correlated with the underlying patterns of trade in goods and services. The size of domestic stock market is the key correlate of aggregate foreign portfolio equity asset and liability holdings. The scale of aggregate foreign equity asset holdings is larger for countries having more per capita income.

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## I. INTRODUCTION

International parity relations suggest that in a fully-integrated global economy without frictions in product or asset markets, the investors should hold identical portfolios, regardless of nationality. However, it is observed that, in the international equity investment patterns, there is a strong bilateral variation in portfolio allocations. The study of asymmetries in the portfolio allocations raises several questions. For instance, which bilateral factors are responsible for explaining the overall size of countries' portfolio investment holdings? Are cultural, informational factors important in explaining the asymmetries in portfolio allocations? How do financial frictions in markets affect the structure of international portfolio allocations? What is the connection between domestic and international financial development? The answers to these questions are important to several fields in economics including international macroeconomics and international finance, portfolio analysis, behavioural finance etc. This paper focuses on identifying the bilateral factors that explain the asymmetries in portfolio allocations.

There is a voluminous literature, that tries to explain the international patterns of bilateral investment. Wei (2000) and Stein and Daude (2003), among others focus on the geography of foreign direct investment. These studies have used the readily available, OECD database for foreign direct investment. Buch (2002,2003); Buch et al (2003); and Kawai and Liu (2001) study the bank lending by employing the readily available BIS database. Ghosh and Wolf (2001) and Sarisoy (2003) study the comparative analysis of the impact of spatial factors on different international investment categories. Portes, Rey and Oh (2001) investigate the roles of explicit informational variables and distance in explaining cross border trade in corporate equities, corporate bonds and government bonds; for the United States. These studies have used the OECD and BIS database on direct investment and bank lending, respectively. These studies have used the empirical methods similar to those employed in traditional gravity models of international goods trade.

This paper makes use of a new data set on international portfolio equity investments. This database provides a geographical breakdown of international portfolio holdings at end-1997, 2001 and 2002, which includes virtually all major international investors economies. This paper extends the work of Obstfeld and Rogoff (2001) and Lane and Milesi-Ferretti (2004) in presenting a simple theoretical model that highlights trade as an important potential determinant of bilateral equity holdings. The empirical analysis focuses on the roles played by financial frictions. This paper highlights the role of bilateral factors in explaining the structure of countries' equity asset portfolios and the role of aggregate country characteristics in explaining the overall size of countries' foreign equity asset and liability positions.

Some authors have focussed specifically on the pattern of bilateral equity investment. Portes and Rey (2003) use panel data set on bilateral gross cross-border equity flows among 14 countries, for the period from 1989 to 1996. They show that gross transaction flows depend on market size and trading costs. The geography of information is the main determinant of the pattern of international transactions. Some studies on the geography of the stock of portfolio equity investment have focussed on a single source country. Studies by Ahearne, Grier, and Warnock (2003), Mane and Meade (2002); Dahlquist, Pinkowitz, Stulz, and Williamson (2002) have focussed on

United States. Coval and Moskowitz (1999) and Huberman (2001) have studied the regional investment patterns within the United States. Honohan and Lane (2000) have focussed their research on Ireland. However, the papers by Yildrium (2003) and Lane and Milesi-Ferretti (2004) are exceptions. Yildirim (2003) has examined the role of various corporate governance indicators in determining investment patterns, by employing 2001 Coordinated Portfolio Investment Survey (CPIS) data (23 source countries, 49 host countries). Lane and Milesi-Ferretti (2004) have analysed the bilateral, source and host factors driving portfolio equity investment across countries (50 sources and 172 host countries), using 2001 CPIS data.

This paper adds value to the existing literature on both the theoretical and empirical front. On the theoretical front, this paper develops a model for analysing the bilateral equity holdings. On the empirical front, this paper analysis the bilateral and aggregate positions utilizing a new dataset.

The structure of this paper is as follows. Section II describes a theoretical framework, Section III the empirical strategy, Section IV the data, Section V the empirical results and Section VI the conclusions and directions for future research.

## II THEORETICAL FRAMEWORK

Davis, Nalewaik, and Willen (2001), Martin and Rey (2000), (2003); Obstfeld and Rogoff (2001); and Ahearne, Alan B., William Grierer and Frank Warnock (2004); have developed approaches to model bilateral equity investment positions.

Ahearne et. al (2004) test home bias in equity holdings using cross-border holdings data and quantitative measures of barriers to international investment in United States. The authors regress the degree of US investors home bias against each country, on a vector of explanatory variables that includes direct and indirect barriers to international investment and control variables such as trade links and historical risk adjusted returns.

Martin and Rey (2000) investigate the impact of financial integration on asset return, risk diversification and breadth of financial markets. They analyse a three country macro economic model in which the number of financial assets is endogenous; assets are imperfect substitutes; cross border asset trade entails some transaction costs and investment technology is indivisible. They study the impact of financial integration in a subset of two of these countries. In this case, lower transaction costs between two financial markets translate into higher demand for assets issued on those markets, higher asset price and larger diversification. For the third country left outside the integrated area, the welfare impact is ambiguous i.e. it enjoys better risk diversification but faces an adverse movement in its financial terms of trade. The authors find that the financial integration benefits the largest economy of the integrated area, when they endogenise financial market location. Financial integration leads to relocation of markets in the smallest economy, only when transaction costs become very small.

Martin and Rey (2003) model generates a bilateral equation for equity positions as a function of the cost of bilateral financial trade and the endogenously determined market capitalization levels. The authors interpret financial frictions to include

informational asymmetries. Their model assumes incomplete asset markets, iceberg costs in financial markets and endogenous asset creation. They show that larger country will benefit from higher asset prices, more financial assets and more diversification per capita than the smaller country. Financial integration leads to an increase in asset prices and imperfect competition structure also leads to a new source of home bias in equity holdings.

Davis, Nalewaik and Willen (2001) have developed dynamic analysis of international trade in risky financial assets under incomplete markets. They construct optimal portfolio positions, compute the benefits of expanded portfolio menus, express the equity premium puzzle in welfare terms and quantify the gains to international trade in risky financial assets. In their model, domestic financial instruments consist of a riskless and a risky asset. The ability of a domestic agent to diversify risk at home depends on the correlation between labour income and the return on the risky asset. The degree to which the availability of an international equity fund improves risk allocation depends on its correlation with domestic labour income and its correlation with the domestic risky asset. In the model, the gains to international financial trade in risky assets depends on these correlations.

In a two country model, Obstfeld and Rogoff (2001) show that the existence of trading costs in the goods market generates a home bias in equity positions, even if global financial markets are complete. These authors also indicate that heterogeneity in consumption preferences is an additional potential source of variation in bilateral investment patterns. This model is the extension of the N-country generalization of the Obstfeld and Rogoff (2001) model and it incorporates the financial frictions similar to those employed by Lane and Milesi-Ferretti (2004).

### **Model**

This paper considers Irving Fisher's (1930) two period microeconomic model of saving, for the case of a small open economy that consumes a single good and lasts for two periods (1 and 2).

An individual  $i$  maximizes lifetime utility,  $U_1^i$ . The utility  $U_1^i$  depends on period consumption levels,  $c^i$ :

$$U_1^i = u(c_1^i) + \beta u(c_2^i), 0 < \beta < 1. \quad (1)$$

where,  $\beta$  is a fixed preference parameter, (subjective discount or time-preference factor), that measures the individual's impatience to consume.

We assume that the period utility function  $u(c_1^i)$  is strictly increasing in consumption and strictly concave:  $u'(c^i) > 0$  and  $u''(c^i) < 0$ .

We assume that there are  $s = 1, 2, \dots, S$  possible date 2 states of nature. We can write lifetime utility as

$$U_1 = u(C_1) + \beta u\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\}, \quad (2)$$

where the consumption index  $\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\}$  is homogenous of degree 1 in  $C_2(1), \dots, C_2(S)$ .

We take  $\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\}$  to be the constant elasticity of substitution (CES) function,

$$\left[ \nu^{\frac{1}{\theta}} C_T^{\frac{\theta-1}{\theta}} + (1-\nu)^{\frac{1}{\theta}} C_N^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \quad \nu \in (0,1), \theta > 0, \quad (3)$$

where,  $C_T, C_N$  denote consumption of tradable and non-tradable goods respectively.  $\theta$  is the intratemporal substitution elasticity between tradable and non-tradable goods.  $\nu, 1-\nu$  are the weights of the prices of tradable and non-tradable goods.

The *constant relative risk aversion* (CRRA) class of utility functions is given by

$$u(C) = \frac{C^{1-\rho}}{1-\rho} \quad (\rho > 0, \rho \neq 1) \quad (4)$$

$$u(C) = \log(C) \quad (\rho = 1) \quad (5)$$

where,  $\rho$  is the coefficient of relative risk aversion. These equations fit the iso-elastic class if  $\sigma$ , the intertemporal substitution of elasticity, equals  $\frac{1}{\rho}$ .

Replace the intratemporal substitution elasticity  $\theta$  in equation (3) by  $\frac{1}{\rho}$ .

$$\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\} = \left[ \sum_{s=1}^S \pi(s) C_2(s)^{1-\rho} \right]^{\frac{1}{1-\rho}} \quad (6)$$

$u(C)$  (in equation (1) is iso-elastic), alongwith the equation (4), leads to an intertemporal utility function that generalizes both isoelastic and CRRA utility by allowing  $\sigma$ , to differ from  $\frac{1}{\rho}$ .

$$U_1 = \frac{C_1^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} + \beta \frac{\left\{ \left[ \sum_{s=1}^S \pi(s) C_2(s)^{1-\rho} \right]^{\frac{1}{1-\rho}} \right\}^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}}. \quad (7)$$

When  $\sigma = \frac{1}{\rho}$ , the equation (5) reduces to the expected life time utility,

$$U_1 = \frac{C_1^{1-\rho}}{1-\rho} + \beta \sum_{s=1}^S \pi(s) \frac{C_2(s)^{1-\rho}}{1-\rho}. \quad (8)$$

There are inherent uncertainties, that underlie the consumption decisions. Therefore, we consider a stochastic model wherein we make assumption that individuals have rational expectations. A rational expectation is a mathematical conditional expectation based on an accurate model of the economy's structure and on all the information about current economic variables that the individual has available.

In stochastic models, individuals can only choose contingency plans for future consumption, rather than definite future consumption levels. Future consumptions are therefore random variables. We assume that the representative individual, faced with this uncertainty, maximizes the expected value of lifetime utility,

$$U_1 = E_t \left\{ \frac{C_1}{1-\rho} + \beta \sum_{s=1}^S \pi(s) \frac{C_2(s)^{1-\rho}}{1-\rho} \right\} \quad (9)$$

The operator  $E_t \{ \}$  is a mathematical conditional expectation i.e. a probability weighted average of possible outcomes, in which probabilities are conditioned on all information available to the decision maker up to and including date  $t$ .

For one period, equation (7) reduces to,

$$U_1 = E_t \frac{C_1}{1-\rho} \quad (10)$$

In an  $N$  country generalization of Obstfeld and Rogoff (2001), the share of country  $i$ 's equity that is held by country  $j$  is 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 an increasing function of the relative importance of good  $i$  in country's  $j$ 's consumption preferences.

There are  $N$  countries and there is symmetric joint distribution across  $(Y_1, \dots, Y_N)$ . There is a complete set of Arrow Debreu securities<sup>1</sup>. We consider a one period portfolio problem. An individual  $i$  seeks to maximize the expected utility from consumption,

$$EU_j = E \left\{ \frac{1}{1-\rho} \left[ \left( \sum_{i=1}^{i=N} \omega_{ij} C_{ij}^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}} \right]^{1-\rho} \right\} = E \frac{C_j^{1-\rho}}{1-\rho} \quad (11)$$

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<sup>1</sup> See Obstfeld, Maurice and Kenneth Rogoff (1996), Chapter 5, Foundations of International Macroeconomics, The MIT Press, Cambridge, Massachusetts, London, England for a discussion on Arrow Debreu securities.

where  $\omega_{ij}$  is the relative preference by consumers in country  $j$  for good  $i$ ,  $C_j$  is the index of total real consumption,  $\theta$  is the elasticity of substitution between any two goods and  $\rho$  is the coefficient of relative risk aversion. These are iceberg shipping costs and only a fraction  $(1 - \tau_{ij})$  of a unit of a good shipped from country  $i$  to country  $j$  survives the journey.

Following the Lane and Milesi-Ferretti (2004),

$$\log(x_{ij}) = \phi_i + \phi_j + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \quad (12)$$

where  $x_{ij}$  is the the country's  $j$  share of equity holdings in country  $i$ ;  $\phi_i$ ,  $\phi_j$  denote aggregate financial frictions that apply at the level of the source and host countries;  $IMP_{ij}$  is the volume of imports to country  $j$  from country  $i$ ;  $F_{ij}$  denotes a set of factors that generate financial frictions at the bilateral level.

### III EMPIRICAL STRATEGY

This paper focuses on single cross sectional observation for the structure of external equity portfolios for the years 1997, 2001 and 2002 respectively. The empirical strategy is to isolate the relative contributions of bilateral factors, source country factors and host country factors. Bilateral factors may explain the heterogeneity in the geographical composition of the asset portfolios of source countries and investor bases of host countries. Controlling for these bilateral considerations, source country factors may explain the cross-country differences in the tendency to invest overseas while host country factors may determine variation in the attractiveness of different destinations for overseas investors.

#### **Bilateral Factors**

In line with our benchmark portfolio allocation model, this paper includes imports variable. This paper also includes some bilateral financial correlations viz. correlations in stock market returns and the correlation in GDP growth rates, that may influence asset holdings in an incomplete markets environment. Further, following Davis et al (2001), this paper also includes the correlation between the host country stock market return and the source country GDP growth rate to take into account the role of the host country stock market in potentially hedging against source country output fluctuations.

This paper utilizes the benchmark allocation model described in equation (12) to analyse the bilateral – host and source country factors affecting the portfolio equity investments across countries’.

$$\log(x_{ij}) = \phi_i + \phi_j + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \quad (12)$$

#### **Source and Host Country Factors**

Lane and Milesi-Ferretti 2001a, 2001b, 2003 examine the determinants of equity assets and equity liabilities. This paper includes various source and host factors viz. country size, domestic stock market capitalisation, trade openness and capital control.

Country size ( $G$ ) may matter in international portfolio allocations. The establishment of domestic financial markets may involve fixed set up costs and so a small country may perform its financial transactions in the financial and capital markets of other large economies. On the contrary, richer countries may invest more overseas to the extent that there are fixed costs to overseas investment and that risk aversion decreases in wealth. Larger countries may be more attractive to international investors because of the existence of fixed costs in acquiring information about investment condition in a given country. Smaller countries may be more specialized, with greater vulnerability to external shocks and more volatile national output levels as compared to larger countries. Countries that face a more volatile environment may increase cross holdings of foreign assets and liabilities to smooth their income.

Larger economies will have correspondingly larger international equity asset and liability positions. However, the gains to international risk sharing may be larger for a smaller country, due to lesser scope for domestic diversification.

Income per capita ( $I$ ) may influence the tendency to engage in international asset trade. Higher income per capita is associated with lower risk aversion and the international asset trade is perceived as riskier than domestic trade; this may also raise international asset trade. The participation in foreign asset markets involve fixed costs, this may provide a reason why high income level countries' involve more in international asset trade.

The measures of trade openness ( $T$ ) are also important in explaining aggregate international investment positions. First, international trade in goods and services itself generates financial flows and accordingly, firms may adopt various investment strategies to hedge the risk. Second, trade openness may raise volatility and hence countries may acquire international asset cross holdings to smooth their income. Third, the cross holdings of assets and liabilities acquired by the countries as a result of foreign direct investment, may generate increased trade in goods and services.

A well developed domestic financial sector ( $S$ ) may affect international investment in several ways. First, a large domestic financial sector enables the issuing of liabilities to foreign investors and thus facilitates international risk sharing. Second, the accumulation of domestic financial assets and liabilities may increase exposure to domestic risk and thus increase the need to diversify overseas. Third, the domestic financial transactions may increase financial sophistication and thus lead to an increase in international investment. These factors may lead to a positive correlation between domestic financial market development and international asset holdings.

However, domestic investors may invest overseas if investment opportunities in a shallow domestic financial market are scarce. Thus, a shallower domestic financial market may be associated with higher asset holdings overseas. The size of the domestic financial market is a basic constraint on the scale of foreign portfolio

liabilities because foreign portfolio equity investment in domestic public companies cannot exceed the size of the domestic stock market capitalization.

This paper considers the impact of controls ( $C$ ) on the determination of countries' aggregate portfolio equity assets and liabilities. The level of foreign holdings may be affected by a country's capital control regulations. A country may have a small foreign asset position if capital controls are in place or have been in recent past. If capital controls are imposed, the level of international asset cross-holdings may increase if capital account is liberalized.

Following from the above discussion and in line with the benchmark allocation model (12),

$$\log(x_{ij}) = \log(G) + \log(I) + \log(T) + \log(S) + C + \varepsilon_{ij} \quad (13)$$

## IV DATA

In 1993, the IMF Committee on Balance of Payments decided to promote an idea for an internationally coordinated benchmark survey of long term portfolio investment holdings to facilitate cross country comparisons, permit data exchanges, and encourage standardization and best practice. Countries undertaking the benchmark survey of holdings would be in a position to obtain a reasonable estimate of the outstanding balances, at market price, of the level of portfolio investment held by their residents, rather than merely summing the balance of payments flows. This would reduce to some extent the imbalance at the global level.

The purpose of the Coordinated Portfolio Investment Survey (CPIS) is to improve statistics of holdings of portfolio investment assets viz. equity, long term debt, and short term debt. CPIS collects comprehensive information, with geographical detail on the country of residence of the issuer, on the stock of cross border equities, long term bonds and notes, and short term debt instruments related to international investment position (IIP). The IIP statistics provide information to check the coverage of recorded estimates of portfolio investment financial flows and associated investment income transactions recorded in the balance of payments. CPIS exchanges the bilateral data among the participating and other countries. This data exchange enables the participating countries to improve their statistics of non-resident holdings of their portfolio investment liabilities and associated financial flows and investment income data.

The IMF has released CPIS data for end-1997, 2001 and 2002. In 1997 CPIS survey, 29 countries participated. 67 countries participated in 2001 CPIS survey. In 2002, 66 countries participated in the CPIS survey.

In 1999, the national compilers of the CPIS formed a Task Force to review the results of 1997 CPIS, to examine to what extent the survey had met its goals, and to determine whether the CPIS should be repeated. The Task Force identified several problem areas in CPIS. These problem areas are:

1. *Valuation problems:* Most of the countries provided data at market prices. However, closing market prices and exchange rates vary across time zones. For a

complete price comparability, the closing price in the last markets to close on December 31 would appear appropriate – for those in the United States. However, it was not clear that is the appropriate price for countries to use for their own purposes (specifically for international investment position). It was not clear that security databases have consistent closing times and market values. There were problems in the conversion of reported values into a common currency for some securities that are traded on two markets (e.g. London and New York).

2. *Distinguishing long term from short term:* Some countries experienced difficulty in separating short term from long term securities, because of misreporting by respondents.
3. *Distinguishing direct investment from portfolio investment:* For some countries, during the process of data collection, the data sources for direct investment were used to check against the double counting in the CPIS. However, for other countries, where these checks were not so readily made, the possibility of double counting remained.
4. *Incomplete country coverage:* A number of countries who were likely the largest holders of portfolio equity assets i.e. British Virgin Islands, China, Kuwait, Taiwan Province of China and United Arab Emirates did not participate to the CPIS.
5. *Problems in collection methods:* Many countries participated in the CPIS for the first time and therefore collection methods may still be inadequate.
6. *Third Party Holdings:* Third party holdings pose a measurement problem when the surveys are based on domestic custodians. These surveys miss the assets that are held by foreign custodians on behalf of domestic residents.
7. *Under reporting of assets:* Under reporting may be due to the incomplete institutional coverage of the survey. For instance, the Bahamas reported exclusively banking sector holdings, the German survey did not cover holdings by households, the Cayman Islands reported only portfolio holdings by the banking sector (and excluded the holdings of mutual fund industry). Under reporting may occur for several Latin American countries that experienced capital flights in the past and for countries whose assets were held in offshore centers for tax shelter reasons.

In spite of the above mentioned problems, CPIS provides comprehensive data on aggregate and bilateral international portfolio equity investment.

**Figure 1** illustrates the scatter plot of equity holdings versus imports for the year 2002. The plot indicates that developed countries have both, large value of equity holdings and imports.

[INSERT FIGURE 1 HERE]

## V EMPIRICAL RESULTS

This paper explains the portfolio equity positions for the end-1997, 2001 and 2002. There are three different dependent variables: bilateral positions, aggregate asset positions and aggregate liability positions. This paper considers a wide range of explanatory variables in the empirical analysis. The data appendix describes the data sources.

## A. The Determinants of Bilateral Equity Holdings

Tables 1a, 1b and 1c present results of panel regressions of equity holdings for the years 1997, 2001 and 2002, respectively. The dependent variable is  $\log(1+\text{equity})$ . The equity positions are measured in dollars; adding 1 to the equity position does not distort the results, rather allows including any zero observations in the log specification.

[INSERT TABLES 1a-1c HERE]

In each table, column (1) presents results using source country imports from the host country, measured as  $\log(1+\text{imports})$ , as an explanatory variable. These results indicate a strong link between bilateral imports and bilateral investment holdings. This is consistent with the model described in section II. The point estimate is slightly below the theoretical value of unity. This may be attributed to several reasons. First, there may be measurement errors in imports, which impart a downward bias to the coefficient estimate. Second, holding destination'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 destination's stock market index may not perfectly reflect import risk (e.g. it may include domestically-orientated firms). Fourth, in some cases, imports from the country may consist of generic commodities for which country's stock market would not be the appropriate hedging mechanism.

The importance of trade in explaining bilateral equity holdings stands in contrast to Ahearne et al (2003). They used 1997 data to study the US pattern of overseas investment and found that the bilateral trade has no role in explaining the bilateral equity holdings of US investors. Their specification includes a different array of control variables and does not account for fixed host country effects. They also measure trade as a ratio of host country's GDP.

Column (2) also includes the correlation in GDP growth rates between the source and host country. This variable is a proxy for the gains from bilateral diversification, along the lines of Davis et al (2001). The correlation between GDP growth rates is significantly positive (except column (3), Table 2c; which is slightly negative). The positive sign of GDP growth rate is unexpected. This indicates that investors hold equity in destinations with similar business cycles.

Column (3) also adds the correlation between stock market returns in the source and host country; and the correlation between source country GDP and host country equity returns (following Davis et al (2001)). These variables are proxies for the gains to bilateral diversification.

The correlations in stock returns are significantly positive for all three years 1997, 2001 and 2002. This is against the predictions of standard diversification arguments. This further illustrates that bilateral equity investment is taking place between countries with correlated stock market returns.

The correlation between source country GDP and host country equity returns is significantly negative. This indicates that the GDP growth rate in host country and

stock market return of source countries move in opposite directions. The investors may offset the fall in GDP growth rate in host country by the stock market return in source countries. This is in line with the standard diversification arguments.

However, other factors like information asymmetries and cultural-institutional proximity such as common language, common legal origin, common currency etc. also affect the bilateral portfolio equity holdings.

### **B. Aggregate Asset Positions**

Table 2 illustrates the panel regressions of the aggregate asset positions, for the years 1997, 2001 and 2002. The dependent variable is log of portfolio equity assets. The independent variables are the log components of the size of domestic GDP, GNI per capita, total exports of goods and services, the size of domestic stock market and a measure of capital controls.

[INSERT TABLE 2 HERE]

The dominant factors explaining equity asset positions are GNI per capita and the size of domestic stock market. The importance of stock market development in explaining portfolio equity investment is in line with the findings of Di Giovanni(2004), who explains that countries with more developed domestic financial market are more likely to engage in mergers and acquisitions abroad.

The measure of capital controls is significantly negatively correlated to portfolio equity holdings, which is in line with the theory and also its strong collinearity with GNI per capita.

The results indicate that the overall level of development and the depth of financial market, as reflected by stock market capitalization, lead to increased external diversification i.e. countries with strong equity culture hold larger gross foreign equity positions.

### **C. Aggregate Liability Positions**

Table 3 illustrates the panel regressions of the aggregate liability positions, for the years 1997, 2001 and 2002. The dependent variable is log of portfolio equity liabilities. The liabilities are not measured directly by the CPIS and are derived by summing the asset holdings that participating countries report in each destination country. The independent variables are the log components of the size of domestic GDP, GNI per capita, total imports of goods and services, the size of domestic stock market and a measure of capital controls.

[INSERT TABLE 3 HERE]

The size of the host country's domestic stock market is the key correlate of portfolio equity liabilities. The level of GNI per capita is significant for the years 2001 and 2002. The measure of capital controls is strongly negatively correlated with total equity liabilities and statistically insignificant. This may be due to the collinearity of capital controls with stock market development and GNI per capita.

## VI CONCLUDING REMARKS

This paper analysis the bilateral, source and host factors driving portfolio equity investment across countries, using International Monetary Fund's new dataset on international equity holdings at the end of 1997, 2001 and 2002. This paper illustrates a model that links bilateral equity holdings to bilateral trade in goods and services.

The most significant result is that the bilateral equity investment is strongly correlated with the underlying patterns of trade in goods. The overall level of development and the depth of financial market, as reflected by stock market capitalization, leads to increased external diversification i.e. countries with strong equity culture hold larger gross foreign equity positions. The size of domestic stock market is the key correlate of aggregate foreign portfolio equity liabilities.

This paper does not take into account the informational linkages, cultural-institutional and political factors into account. These factors also play a vital role in the bilateral equity investment patterns.

There are several issues for future research. 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. In addition, this will provide insight into the external capital structure of nations. An important issue, which may be examined, is the role of offshore centres in equity investment patterns. The research objective may be to devise methods to allocate equity investment in offshore centres to their ultimate destinations.

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## Data Appendix

Total portfolio equity holdings, CPIS: Total portfolio equity holdings held by source country residents as per CPIS 1997, 2001 and 2002.

Bilateral portfolio equity holdings: Portfolio equity issued by host country residents and held by source country residents as per CPIS 1997, 2001 and 2002.

Source – country imports: Imports of goods by source countries from host country. Source: International Monetary Fund, Direction of Trade Statistics.

Correlation in growth rate: correlation between GDP growth rate in the source and host country, 1990-2002. Source: calculations based on World Bank, World Development Indicators.

Correlation of stock returns: Correlation between the stock market returns of the host and source country, 1995-2002. Source: Calculations based on Datastream, Morgan Stanley Capital International.

Correlation growth-stock return: correlation between GDP growth in source country and real stock returns in host country, 1995-2002. Source: Calculations based on Datastream, Morgan Stanley Capital International and World Development Indicators.

Log GDP: Log of 1997, 2001, 2002 GDP level in current US dollars. Source: World Bank, World Development Indicators.

Log GNI per capita: Log of 1997, 2001, 2002 GNI per capita level in current US dollars. Source: World Bank, World Development Indicators.

Log domestic stock market capitalization: Log of domestic stock market capitalization in US dollars for end- 1997, 2001 and 2002. Source: World Stock Exchanges, FIBV database

Capital Controls: Source : Jacques Miniane (2004)

Table 1 a: Bilateral Portfolio Equity Holdings: Panel Regressions (1997)

	(1)	(2)	(3)
Imports	0.94	0.93	0.92

	(153.71)***	(75.65)***	(65.42)***
Correlation in growth rates		0.47 (2.01)**	0.47 (1.89)*
Correlation in stock returns			0.05 (0.28)
Correlation in growth-stock returns			-0.09 (-0.45)
Observations	408	224	224
No. of host countries	6	14	14
No. of source countries	70	16	16
Adjusted R <sup>2</sup>	0.34	0.22	0.21

Note: The dependent variable is log of 1 + portfolio equity holdings of the source country in the host country. t – statistics is reported in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 0.1, 0.05 and 0.01 confidence level, respectively.

Table 1 b: Bilateral Portfolio Equity Holdings: Panel Regressions (2001)

	(1)	(2)	(3)
Imports	0.93 (164.44)***	0.94 (75.65)***	0.91 (58.02)***
Correlation in growth rates		0.59 (2.01)**	0.41 (1.65)*
Correlation in stock returns			1.03 (3.01)***
Correlation in growth-stock returns			-0.79 (-2.71)***
Observations	424	272	272
No. of host countries	6	17	17
No. of source countries	71	16	16
Adjusted R <sup>2</sup>	0.45	0.17	0.20

Note: The dependent variable is log of 1 + portfolio equity holdings of the source country in the host country. t – statistics is reported in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 0.1, 0.05 and 0.01 confidence level, respectively.

Table 1 c: Bilateral Portfolio Equity Holdings: Panel Regressions (2002)

	(1)	(2)	(3)
Imports	0.93	0.94	0.90

	(160.02)***	(88.55)***	(65.78)***
Correlation in growth rates		0.17 (0.77)	-0.07 (-0.35)
Correlation in stock returns			1.30 (4.64)***
Correlation in growth-stock returns			-0.69 (-2.83)***
Observations	391	272	272
No. of host countries	7	17	17
No. of source countries	66	16	16
Adjusted R <sup>2</sup>	0.42	0.39	0.44

Note: The dependent variable is log of 1 + portfolio equity holdings of the source country in the host country. t – statistics is reported in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 0.1, 0.05 and 0.01 confidence level, respectively.

Table 2: Aggregate Portfolio Equity Assets : Panel Regressions

	(1) 1997	(2) 2001	(3) 2002
Log GDP	-0.03 (-1.18)	-0.58 (-1.30)	-0.59 (-1.37)
Log GNI per capita	1.49 (5.57)***	1.41 (5.13)***	1.34 (4.97)***
Log domestic stock market capitalisation	0.88 (3.25)***	1.22 (2.94)***	1.09 (2.78)***
Log exports	0.09 (0.23)	0.40 (0.95)	0.45 (1.08)
Capital controls	-6.74 (-2.59)**	-7.11 (-3.01)***	-5.74 (-2.42)**
Observations	22	32	32
Adjusted R <sup>2</sup>	0.89	0.85	0.84

Note: Dependent variable is the log of portfolio equity assets. t – statistics is reported in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 0.1, 0.05 and 0.01 confidence level, respectively.

Table 3: Aggregate Portfolio Equity Liabilities: Panel Regressions

	(1) 1997	(2) 2001	(3) 2002
Log GDP	0.002	-0.19	0.10

	(0.06)	(-0.68)	(0.41)
Log GNI per capita	-0.07 (-0.41)	0.10 (0.52)	0.31 (2.38)
Log domestic stock market capitalisation	1.14 (5.10)***	1.15 (4.11)***	0.84 (3.76)**
Log imports	0.05 (0.16)	0.24 (0.67)	-0.007 (-0.02)
Capital controls	-2.82 (-1.40)	-3.23 (-1.77)	-1.31 (-0.90)
Observations	35	35	35
Adjusted R <sup>2</sup>	0.86	0.85	0.85

Note: Dependent variable is the log of portfolio equity liabilities. t – statistics is reported in parentheses. \*, \*\*, \*\*\* indicate statistical significance at 0.1, 0.05 and 0.01 confidence level, respectively.

Fig 1: Scatter of 2002 Equity Holdings Versus 2002 Imports



UK  
SWITZERLAND GERMANY  
NEW ZEALAND  
MALAYSIA KOREA  
INDONESIA THAILAND