

INTERNATIONAL EQUITY INVESTMENT AND AUSTRALIA'S POSITION IN THE GLOBAL ECONOMY

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STATEMENT OF AUTHENTICATION

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in whole or in part, for a degree at this or any other institution.

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ABSTRACT

Research in this thesis investigates the following issue; dynamics of international financial integration; international portfolio equity investment patterns; Australian investors' equity investment position in the global economy; and finally geographical and home bias related to equity investment. Research in this thesis employs a new International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset to examine bilateral equity investment in the international and Australian context. This dataset is being employed for the first time in the Australian context.

Research in this thesis provides insights into the broad trends on cross country holdings and indicates that the growth in goods trade and stock market capitalisation are the main determinants of the growth in the scale of international balance sheets. The analysis of rates of return on foreign assets and liabilities finds that international cross holdings provide diversification opportunities against fluctuations in domestic market returns.

This thesis develops a model that links bilateral equity holdings to bilateral trade in goods and services. This thesis finds that the bilateral equity investment is strongly correlated with the underlying patterns of trade in goods and services. The information asymmetries and cultural-institutional proximity, such as a common language and a common legal origin are also important for bilateral equity investment. Research in this thesis states that the bilateral equity investments take place between countries with similar characteristics, including coordinated business cycles and correlated stock market returns, against the predictions of standard diversification arguments.

The overall level of development and the depth of financial markets as reflected by stock market capitalization, lead to increased external diversification i.e. countries with a strong equity culture hold larger gross foreign equity positions. The size of the 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 richer countries. Capital controls and income per capita do not have a significant impact on countries' aggregate foreign portfolio equity liabilities positions.

Research in this thesis provides answers to some of the following questions;

- i. why does the pattern of Australia's capital flows not match that of its trade flows;
- ii. which bilateral factors are responsible for explaining Australia's portfolio equity investment holdings;
- iii. are cultural, informational factors important in explaining Australia's portfolio allocations;
- iv. how do regulatory and legal variables affect equity portfolio holdings.

The major determinants of Australia's geographical allocation of portfolio investment indicate a broad correspondence between stock market capitalisation of destination countries and the allocation of Australian financial investments but with some deviations from that baseline, where the deviations are correlated with Australian trade patterns.

Research in this thesis investigates geographical bias by developing an empirical model from a consumption based asset pricing model that includes both, information and transaction costs. Research in this thesis documents that investors exhibit a preference for geographically close, same language and same culture countries. Source country investors prefer holding equities of foreign firms with which they are familiar through trade in goods and services. Financial development measured as the amount of credit provided by the banking sector relative to GDP has positive effects on the source country investors. This thesis states that Australian investors' are willing to hold equity portfolios in countries where the judicial system is recognised as efficient and appears to uphold enforcement of the rule of law, and countries which have well developed accounting standards.

Research in this thesis also investigate home bias puzzle in the international and Australian context. This thesis indicates that the share of destination countries' stock market that is invested in the host country, capital controls, trade links, risk adjusted returns and transaction costs have impact on the home bias puzzle. Information asymmetries arising due to countries regulatory and legal environment have impact on the home bias puzzle.

PREFACE

Research in this thesis analyses international financial integration and international equity investment. Unless otherwise stated, all results and opinions are those of the author of the thesis. Specific results presented in this thesis have been presented at international conferences and published as refereed journal articles.

Research in Chapter 2 has been presented at *Financial Markets, Asia Pacific Conference 2005, Sydney, May 26-27*. A portion of this chapter has been published as joint paper in the *Journal of Asia Pacific Economy*, vol. 11, No. 4, pp. 444-461, November 2006.

Research in Chapter 3 has been presented at *Financial Markets, Asia Pacific Conference 2005, Sydney, May 26-27*. A portion of this chapter has been published as sole paper in the *Research in International Business and Finance*, d.o.i:10.1016/j.ribaf.2006.09.002, November 2006.

Chapter 4 has been presented at *International Business Research Conference 2004, Melbourne, November 15-16*. A portion of this chapter has been published as joint paper in the *Australian Economic Review*, vol. 39 No. 1, pp. 47-59, March 2006.

Research in Chapter 6 has been presented at the *35th Australian Conference of Economists 2006, Curtin University, September 26-28*.

CHAPTER 1.

INTRODUCTION

1.1 Scope of the Thesis.

During the late 1980s and 1990s, many countries dismantled restrictions and controls on capital outflows, deregulated domestic financial markets, liberalized restrictions on foreign direct investment and introduced market oriented reforms. This resulted in increased globalization of investments seeking higher rates of returns and the opportunity to diversify risk internationally. The degree of integration of financial markets around the world increased significantly, during this period. The Australian investment environment experienced the removal of foreign exchange controls in 1987, and the movement to a floating exchange rate regime, other milestones included opening up the banking sector to foreign competition.

This thesis investigates the dynamics of international financial integration, both in the international and Australian context. The thesis examines the bilateral factors driving portfolio equity investment across countries and determinants of cross border equity investments, both in the international and Australian context. This research employs a new International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset to examine bilateral equity investment in the international and Australian context. This is first time that CPIS data is used in the Australian context. This thesis examines Australia's cross border equity investment position in the global context. Further, this thesis investigates the phenomenon of equity home bias and geographical bias, both in the international and Australian context.

1.2 International Financial Integration: Perspective

Several authors study certain aspects of international financial integration. For instance Bekaert and Campbell (2000) use an asset-pricing model to integrate the emerging market stock exchanges into the global market. Henry (2000), Levine et al. (2000), Edison et al (2002), Edison and Warnock (2004) and O'Donnell (2002) each examine the impact of international financial integration on various indicators. Obstfeld and Taylor (2002) and Davis and Gallman (2001) provide wide-ranging historical overview. For Europe, Adam et al (2002) explore a wide range of measures of international financial integration and Hummels et al (2001) and Lane (2003, 2004) study the growth in world asset trade. Some empirical work has been done on the rates of return earned on foreign assets and liabilities. Bond (1977), Sorensen and Yosha (1998), and Lane (2001) study the behaviour of investment income flows, but not the contribution of capital gains and losses, while Sorensen, Yosha and Wu (2002) provide some indirect evidence on the role of portfolio equity holdings in international risk sharing. Lane and Milesi-Ferretti (2002a, 2002b, 2003) provide some initial evidence on the behaviour of overall rates of return. They find that the rates of return on both assets and liabilities tend to be high, easily exceeding countries' growth rates; cross-country differences in rates of return are substantial and some countries exhibit substantial differences between returns on external assets and liabilities. Lane and Milesi-Ferretti (2005) empirically explore some of the interconnections between financial globalization and exchange rate adjustment and discuss the policy implications.

Noticeably absent from these is Australia's position in the international financial integration studies. This thesis contributes to the literature by investigating the

phenomenon of international financial integration in the Australian context. This thesis characterizes the salient features of the increase in international financial integration and relates the growth in foreign assets and liability positions to capital controls, increases in goods trade, income per capita, domestic financial developments and tax policy. This thesis also examines the dynamic behaviour of rates of return on external assets and liabilities, the links between rates of return on the international investment position and various financial market returns, and inter-relations between domestic and foreign real rates of return and real exchange rate fluctuations. In their study on international financial integration, Lane and Milesi-Ferretti (2003) employ a dependent variable foreign assets plus liabilities scaled by GDP against a set of independent variables including ratio of stock market capitalisation to GDP. They state that stock market capitalisation is strongly correlated with the dependent variable. Engel (2003) suggests that an economic model wherein depth of equity markets explains something about external holdings, then a variable (foreign equity holding as a fraction of total market capitalisation) should be employed. This thesis incorporates Engel's (2003) suggestion and fills in the gap in Lane and Milesi-Ferretti (2003). This contributes to the existing literature on international financial integration by employing a measure of depth of equity markets viz. foreign equity liabilities as a fraction of total market capitalisation.

Studies related to international patterns of bilateral investment include Wei (2000), and Stein and Daude (2003), among others focussed on the geography of foreign direct investment. These studies have used the readily available, Organisation for Economic Cooperation and Development (OECD) database for foreign direct investment. Buch (2002, 2003), Buch et al (2003) and Kawai and Liu (2001) study

bank lending by employing the readily available Bank for International Settlements (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 et al (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. In addition, these studies have used the empirical methods similar to those employed in traditional gravity models of international goods trade.

Some authors have focussed specifically on the pattern of bilateral equity investment. Portes and Rey (2005) use panel data set on bilateral gross cross-border equity flows among 14 countries, for the period from 1989 to 1996. They find 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 focus on a single source country. For instance, studies by Ahearne et al. (2004), Mann and Meade (2002), Dahlquist et al (2003) focus on United States (US); Coval and Moskowitz (1999) and Huberman (2001) study the regional investment patterns within the United States; Honohan and Lane (2000) focus their research on Ireland. However, the papers by Yildirim (2003) and Lane and Milesi-Ferretti (2004) are exceptions. Yildirim (2003) examines 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) analyse the bilateral, source and host factors driving portfolio equity investment

across countries (50 sources and 172 host countries), using 2001 CPIS data. Noticeably absent from these studies is Australia's cross border equity investment patterns. This thesis contributes to the existing literature by investigating the cross border equity investment patterns in the Australian context.

1.3 International Equity Investment: Area of focus.

This thesis focuses on cross border equity investment patterns, geographical bias and home bias; both in the international and Australian context. There are several papers that focus on portfolio equity investment patterns. French and Poterba (1991) use a model of investor preferences and behaviour to show that the current portfolio patterns imply that investors in each nation expect returns in their domestic equity market to be several hundred points higher than returns in other markets. Tesar and Werner (1995) study international portfolio investment in five OECD countries. They find that geographical proximity is an important factor that affects international portfolio flows. Ghosh and Wolf (1998) study the international capital flows of the G-7 economies and conclude that geographical distance is inversely related to the amount of capital flow. Portes et al (2001) find that information asymmetries are responsible for the strong negative relationship between asset trade and distance. They investigate the roles of explicit informational variables, as well as distance, in explaining separately cross-border trade in corporate equities, corporate bonds, and government bonds.

Portes and Rey (2005) explore a new panel data set on bilateral gross cross-border equity flows between 14 countries, 1989-1996. They show that gross transaction flows depend on market size in source and destination country as well as trading

costs, in which both information and the transaction technology play a role. In their model, distance proxies for some information costs, and other variables explicitly represent information transmission, information asymmetry between domestic and foreign investors, and the efficiency of transactions. They find that the geography of information is the main determinant of the pattern of international transactions, while there is weak support for a diversification motive, in their data, once they control for the informational friction. Martin and Rey (2004) construct a gravity model where assets are imperfect substitutes and supply of assets are endogenous. Their model implies that gross asset flows will be greater the smaller the distance between host and source countries. They find that for a large cross section of countries the geographical component in explaining the volume and direction of international capital flows dominates. Aviat and Coeurdacier (2004) state that distance affects bilateral asset holdings mainly through its impact on trade in goods. Once the impact of trade in goods on equity holdings is taken into account, distance loses its significance in explaining equity holdings. But absent from these is a study on information based asymmetries in Australia's portfolio investment patterns. This chapter contributes to the literature by investigating the determinants of cross border equity investments and geographical bias in the Australian context.

The logic of diversification suggests that people should hold a substantial fraction of their stock portfolios abroad. However, in the real world residents of most countries hold a very large share of their equity wealth at home. The contradiction between the obvious benefits of holding a globally diversified set of equities and the apparent reluctance to do so is known as the *home bias puzzle*. There are several papers related to portfolio equity home bias. Black (1974) and Stulz (1981) develop a two country

capital market equilibrium model where there are barriers to cross border investment and these barriers can be considered as a tax on net foreign investment. This tax represents various kinds of barriers to international investment including direct controls on the import or export of capital; the possibility of expropriation of foreign holdings, reserve requirements on bank deposits and other assets held by foreigners; and restrictions on the fraction of business that is owned by foreigners. It may also include barriers due to information asymmetries i.e. unfamiliarity of residents of one country with the stock markets of other countries. Merton (1987) develops a model where investors hold stocks that they are familiar with. In their model, investors think that the risk of stocks they do not know is extremely high. Accordingly, the investors may overweight domestic stocks. Cooper and Kaplanis (1986) develop an international capital market equilibrium model which allows for differential taxes on foreign investment depending on the country of investment and the origin of investor. They obtain unique solutions for taxes under extreme assumptions that taxes depend on the country of investment, or on the origin of the investor. Cooper and Kaplanis (1994) find that hedging against inflation risk cannot explain the home bias.

Several papers consider the effect of indirect barriers i.e. information asymmetries on home bias of equity investment. Gehrig (1993) uses a noisy rational expectations model to investigate the effect of asymmetric information between domestic and foreign investors. In aggregate investors observe noisy signals with different degrees of precision. The domestic investors, for instance receive signals of future returns that are more precise. The investors remain incompletely informed about all investment opportunities (domestic and international), even in equilibrium. Domestic bias arises from better investor information about domestic stocks. Thus, on average foreign

investments appear to be more risky. Hasan and Simaan (2000) derive the premium that an investor is willing to pay to buy the full information of the mean return vector and show that rational investors prefer home country dominated portfolios over diversified portfolios if the variability of estimation errors far exceeds the variability of the mean return vector. Chan et al (2005) state that the stock market development and familiarity variables have significant but asymmetric, effects on domestic bias and foreign bias and that economic development, capital controls and withholding tax variables have significant effects only on the foreign bias. For Japan, Kang and Stulz (1997) find that foreign investors concentrate on equity investments in firms that are large; firms that export more and firms with good accounting performance. For Sweden, Dahlquist and Robertsson (2001) find that non-resident investors are mostly institutional investors and that the holdings of stocks by non-resident investors exhibit biases that are also typical of resident institutional investors. Their findings are consistent with Kang and Stulz (1997). In Korea, Kim and Wei (2002) find that a significant information asymmetry exists between the resident foreign investors and non-resident foreign investors. They base their finding by testing the hypothesis that non-resident foreign investors may herd more than resident foreign investors like Korean subsidiaries and branches of foreign institutions as the latter have more timely information about the country they live in. For the US, Ahearne et al (2004) test the home bias puzzle by employing the data on US holdings of foreign equities. They find that information cost is a major determinant of a country's weight in a US investor's portfolio. Dahlquist et al (2003) find that, in most countries, firms have controlling investors who do not trade their shares. Absent from these is a study on Australia's equity home bias. This thesis contributes to the literature by investigating the phenomenon of equity home bias in the Australian and international context.

1.4 Objectives of the Thesis.

The primary objective of research in this thesis is to investigate the salient features of financial integration for a set of industrial countries and the behaviour of rates of return on external assets and liabilities; to relate the time series and cross sectional patterns in the levels and composition of foreign assets and liabilities to potential drivers of integration, in both international and Australian context. Second, this thesis investigates the cross border equity investment patterns using high quality International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset. In particular the thesis examines Australia's cross border portfolio equity investment patterns; characterizes the bilateral factors driving cross border portfolio equity investments; investigates the determinants of cross border equity investments and geographical bias; investigates the phenomenon of equity home bias in both, the international and Australian context.

Within the context of the primary objective, this thesis seeks to provide answers for the following research questions:

- i. What are the salient features of increase in international financial integration over the period from 1990 to 2003?
- ii. Which bilateral factors are responsible for explaining the overall size of countries cross border equity holdings?
- iii. Where do Australians Invest?
- iv. Are cultural, informational factors and financial frictions important in explaining the asymmetries in portfolio allocations?
- v. What are the determinants of cross border equity investments and geographical bias?

- vi. What is the impact of direct and indirect barriers of equity investment on home bias?

1.5 Significance of the Study

The thesis is focussed on international financial integration and international equity investment, both in the international and the Australian context. Research in Chapter 2 characterizes the salient features of the increase in international financial integration for a period from 1990 to 2003, by addressing questions such as whether the composition of country portfolios has changed over time and what are the relative contributions of stock market and new capital flows in determining the gross international investment positions. Chapter 2 is important to policy makers for the following reasons. First, stocks of foreign assets and liabilities represent an important global linkage i.e. shocks in a country may have impact on another country via revaluation and wealth effects. The cross holding of an appropriate bundle of foreign assets and liabilities can potentially reduce the volatility of national income, by generating investment income streams that are imperfectly correlated with domestic output fluctuations. Otherwise, volatility will rise if external investments leverage domestic positions. Exchange rate devaluation can also have a negative effect on the domestic banking system if a country has substantial foreign currency liabilities. Second, the identification of the sources of growth in world asset trade may contribute to an understanding of its sustainability and likely future trends. Third, the size of foreign assets and liabilities holdings may be treated as a volume based measure of financial openness or the level of integration into international capital markets. The level of integration into international capital markets may also be important in understanding the diffusion of new financial technologies and in determining the level

of productivity in the domestic financial sector (Grossman and Helpman, 1991). Fourth, a high volume of international asset trade may constrain a country's ability to tax mobile capital and the financial sector. Fifth, the importance of globalization forces in shaping domestic politics may vary across countries in line with variation in the level of exposure to international capital markets (Rodrik, 1997). The level and composition of foreign assets and liabilities affects countries macroeconomic adjustment to shocks.

Rates of return are the channel through which international investment positions provide risk sharing. The associated international transfers are important in determining a country's trade balance and the real exchange rate. The dynamics of asset and liability stocks depend on capital gains and losses in addition to new capital flows. This is important for countries holding large portfolio equity and FDI portfolios that may take most of their returns in the form of capital gains, which do not affect investment income flows, rather than yields which do affect investment income flows.

Until recently, data on the level and geographical pattern of international portfolio investment has been inadequate. Due to data limitations, most of the studies on international investment patterns have been quite narrowly focused for instance considering only a single source country i.e. the United States. There are no similar studies in the Australian context, due to lack of data on cross border equity investment. In recognition of this fact the International Monetary Fund (IMF) commenced in the mid 1990s a pioneering comprehensive survey of the geographic structure of the foreign portfolios (equity and long-term bonds). The first publication

covered the end-1997 foreign portfolios held by the residents of twenty-nine countries, including Australia (IMF 2000). The data on bilateral portfolio equity holdings, employed in this thesis comes from the International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS). This thesis contributes to existing knowledge in this area by employing the high quality CPIS data in the international and Australian context to study the portfolio equity investment patterns and analyse the geographical bias and home bias puzzles. The Appendix and Chapter 3 furnish a detailed description of the CPIS dataset.

Research in Chapter 3 is motivated by the idea that understanding the geography of international investment provides insights into the globalization process. Macroeconomic theory suggests that investors in a fully-integrated global economy without frictions in product or asset markets should hold identical portfolios, regardless of nationality. However, it is observed in international equity investment patterns that there is a strong bilateral variation in portfolio allocations. Research in Chapter 3 focuses on identifying the bilateral factors that explain these portfolio asymmetries.

The geographical location of countries may matter in receiving foreign equity investments, i.e. a financially remote country will receive less inward investment and faces a higher cost of equity capital than countries in close proximities. Asymmetries in the geography of international investment may have important implications for other international economic linkages and may also shape the international risk sharing patterns. Forbes and Chin (2003) test if real and financial linkages between countries can explain why movements in the world's largest markets often have such

large effects on other financial markets, and how these cross-market linkages have changed over time. They find that despite the growth in global financial flows, direct trade still appears to be the most important determinant of how movements in world's largest markets affect financial markets around the globe. Imbs (2004b) shows how correlations in GDP fluctuations rise with financial integration. Imbs (2004a) states that a variety of measures of financial integration suggest that economic regions with strong financial linkages are significantly more synchronized, even though they tend to be more specialized.

Finally, Chapter 3 adds value to the existing literature on both the theoretical and empirical front. On the theoretical front, the chapter develops a model for analysing the bilateral equity holdings. On the empirical front, the chapter analyses the bilateral and aggregate positions utilizing a new dataset, in the international and Australian context. This is first of its kind of study in the Australian context.

Chapter 4 describes Australia's cross border equity investment patterns. The chapter provides answers to some of the following questions: are there linkages between Australia's portfolio equity investment patterns and trade patterns; which bilateral factors are responsible for explaining Australia's portfolio equity investment holdings; are cultural, informational factors important in explaining Australia's portfolio allocations and how do regulatory and legal variables affect equity portfolio holdings. Answers to these questions reveal the nature of the current limitations on global economic integration and are therefore, important for several discipline fields including economics, international trade, international finance, portfolio analysis and behavioural finance.

Chapter 5 focuses on the determinants of cross border equity investment and geographical bias, both in the international and Australian context. Research in the chapter is important for several reasons: First, asset flows have increased greatly in the past two decades and equity portfolios are a major component of international capital flows. The determinants of portfolio equity investments throw some light on the frictions economic agents encounter when trading assets and the degree of market segmentation. These frictions may help to interpret herding and contagion effects, and the functioning of international capital markets at large. It may also help to understand when arbitrage across markets takes place and when it does not. Bekaert et al. (2003) find that for emerging markets, the dynamics of returns and net flows is altered depending on whether the countries are relatively open for foreign investment or not. Research in this chapter investigates the dependence of portfolio equity investment on information asymmetries. Second, the on-going financial market integration at the global level, particularly in the Euro area will have a significant impact on the asset trade. The knowledge regarding the determinants of portfolio equity investments will enable to analyse how the various aspects of integration will affect international portfolio equity investments. Third, the portfolio equity investments are associated with the liquidity of the relevant markets. Fourth, the knowledge of the determinants of portfolio equity investments will facilitate a better understanding of home bias puzzle.

Chapter 6 focuses on the phenomenon of portfolio equity home bias in both the international and Australian context. The empirical investigation into the home bias puzzle is important for several reasons. First, globalization in general has increased capital mobility and foreign equity investments (Obstfeld, 1995). The identification of

the relevance of capital market frictions promoting home bias give further insight into the future changes in portfolios. Second, the ongoing integration process in the European Union is likely to lead a change in its portfolio composition due to the joining of the Eastern European countries. The financial integration process will also affect international portfolio equity composition. Third, severe demographic changes in European countries and Japan are likely to lead to a change in the capital flows. It is important for the estimation and prediction of future investments to know more about the effect of capital market frictions and the extent of capital mobility. Fourth, due to lack of high quality data on cross border equity holdings, country specific studies are either limited to US foreign equity holdings or focus on countries foreign equity holdings not subdivided into country pairs. There are no studies focussing on portfolio equity home bias in the Australian context. Research in Chapter 6 contributes to existing literature by empirically investigating the phenomenon of home bias both in the international and Australian context, using high quality CPIS dataset.

1.6 Sources of data.

- The data on external assets and liabilities, trade openness is from the IMF's Balance of Payments (BOP) Statistics.
- The data on Gross Domestic Product (GDP), Gross National Income (GNI) per capita, liquid liabilities, domestic bond yield, investment income and capital flow is from IMF's International Financial Statistics (IFS).
- The data on Stock Market Capitalisation and value of domestic share and bond trading is from Federation Internationale des Bourses de Valeurs (FIBV) dataset.

- Data on tax rate is from Devereux et al (2002a, 2002b). Stock market returns are calculated using stock market indices data from Morgan Stanley Capital International (MSCI).
- The data on capital controls is from Miniane (2004).
- The data on bilateral portfolio equity holdings is from CPIS.
- The import and export data is from the IMF's Direction of Trade (DOT) Statistics.
- Language data is taken from <http://www.cia.gov/cia/publications/factbook/>. Legal origin data is from La Porta et al (1998).
- The data on the number of main phone lines in use per 1000 inhabitants in countries is from the World Competitiveness Yearbook, 2001, published by the International Institute for Management Development (IMD). The data on phone cost is from the web site: <http://www.phone-rate-calculator.com>.

1.7 Research Methodology.

Research in this thesis employs pool panel fixed effect least squares estimation technique to investigate the international financial integration for advanced economies over the period 1990 to 2003. This thesis also employs pool panel fixed effect least squares estimation technique to investigate the behaviour of rates of return on foreign assets and liabilities.

Empirical investigation in this thesis employs the ordinary least squares and two stage least squares regression to study the effect of bilateral source and host country factors on portfolio equity holdings. Research in this thesis also employs the ordinary least squares regression to study the factors affecting aggregate asset and liability positions;

and to determine Australia's destination country portfolio shares on the share of Australia's trade with each country, financial market share and share in world GNI. This thesis employs the ordinary least squares and tobit regressions to study the determinants of cross border equity investment and geographical bias; and to investigate the phenomenon of home bias both in the international and Australian context.

1.8 Plan of the Thesis.

The thesis research consists of three Parts. Part I provides an introduction to issues pertaining to international equity investment and investigates the phenomenon of international financial integration. Part II investigates the cross border equity investment patterns; phenomenon of geographical bias and home bias; and also examines the determinants of cross border equity investments. Finally, Part III of this thesis provides concluding remarks on international financial integration and cross-border equity investment.

Part I comprises Chapters 1 and 2. Chapter 2 describes the international financial integration both, from international and Australian perspective. This chapter describes the broad trends in international financial integration for a sample of advanced economies; relates the time series and cross sectional patterns in the levels and composition of foreign assets and liabilities to potential drivers of integration viz. global trade in goods and services, output per capita, domestic financial development, tax and capital controls; and investigates the behaviour of rates of return on external assets and liabilities, the relation between the rates of return on external assets and

liabilities and financial market returns, the relation between the domestic and foreign real rates of return and real exchange rate fluctuations.

Part II comprises of Chapters 3 to 6. Chapter 3 describes the international investment patterns for a sample of host and source countries using the CPIS 1997, 2001 and 2002 dataset. This chapter develops a model that links bilateral equity holdings to bilateral trade in goods and services. This chapter also presents stylized facts about the portfolio equity assets and liabilities based on CPIS dataset.

Chapter 4 provides a summary account of Australia's (including major OECD countries) external holdings of debt and equity, information on Australia's portfolio (equity and long term debt) investment share, Australia's trade share, countries' world's financial market share and countries' world's gross national income share. This chapter develops empirical models for Australia's cross-border portfolio equity investment and investigates Australia's equity - trade links.

Chapter 5 investigates the determinants of cross border equity investment in both, international and Australian context. Empirical specification develops a model that links source countries portfolio equity investment in host countries with a number of factors viz. sizes of source and host countries, distance between capital cities of source and host countries, phone cost, number of phone lines per thousand residents of source and host countries, dummies for language and legal origin, financial development in source and host countries, legal and governance indices for host countries.

Chapter 6 focuses on the theoretical and empirical investigation into the phenomenon of equity home bias, both in the international and the Australian context. Empirical specification employs two models – Portfolio Share Model and Information Cost Model to study the impact of capital market frictions on international equity portfolios, using IMF’s new dataset on bilateral equity holdings. Research in this chapter empirically investigates the role of direct barriers to investment that include transaction costs such as capital controls and indirect barriers based on information asymmetries including legal barriers and the development of financial markets in explaining the home bias puzzle.

Chapter 7 finally provides some concluding remarks pertaining to the theoretical and empirical research conducted in this Thesis. The empirical findings are presented in terms of those derived from the pool panel data, ordinary least square, instrumental variable regression analysis. Within the context of this analysis, the conclusions from each chapter are separately considered. Theoretical implications of these conclusions are considered throughout the chapter.

CHAPTER 2.

INTERNATIONAL FINANCIAL INTEGRATION

2.1 Introduction

In the last three decades, there have been large changes in the level and composition of capital flows. During the late 1970s and early 1980s, syndicated bank lending and official flows were the most common forms of international financing to developing economies; however, during the second part of the 1980s and especially the 1990s, portfolio flows and foreign direct investment have increased substantially.

One of the major challenges facing international economists is in understanding the determinants and implications of these shifts in the structure of capital flows. There is much theoretical and empirical research related to debt flows such as sovereign risk, optimal maturity structure of debt liabilities, roll over risk and resolution of debt crisis. However, less attention has been devoted to understanding both the driving forces and implications of equity and direct investment flows. The empirical work in this area has been severely hampered by the paucity of data on equity and FDI stocks.

Different types of capital flows have different properties with regard to risk, liquidity, tradability, reversibility, expropriability and tax treatment. The composition of capital flows may influence productivity growth in the recipient country. For instance, direct investment in developing countries can involve a transfer of technology and entrepreneurial skills, and financial operation, while international portfolio equity flows may stimulate stock market development and improve corporate governance. Foreign direct investment and portfolio equity flows entail different risk sharing

properties between domestic and foreign residents in comparison to external debt flows for vulnerable developing countries. For example, if negative shocks to the domestic economy result in real exchange rate depreciation, the burden of servicing foreign currency denominated external debt will be countercyclical, while returns on FDI and equity will be procyclical.

Research here investigates the dynamics of international financial integration using data on the level and composition of foreign assets and liabilities, for a set of 13 industrial countries. The countries are Australia, Canada, France, Germany, Italy, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, United Kingdom and United States. Australia has close links with these industrial countries in terms of its trading relationships, portfolio equity and foreign direct investments, cultural ties, legal origin, common language etc. Study of the dynamics of international financial integration, by taking into account these countries will enable a better understanding about Australia's position in industrialised global economy.

First, research of the literature characterizes the salient features of the increase in international financial integration for a period from 1990 to 2003, by addressing questions such as whether the composition of country portfolios changed over time. What are the relative contributions of stock market and new capital flows in determining the gross international investment positions?

Second, this chapter relates the time series and cross sectional patterns in the levels and composition of foreign assets and liabilities to potential drivers of integration viz.

global trade in goods and services, output per capita, domestic financial development, tax and capital controls.

Third, here research relates the depth of equity markets to potential drivers of integration employing Lane and Milesi-Ferretti (2003) methodology of relating broad measure of financial integration to external assets and liabilities scaled to GDP. Lane and Milesi-Ferretti (2003) state that stock market capitalisation is strongly correlated with external assets and liabilities. Foreign investors can have large holdings of a country's equities if the country has a lot of equities to sell. A country with few equity listings certainly will have a low value of foreign holdings of its equity portfolio. Engel (2003: 177) comments "If we were building an economic model in which depth of equity markets were going to explain something about external holdings, I would guess that the variable we would end up trying to explain is foreign equity holdings as a fraction of total market capitalisation. So what might be especially useful are regressions that have foreign equity liabilities divided by stock market capitalisation as the dependent variable." Accordingly, research in this chapter takes into account Engel (2003) comments to fill the gap in Lane and Milesi-Ferretti (2003).

Finally, this chapter investigates the behaviour of rates of return on external assets and liabilities, the relation between the rates of return on external assets and liabilities and financial market returns, the relation between the domestic and foreign real rates of return and real exchange rate fluctuations.

This work is important for the following reasons. First, stocks of foreign assets and liabilities represent an important global linkage i.e. shocks in a country may have

impact on another country via revaluation and wealth effects. The cross holding of an appropriate bundle of foreign assets and liabilities can potentially reduce the volatility of national income, by generating investment income streams that are imperfectly correlated with domestic output fluctuations. Otherwise, volatility will rise if external investors leverage domestic positions. Exchange rate devaluation can have a negative effect on the domestic banking system if a country has substantial foreign currency liabilities. Second, the identification of the sources of growth in world asset trade may contribute to an understanding of its sustainability and likely future trends. Growth that is linked to output per capita and goods trade can be predicted to continue in to the future. Income per capita may influence the propensity to engage in international asset trade. Goods trade directly entail corresponding financial transactions (trade credit and export insurance) and financial openness in goods markets may increase the willingness to conduct cross border financial transactions. Third, the size of foreign assets and liabilities holdings may be treated as a volume based measure of financial openness or the level of integration into international capital markets. The level of integration into international capital markets may also be important in understanding the diffusion of new financial technologies and in determining the level of productivity in the domestic financial sector (Grossman and Helpman, 1991). Fourth, a high volume of international asset trade may constrain a country's ability to tax mobile capital and the financial sector. Finally, the importance of globalization forces in shaping domestic politics may vary across countries in line with variation in the level of exposure to international capital markets (Rodrik, 1997). The level and composition of foreign assets and liabilities affects countries macroeconomic adjustment to shocks.

This thesis chapter is structured as follows: Section 2.2 describes the literature review. Section 2.3 describes the data and stylized facts. Section 2.4 describes the empirical model and results pertaining to external assets and liabilities. Section 2.5 describes the empirical model and results related to rates of return. Section 2.6 furnishes concluding remarks.

2.2 Literature Review

Several authors have studied certain aspects of international financial integration including Bekaert and Campbell (2000) who used an asset-pricing model to integrate the emerging market stock exchanges into the global market. Henry (2000), Beck et al (2000), Edison et al (2002), Edison and Warnock (2004) and O'Donnell (2002) examined the impact of international financial integration on various indicators. Obstfeld and Taylor (2002) provided a wide-ranging historical overview, including analysis of long run changes in gross asset trade. Adam and others (2002) explored a wide range of measures of international financial integration for Europe. Hummels et al (2001) and Yi (2003) studied the growth in world trade while Lane (2000) provided some evidence on the change in gross cross holding positions over time for OECD countries. Lane and Milesi-Ferretti (2002a) explored the determinants of net foreign asset positions over time. Lane and Milesi-Ferretti (2003) studied international financial integration for 14 countries using portfolios of external assets and liabilities for the years 1982 to 2001. In their study, they employed broad measures of financial integration viz. trends in the ratio of total external assets and liabilities to GDP, ratio of portfolio equity and FDI assets (liabilities) to GDP, and the ratio of external assets and liabilities to the sum of imports and exports (financial openness).

Some empirical work has been done on the rates of return earned on foreign assets and liabilities. Bond (1977), Sorensen and Yosha (1998), and Lane (2001) studied the behaviour of investment income flows but not the contribution of capital gains and losses, while Sorensen et al (2002) provided some indirect evidence on the role of portfolio equity holdings in international risk sharing. Lane and Milesi-Ferretti (2002a, 2002b, 2003) provided some initial evidence on the behaviour of overall rates of return. They found that the rates of return on both assets and liabilities tended to be high, easily exceeding countries growth rates; cross-country differences in rates of return were substantial and some countries exhibited substantial differences between returns on external assets and liabilities. Lane and Milesi-Ferretti (2005) empirically explore some of the interconnections between financial globalization and exchange rate adjustment and discuss the policy implications.

2.3 Measures of International Financial Integration and Stylized Facts

2.3.1 Measures of International Financial Integration

Research in this chapter employs data from the International Investment Position (IIP), published by the International Monetary Fund (IMF) and based on countries portfolios of external assets and liabilities to study international financial integration. This database summarizes the domestic residents' total financial claims on the rest of the world and non-residents' claims on the domestic economy. Research here classifies the external assets and liabilities as per Balance of Payments Manual 5 (IMF, 1993). External liabilities are divided into five main categories: FDI, portfolio equity investment, portfolio debt investment, other investment and derivatives. External assets are classified into the same five categories as external liabilities plus

official reserves. The potential measures of international financial integration are described in Appendix A 2 and also mentioned below:

Measures	Description
Trade openness (Appendix A 2.1)	Trade Openness is the ratio of the sum of exports and imports to GDP. The imports and exports data is taken from IMF's Direction of Trade and the GDP data is from World Bank's World Development Indicators. There is a positive relationship between trade openness and international investment positions.
Income per capita (Appendix A 2.2)	This measure is taken from the World Bank's World Development Indicators. Income per capita matters for international asset trade.
Financial Development (Appendix A 2.3)	This chapter employs two measures of financial development i.e. financial depth and stock market capitalisation. Financial depth is the ratio of currency plus demand and interest bearing liabilities of banks and non-bank financial intermediaries to GDP (ratio of M2 to GDP). Stock market capitalisation is the ratio of domestic stock market capitalisation to GDP i.e. the ratio of the value of listed domestic shares to GDP. Financial development is expected to have positive relationship with the proxies of international financial integration.
Tax (Appendix A 2.4)	This measure is taken from Devereux et al. (2002a, 2002b). Tax is expected to have negative relationship with the proxies of international financial integration.
Capital control (Appendix A 2.5)	This measure is taken from Miniane (2004). Capital control is expected to have negative relationship with the proxies of international financial integration.

Note: Appendix A 2 briefly describes these measures.

2.3.2 International Financial Integration - Stylized Facts

Research in this section describes the broad trends in international financial integration by relating the countries external holdings with potential measures of international financial integration. The trends in international financial integration focus on variables that may raise the desirability of income smoothing and reduce the barriers to international asset trade.

This chapter involves the construction of several proxies to measure international financial integration covering the period 1990 to 2003 for a group of countries across a range of measures commonly used as indicators of international financial integration in an attempt to compare Australia's relative performance with a representative group of countries considered to be at a similar stage of economic development. The international financial integration proxies measure the size of foreign investment globally that is appropriately scaled and consistent over time. The measure of the activity in the global capital market is to consider the total stock of overseas investment at a point in time. Foreign investment stocks are commonly measured at a point in time in current nominal terms, in US dollars. The growth in the national and international economies and long run inflation might be associated with an increase in nominal quantity of foreign investment stocks. The foreign capital stock at each point in time should be normalized by some measure of the size of the world economy, by a denominator in the form of nominal size index. A suitable denominator would probably be the total stock of capital, whether financial or real because the numerator is the stock of foreign owned capital. The problem with using financial capital measures is that they have greatly multiplied over the long run with the rise in numerous financial intermediaries and financial development has expanded the number of balance sheets in the economy (Goldsmith, 1985). This trend could happen at any point in time without any underlying change in the extent of foreign asset holdings. The problem with using real capital stocks is that only a few countries have a reliable data from which to estimate capital stocks. Most of these estimates are accurate only at benchmark censuses and in between census dates they rely on combinations of interpolation and estimation based on investment flow data and depreciation assumptions. Most of these estimates are calculated in real (constant

price) rather than nominal (current price) terms, which make them disproportionate with the nominally measured foreign capital data. Research in this thesis utilizes a readily available size of an economy, namely the level of output (*GDP*) measured in current prices in a common currency unit (Obstfeld and Taylor, 2002).

(i) International Financial Integration

Equation (2.1) indicates a volume based measure of international financial integration.

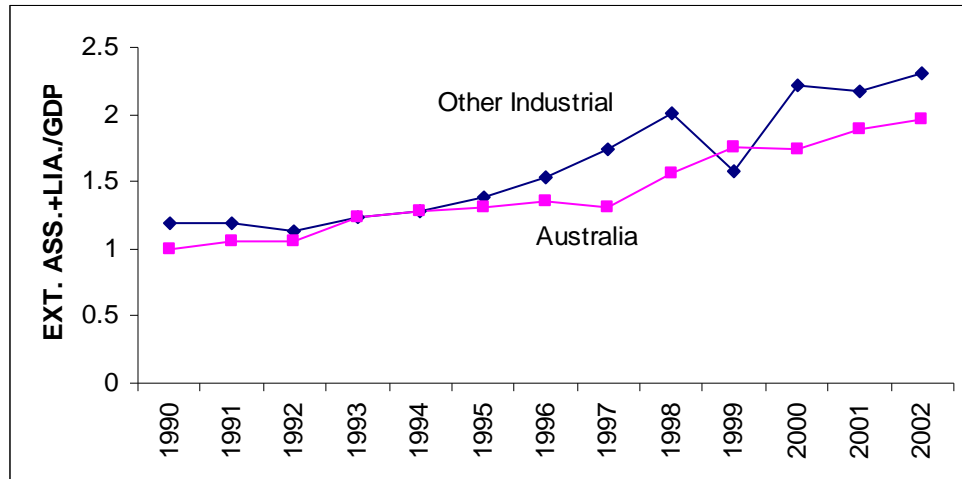
$$IFI_{it} = \frac{FA_{it} + FL_{it}}{GDP_{it}} \quad (2.1)$$

where IFI_{it} is volume based measure of international financial integration, FA_{it} is stock of foreign assets, FL_{it} is stock of foreign liabilities and GDP_{it} is gross domestic product.

Figure 2.1 illustrates a broad indicator of international financial integration based on a volume measure to compare the representative group of countries with that of Australia. The representative group of countries are United States, United Kingdom, Canada, Japan, Germany, France, Italy, Sweden, Switzerland, Spain, New Zealand and Netherlands. Over the time period from 1990 to 2002, the measure of international financial integration has increased by approximately 93 percent for the representative group of countries and by 97 percent for Australia. Noteworthy is the depression in the aggregate international financial integration ratio for the years 1999 to 2002, coinciding with the steep fall in international stock market prices between end – 1999

and end – 2002. This lead to a reduction in the stock of portfolio equity assets and liabilities, during the period from end – 1999 and end – 2002.

Figure 2.1: International Financial Integration, 1990-2002



Source: Author's own calculations

(ii) International Equity Integration

Equation (2.2) indicates the equity-based (portfolio and FDI) measure of international financial integration.

$$EQ_{it} = \frac{PQA_{it} + FDIA_{it} + PQL_{it} + FDIL_{it}}{GDP_{it}} \tag{2.2}$$

where EQ_{it} is indicator of the level of equity (portfolio and FDI) cross-holdings

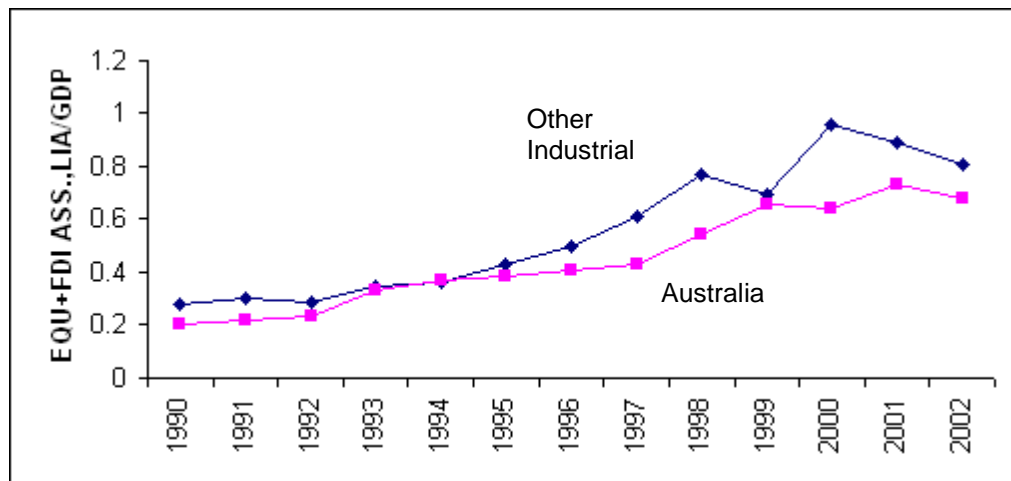
$PQA(L)$ is portfolio equity assets (liabilities)

$FDIA(L)$ is FDI assets (liabilities)

Figure 2.2 provides us with an indication of the level of equity cross-holdings, which illustrates the changes in international equity integration over the period 1990 to 2002, the noticeable feature here is the increase in this ratio by approximately 185 percent

for 12 countries' and about 236 percent for Australia. This ratio has increased much faster than the increase in IFI_{it} measure reported above in Figure 2.1. The rise in the international financial asset holdings may be due to the substantial increase in the international trade. The international trade involves corresponding financial transactions (trade credit and export insurance) and openness in goods market may increase the willingness to conduct cross border financial transactions. There is depression in the equity integration ratio for the years 1999, 2001 and 2002; coinciding with the steep fall in international stock market prices over these years, thus leading to a reduction in the stock of portfolio equity assets and liabilities. Other industrial countries as per Figure 2.2 are United States, United Kingdom, Canada, Japan, Germany, France, Italy, Sweden, Switzerland, Spain, New Zealand and Netherlands.

Figure 2.2: International Equity Integration, 1990-2002



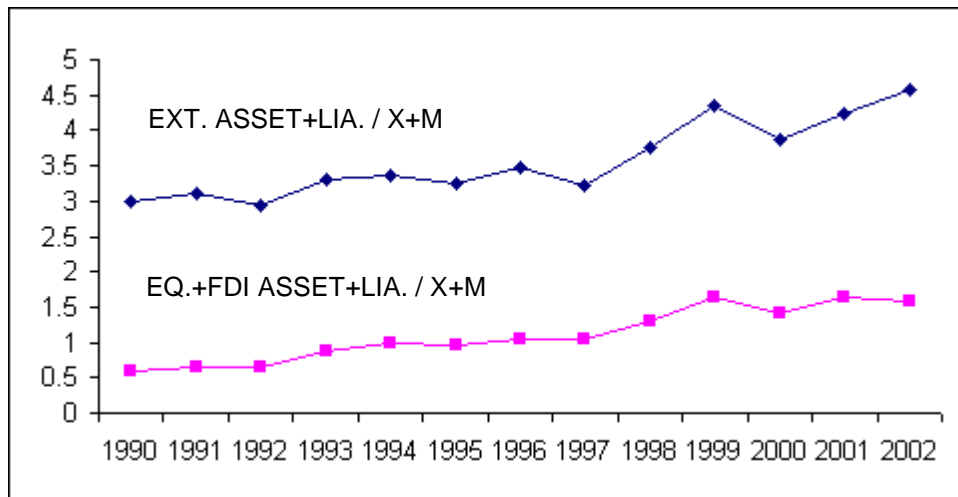
Source: Author's own calculations

(iii) Financial Integration: Finance versus Trade

Figure 2.3 plots the IFI and EQ measures as a ratio of exports plus imports rather than GDP (as in Figures 2.1 and 2.2 above) for 12 countries. It is observed that both

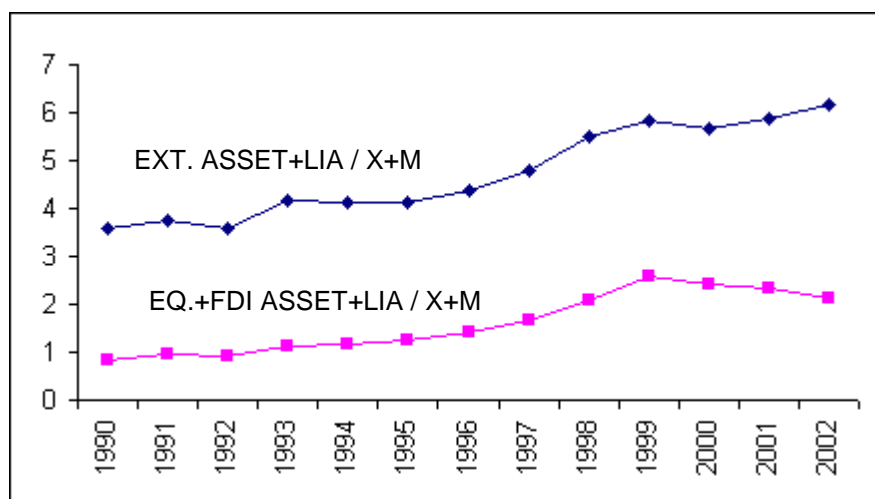
ratios have increased substantially over the period. *IFI* ratio has grown far more rapidly than *EQ* ratio. This implies that international asset trade has grown at a rapid pace that goods trade, by this measure.

Figure 2.3: International Integration: Finance versus Trade (1990-2002)



Source: Author's own calculations

Figure 2.4: Australia's International Integration: Finance versus Trade (1990-2002)



Source: Author's own calculations

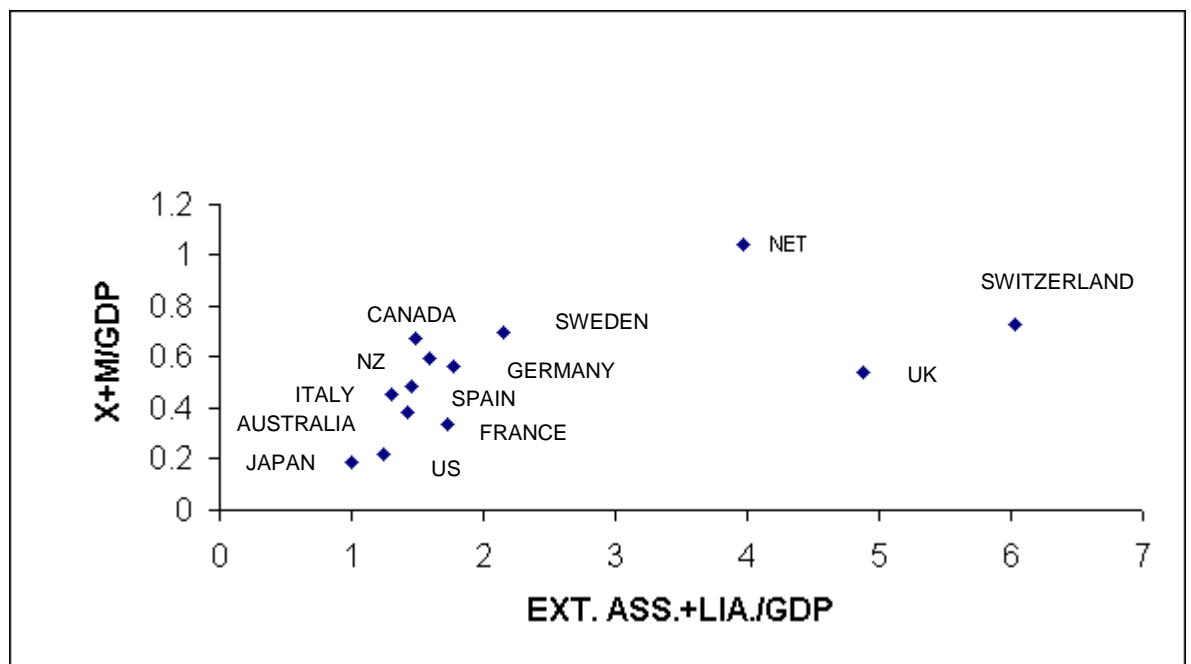
Figure 2.4 plots the *IFI* and *EQ* measures as a ratio of exports plus imports for Australia. Figure 2.4 illustrates that the trends for Australia are similar trends to those

in Figure 2.3, the plot for twelve industrial countries. Figure 2.4 further reinforces that the aggregate level international asset trade has grown at a more accelerated rate compared to goods trade by this measure.

(iv) Trade openness versus financial openness

Figure 2.5 shows the scatter plot at the individual country level, by showing the relation between the percentage change in the external assets and liabilities to GDP (i.e. financial openness) ratio and the percentage change in the sum of exports and imports to GDP (i.e. trade openness) ratio for the years 1989 to 2003. Australia has greater external assets and liabilities to GDP ratio as compared to exports and imports to GDP ratio. Figure 2.5 illustrates that financial openness has increased more than trade openness.

Figure 2.5: Scatter Plot of trade openness versus financial openness (1989-2003)

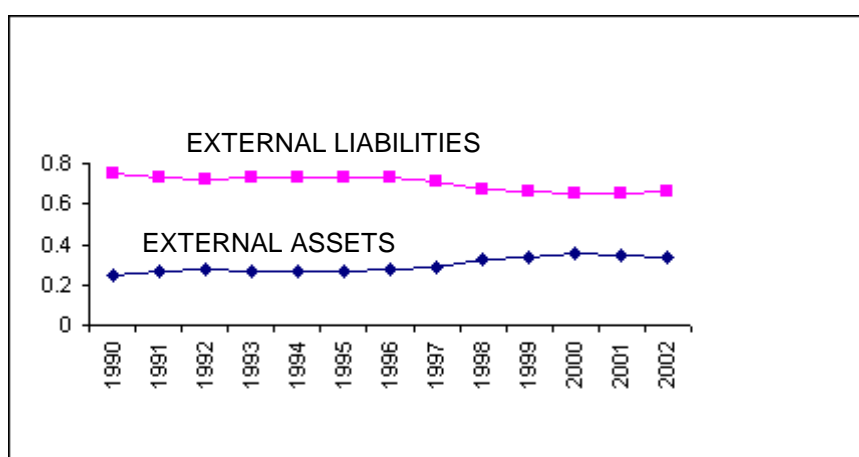


Note: NZ: New Zealand; NET: Netherlands. **Source:** Author's own calculations

(v) Australia's external assets and liabilities

Figure 2.6 illustrates the ratio of external financial holdings over total financial holdings for Australia. The ratio of external financial assets holdings over total financial holdings shows clearly an increase from 1990 onwards. The ratio of external financial liabilities over total financial holdings shows a slight decrease from 1990 to 2001 and then gradually rises.

Figure 2.6: Australia's share of external financial assets, 1990-2002



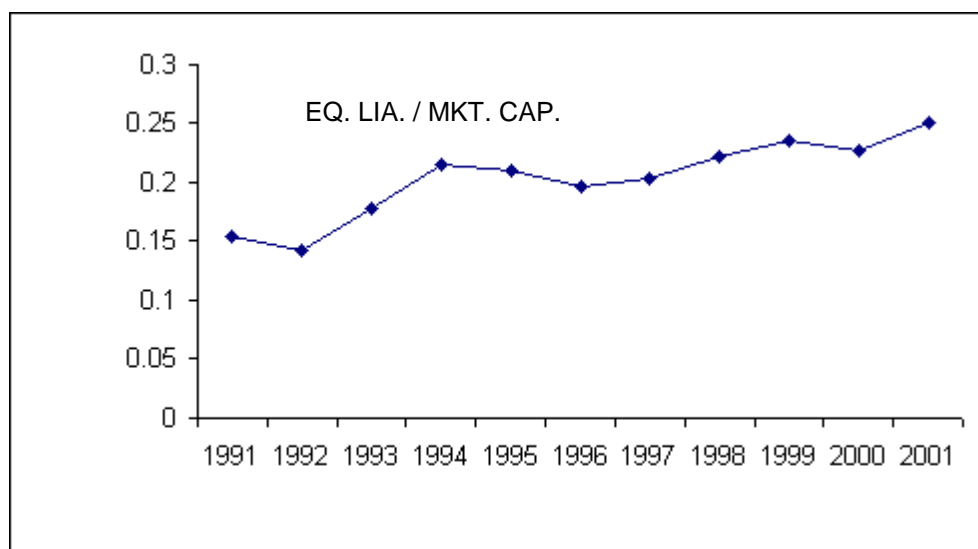
Source: Author's own calculations

(vi) Australia's portfolio equity liabilities/domestic stock market capitalisation

Further evidence of increased financial integration is provided in Figure 2.7 which shows the trend in the ratio of portfolio equity holdings by foreigners to stock market capitalisation for Australia, over the period 1991 to 2001. For instance, in the period from 1991 to 1992, there has been a rise both, in the values of equity liabilities and stock market capitalisation; with the rise in the value of stock market capitalisation much greater than the rise in the value of equity liabilities. This results in a downward trend from 1991 to 1992. The period over 1992 to 1994 is characterized by a fall in the value of equity holdings and stock market capitalisation; with the fall in the value

of stock market capitalisation much greater than the fall in the value of equity liabilities. This results in an upward trend from 1992 to 1994. The period over 1996 to 1997 is characterized by a rise in the value of equity holdings and stock market capitalisation; with the rise in the value of stock market capitalisation greater than the rise in the value of equity liabilities. This results in an upward trend from 1996 to 1997. The period over 2000 to 2001 is characterized by a fall in the value of equity holdings and stock market capitalisation; with the fall in the value of stock market capitalisation lower than the fall in the value of equity liabilities. This results in an upward trend from 2000 to 2001.

Figure 2.7: Portfolio equity liabilities/domestic stock market capitalisation, 1991-2001



Source: Author's own calculations

Overall, broad trends of international financial integration suggest that financial assets and liabilities increase much faster than GDP over decade; increase in financial openness dwarfs the increase in trade openness and the ratio of portfolio equity holdings by foreigners to stock market capitalisation increases from 1990 to 2001.

2.3.3 Rates of Return – Data Description

Research in this chapter employs the IMF balance of payments statistics data on interest earnings and payments on external holdings, data on international investment positions and on capital flows to construct measures of yields and rates of return on external assets and liabilities. The research then assesses the degree to which these yields and returns can be explained by market rates of return. These market rates of return are constructed using information on the composition and geographical allocation of external assets and liabilities. The specification below is in line with Lane and Milesi-Ferretti (2003). The basis of the model is:

$$yc_t^X = \frac{IC_t^X}{XA_{t-1}} \quad (2.3)$$

$$yd_t^X = \frac{ID_t^X}{XL_{t-1}} \quad (2.4)$$

where

yc_t^X is the yield on assets

yd_t^X is the yield on liabilities

IC_t^X is the income credit in US dollars for asset type X in year t

ID_t^X is the income debit in US dollars for asset type X in year t

XA is the country's stocks of external X type assets

XL is the country's stocks of external X type liabilities

The year t capital gain on asset X is given by the difference between the change in the stock of X between t and $t-1$ and the underlying flow x during year t , divided by the initial stock of X :

$$kc_t^x = \frac{XA_t - XA_{t-1} - xa_t}{XA_{t-1}} \quad (2.5)$$

$$kd_t^x = \frac{XL_t - XL_{t-1} - xl_t}{XL_{t-1}} \quad (2.6)$$

The nominal rate of return on assets is,

$$ic_t^x = (1 + yc_t^x)(1 + kc_t^x) - 1 \quad (2.7)$$

The nominal rate of return on liabilities is,

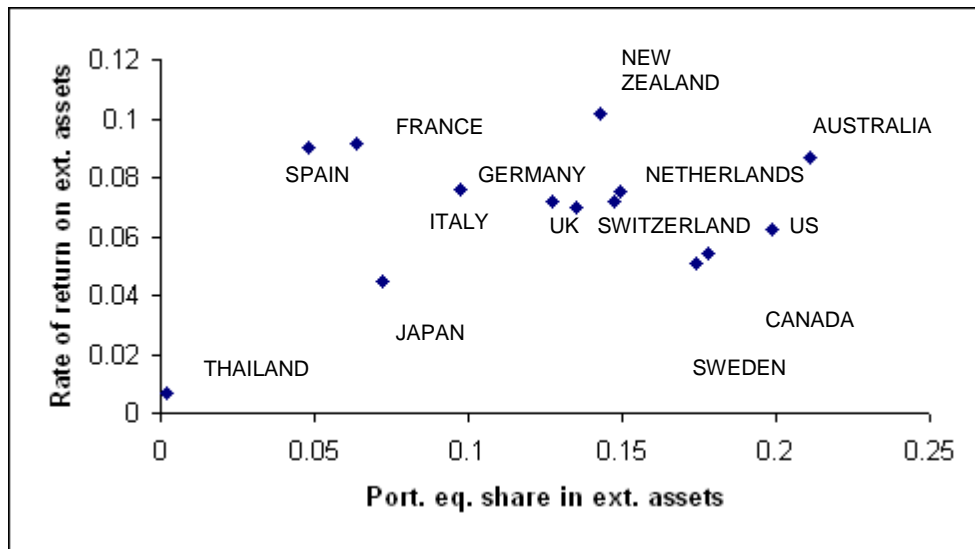
$$id_t^x = (1 + yd_t^x)(1 + kd_t^x) - 1 \quad (2.8)$$

Real yields and real rates of return are obtained by deflating nominal US dollar returns by US rate of inflation. Nominal and real rates of return in domestic currency are obtained using the same methodology, but with all variables measured in domestic currency.

2.3.4 Rates of Return - Stylized Facts

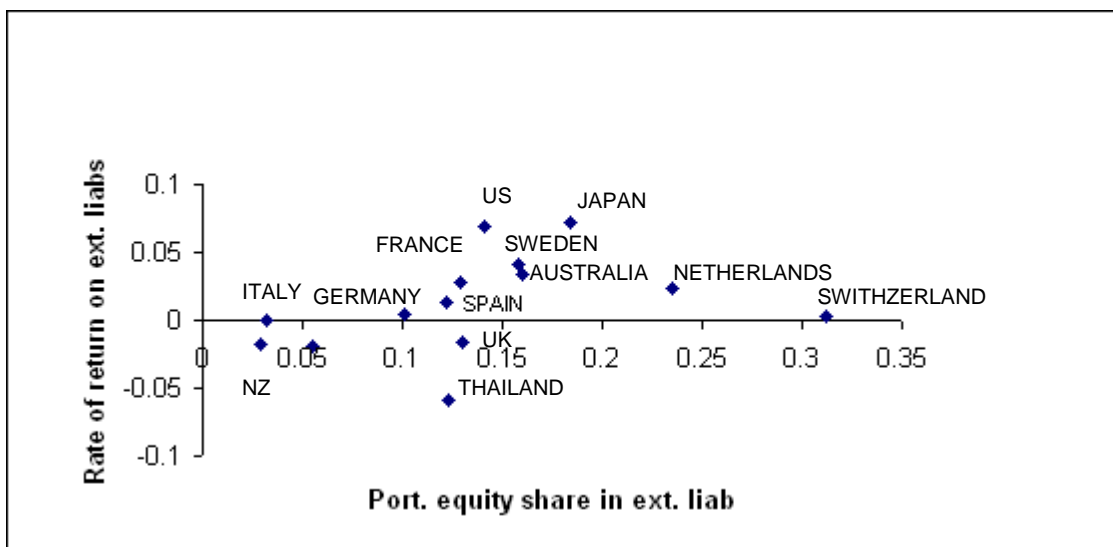
Stylized facts of rates of return in the following section show that aggregate returns on foreign assets and liabilities depend on the composition of international balance sheet between equity and non-equity components. Figures 2.8 and 2.9 plot the average returns and the share of equity in the external portfolio over 1990 to 2003 for our cross section of countries. The figures show a strongly positive relation between the equity share and the average return i.e. a larger equity share is associated with a higher return.

Figure 2.8: Rate of Return on Foreign Assets and Equity Share (1990-2003)



Source: Author's own calculations

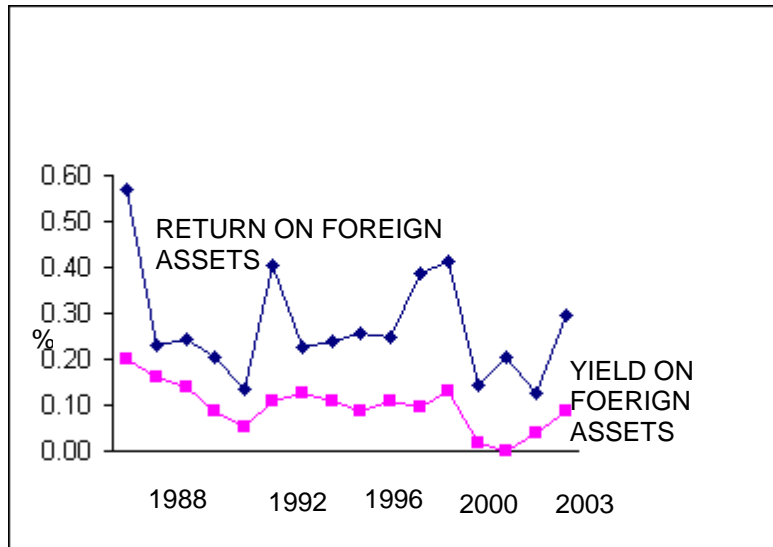
Figure 2.9: Rate of Return on Foreign Liabilities and Equity Share (1990-2003)



Source: Author's own calculations

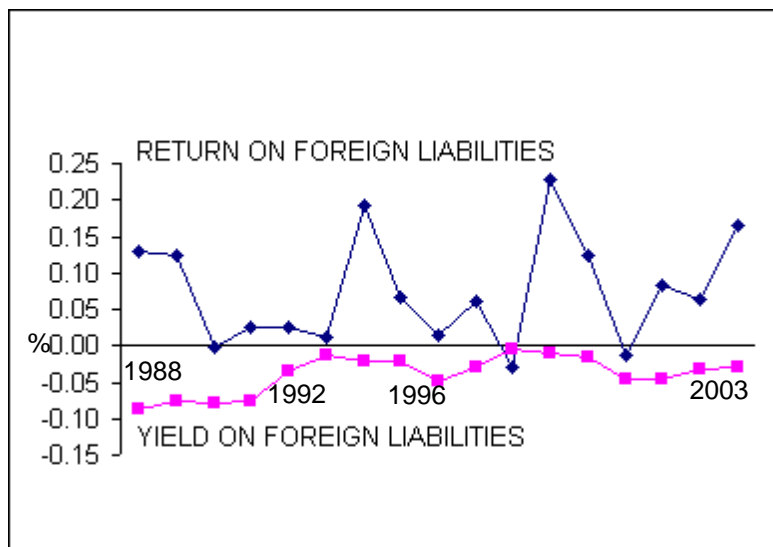
Figures 2.10 and 2.11 show that returns are more variable than yields for both foreign assets and liabilities in the case of Australia. Similar results are found for United States (Lane and Milesi Ferretti, 2003).

Figure 2.10: Rates of Returns and Yields on Australia's Foreign Assets, 1988-2003



Source: Author's own calculations

Figure 2.11: Rates of Returns and Yields on Australia's Foreign Liabilities, 1987-2003



Source: Author's own calculations

One important aspect for the explanation of the stylized facts related to rates of returns is the increasing importance of portfolio equity and FDI stocks in international portfolios. The increase in world stock market values during the 1990s has implied substantial capital gains and rates of returns on portfolio equity and FDI stocks, thus explaining high measured rates of return on external assets and liabilities. Differences in countries' external holdings of equity type instruments can also account for cross country heterogeneity in rates of return.

Most of the return on equity and FDI instruments comes through capital gains, and yields are relatively small. However, in capital accounts, investment income flows include only yields, but do not include capital gains. Therefore yields on external assets will tend to be higher in countries with more debt - type instruments in their portfolio. For example, Italy is a creditor country where investment income payments are higher than receipts. This is accounted by the fact that Italy's external assets have a larger share of equity - type instruments than Italy's external liabilities.

Section 2.3.2 illustrated stylized facts for external assets and liabilities. The broad trends indicate an increase in international financial integration and that asset trade has grown at a more accelerated rate compared to goods trade over the period from 1990 to 2003. Section 2.3.4 illustrated stylized facts for rates of returns. The stylized facts indicate that larger equity share is associated with higher return. In the Australian context, returns are more variable than yields, both for foreign assets and liabilities.

2.4 Empirical Model and Results - External Assets and Liabilities

2.4.1 Empirical Model

International parity theory assumes that in a world with no borders, the allocation of international asset holdings take place with no transactions costs; here it is assumed that complete global financial market integration exists. Each country would hold a very high level of foreign assets and liabilities, in line with full diversification. However in the real world, there are implicit and explicit barriers to full integration and in the gains to international diversification. In a recent study, Martin and Rey (2000, 2004) develop a theoretical model that assumes that investors are risk averse, the numbers of financial assets are endogenous, assets are imperfect substitutes, and cross border asset trade entails transactions costs. Under these assumptions, a reduction in international transaction costs stimulates an increase in the demand for (and supply of) assets and an increase in asset prices, leading to higher cross border diversification.

The model developed in this chapter relaxes the assumptions of Martin and Rey (2004) and considers N countries. There are n risk averse immobile identical agents in each country. There are two periods. In the first period, each agent $h_i \in \{1, \dots, n\}$ in country i is endowed with y units of a freely traded good and a risky project h_i . The agents can choose to consume, invest in fixed size risky projects or buy shares of projects developed by others. In the second period there are M exogenously determined and equally likely states of nature.

Project h_i pays dividend d if state $m \in \{1, \dots, M\}$ occurs, otherwise it pays no dividend. These dividends are the sole source of consumption in the second period.

Shares of these projects are traded on the countries stock markets in first period. The risky project h_i is an Arrow Debreu security with payoff $\delta_{xm}d$ in state m , $m \in \{1, \dots, M\}$, where $\delta_{xm} = 1$ if $x = m$ and $\delta_{xm} = 0$ if $x \neq m$. This assumption implies that different projects and assets are imperfectly correlated so that assets are imperfect substitutes and there is an incentive to diversify. All the projects are traded in the competitive market with exogenous prices. Let P be the total number of projects in the world. It is assumed that M , the total states of the world is always bigger than P , which implies that the market is imperfect and agents cannot eliminate all of the risk by holding a portfolio of all traded assets. The total number of projects in the world is $P = \sum_{i=1}^N \sum_{h_i=1}^n x_{h_i} = \sum_{i=1}^N n_i$ as $x_{h_i} = 1$, where x_{h_i} denotes the number of projects that are developed by agent h_i .

In the first period, agents raise capital by selling shares of their projects and they buy shares of other projects. In the second period, agents consume their shares of the payoffs of the projects that they bought in the first period. In the first period, when agents trade assets the buyers of the assets bear transaction cost. The amount paid by an agent h_i , located in country i , to buy x_j asset sold on the stock market in country j is $p_i^j x_j (1 + \tau_i^j)$, where p_i^j is the price of a share of a project developed by agent h_j located in country j and τ_i^j is the transaction cost in asset markets between country i and country j . The transaction costs on assets captures different types of costs viz. banking commissions and variable fees, exchange-rate transaction costs and taxes. In the second period, when the stochastic dividend is shifted from country j to country i , there is an iceberg cost (transportation cost) of ψ_j^i involved. If an agent in

country i holds an asset sold in country j which pays a dividend d in period 2, the shareholder in country i will receive only $(1-\psi_j^i)d$ per share. It is assumed that the transaction and information costs between two countries are symmetric i.e.

$$\tau_i^j = \tau_j^i \text{ and } \psi_i^j = \psi_j^i.$$

The budget constraint at period 1 for an agent h_i in country i is given as,

$$c_{1,h_i} + \sum_{j=1}^N (1 + \tau_i^j) n_j p_i^j x_j = y + p_i^i \quad (2.9)$$

where

τ_i^j is the international transaction cost on financial market $\tau_i^j > 0$ if $j \neq i$ and $\tau_i^i = 0$ if $j = i$.

Each agent h_i in country i maximizes the following utility,

$$\text{Max}_{c_{1,h_i}, c_{2,h_i}} EU_{h_i} = c_{1,h_i} + \beta E \left(\frac{c_{2,h_i}^{1-1/\sigma}}{1-1/\sigma} \right) \quad (2.10)$$

where

c_{1,h_i} and c_{2,h_i} are the period 1 and period 2 consumption of country's i agent h_i .

The second period consumption c_{2,h_i} is stochastic,

$$c_{2,h_i} = \sum_{j=1}^N \sum_{h_j=1}^{n_j} x_j (1 - \psi_j^i) \delta_{xm} d \text{ for all state } m \in \{1, \dots, M\} \quad (2.11)$$

where

x_j is the demand of an agent h_i for an asset that has been developed by agent h_j .

ψ_j^i is the iceberg costs in trade $\psi_j^i > 0$ if $j \neq i$ and $\psi_j^i = 0$ if $j = i$.

δ_{xm} is an indicator function, where $\delta_{xm} = 1$ if $x = m$ and $\delta_{xm} = 0$ if $x \neq m$.

The expected utility of agent h_i is,

$$E[U_{h_i}] = c_{1,h_i} + \beta \frac{1}{P} \sum_{j=1}^N \left[n_j \left((1 - \psi_i^j) dx_j \right)^{1-1/\sigma} / \left(1 - \frac{1}{\sigma} \right) \right] \quad (2.12)$$

The expected utility function of agent h_i is strictly increasing in relation to c_{1,h_i} , the budget constraint equation (2.9) trivially binds at the optimal solution. $c_{1,h_i} > 0$ at optimal. Thus, c_{1,h_i} can be solved from equation (2.9) and substituted in the utility function of agent h_i . The optimization problem, given the description of the payoff structure of different projects, is

$$\underset{\{x_i^j\}_{j=1, \dots, N}, \{h_j\}_{j=1, \dots, n_j}}{\text{Max}} \quad y + p_i^i - \sum_{j=1}^N (1 + \tau_i^j) h_j p_i^j x_i^j + \frac{\beta}{P} \sum_{j=1}^N \frac{n_j \left((1 - \psi_j^i) dx_i^j \right)^{1-1/\sigma}}{1 - 1/\sigma} \quad (2.13)$$

by first order condition,

$$x_i^i = \left(\frac{\beta}{P} \right)^\sigma \frac{d^{\sigma-1}}{p_i^{i\sigma}} \quad (2.14)$$

$$x_i^j = \left(\frac{\beta}{P} \right)^\sigma \frac{d^{\sigma-1} (1 - \psi_j^i)^{\sigma-1}}{p_i^{j\sigma} (1 + \tau_j^i)^\sigma} \quad (2.15)$$

The asset market clearing condition requires that the demand of agent h_i located in country i must equal the supply for an asset developed by agent h_j located in country j .

Let α_i and α_j denote the supply of a typical asset in countries i and j . Form first order conditions,

$$\alpha_i = 1 - \delta p_i^{-\sigma} \left(\frac{\beta}{P} \right)^\sigma d^{\sigma-1} \quad (2.16)$$

$$\alpha_j = 1 - \delta p_j^{-\sigma} \left(\frac{\beta}{P} \right)^\sigma d^{\sigma-1} \quad (2.17)$$

$$\delta \equiv \left(\frac{\sigma}{\sigma-1} \right)^\sigma > 1. \quad (2.18)$$

where p_i and p_j are asset prices in countries i and j .

The supply of each asset on the market is an increasing function of the price and a decreasing function of the dividend. The supply of assets depends negatively on δ . δ can be interpreted as a measure of imperfect competition on asset markets. The amount of shares offered for a specific asset equals the aggregate domestic demand plus the aggregate foreign demand inclusive of transaction costs:

$$\text{Stock market in } i: (n_i - 1)x_i^i + (1 + \tau)n_j x_j^i \quad (2.19)$$

$$\text{Stock market in } j: (n_j - 1)x_j^j + (1 + \tau)n_i x_i^j \quad (2.20)$$

Using equations (2.12), (2.14), (2.15), (2.16) and (2.17), the portions of each project sold on the stock markets:

$$\alpha_i = \frac{n_i - 1 + n_j \phi}{n_i - 1 + \delta + n_j \phi} \quad (2.21)$$

$$\alpha_j = \frac{n_j - 1 + n_i \phi}{n_j - 1 + \delta + n_i \phi} \quad (2.22)$$

$$\phi \equiv \left(\frac{(1 - \tau)}{(1 + \tau)} \right)^{\sigma-1} \quad (2.23)$$

The parameter ϕ is an indication of the market segmentation. It measures the extent to which the interaction between transaction costs and the elasticity of substitution between assets leads foreign agents to restrain their demand for domestic assets. Lower transaction costs lead to lower market segmentation and higher ϕ . Asset prices are given by:

$$p_i = \left(\frac{\beta}{P}\right) d^{1-\frac{1}{\sigma}} [n_i - 1 + \delta + n_j \phi]^{\frac{1}{\sigma}} \quad (2.24)$$

$$p_j = \left(\frac{\beta}{P}\right) d^{1-\frac{1}{\sigma}} [n_j - 1 + \delta + n_i \phi]^{\frac{1}{\sigma}} \quad (2.25)$$

The optimal choice, P_i and P_j , the number of projects developed by each agent in countries i and j , respectively is:

$$\begin{aligned} f'(P_i) &= p_i \\ f'(P_j) &= p_j \end{aligned} \quad (2.26)$$

Due to perfect competition in the market for developing projects, the choice of the number of projects, P_i and P_j is such that the price of the asset p_i and p_j , respectively is equal to the marginal cost of the last project. The assumed convexity of the cost function implies that the number of projects/assets is increasing in asset prices in both countries.

If country i is the larger economy (has a larger population), then project owners choose to retain fewer shares of their projects and to sell more on the stock market:

$\alpha_i > \alpha_j$. Financial markets are more developed in the large country, so there exists a market size effect on financial markets. Shares of the projects developed by agents located in the large country have a higher price than those developed in the small country: $p_i > p_j$.

Using the equilibrium on asset markets, and the individual demands given in equation (2.16) and (2.17), the aggregate demand for a specific asset in countries i and j :

$$\alpha_i = \left(\frac{\beta}{P}\right)^\sigma d^{\sigma-1} p_i^{-\sigma} (n_i - 1 + n_j \phi) \quad (2.27)$$

$$\alpha_j = \left(\frac{\beta}{P}\right)^\sigma d^{\sigma-1} p_j^{-\sigma} (n_j - 1 + n_i \phi) \quad (2.28)$$

Lowering the transaction costs between countries i and j implies that agents in i (j) increase their demand for assets of country j (i). In the model, the financial integration can be modelled as an increase in ϕ . The comparative statics for the price of assets in country i (and in country j) is as follow:

$$\frac{dp_i}{d\phi} = \frac{n_i p_i c_i f''(m_i)}{(n_i - 1 + \delta + n_i \phi)(\sigma c_i f''(m_i) + p_i^2)} \quad (2.29)$$

The price of assets increases as the demand for assets from foreign agents increases with lower transaction costs. In the model, financial integration between markets (lower transaction costs) can be interpreted as an increase in effective market size i.e. it generates an increase in total demand for assets and induces higher asset prices (Bekaert and Campbell, 2000; Henry, 2000).

To complement the conceptual issues and graphical analysis of the trends in international financial integration, the basic panel specification is provided in equations (2.30) to (2.33) below. These specifications are in line with Lane and Milesi-Ferretti (2003) and Mishra and Daly (2005a, 2006b).

$$\Delta(IFIG_{it}) = \alpha_i + \gamma * X_i + \beta * \Delta(Z_{it}) + \varepsilon_{it} \quad (2.30)$$

$$\Delta(EQ_{it}) = \alpha_i + \gamma * X_i + \beta * \Delta(Z_{it}) + \varepsilon_{it} \quad (2.31)$$

$$\Delta(EQSHARE_{it}) = \alpha_i + \gamma * X_i + \beta * \Delta(Z_{it}) + \varepsilon_{it} \quad (2.32)$$

$$\Delta(FELSTK_{it}) = \alpha_i + \gamma * X_i + \beta * \Delta(Z_{it}) + \varepsilon_{it} \quad (2.33)$$

where X_i, Z_{it} are a set of country and time varying determinants.

This chapter uses first differences of $IFIG_{it}$, EQ_{it} , $EQSHARE_{it}$, $FELSTK_{it}$ and Z_{it} to take into account the non-stationarity of the levels of dependent and some of the dependent variables and conducts fixed effect least squares estimation with white corrected standard errors. Equation (2.33) additionally incorporates a dependent variable suggested by Engel (2003), which accounts for the effect of foreign equity liabilities as the ratio of stock market capitalisation ($FELSTK_{it}$).

2.4.2 Results

(i) Panel Analysis of International Financial Integration

Table 2.1 shows the pool panel data analysis by taking the first difference of growth in international financial integration, $\Delta(IFIG_{it})$ as the dependent variable for the years 1990 to 2003. The first regressor trade openness, defined as the sum of exports plus imports relative to GDP (Trade), is significant throughout. The overall

explanatory power of 0.43 is encouraging; the average trade openness coefficient in the columns (1) to (5) is 3.50. This indicates that a 10 - percentage point increase in the trade openness increases $\Delta(IFIG_{it})$ by 35 - percent. The results here are in accordance with theoretical insights, which posit a direct relationship between trade and financial integration. Columns (2) to (5) introduce GNI per capita as a proxy for the systematic relationship between cross-boarder financial activity and the level of development; this variable shows a negative but not significant relationship. Columns (3) to (5) add financial depth and stock market capitalisation variables to the set of regressors, both variables are positive throughout. The stock market capitalisation variable is significant in the columns (3) and (5). There is a strong positive correlation between an open capital account and a large domestic stock market. Not surprising is the mechanical result arising from an increase in stock market capitalisation value and the value of foreign equity liabilities. Columns (4) and (5) add a tax rate variable; this variable is not significant in explaining the variation in the level of international financial integration. Finally the capital control variable is added in the column (5) which turns out to be negative and insignificant.

Results of Table 2.1 suggest that international financial integration as measured by the ratio of external assets and liabilities to GDP increases with trade openness and financial depth. Goods trade is directly associated with financial transactions (trade credit and export insurance). International asset cross - holdings serve as a mechanism for income smoothing to counteract the rise in volatility due to trade openness. A well developed domestic financial market attracts foreign investors. In a well developed domestic financial market, firms and households that are accustomed to domestic trade in assets may also be more familiar to the benefits of holding international

investments in smoothing income. Countries that are more open to trade and countries whose domestic financial markets are well developed are more likely to engage in international asset trade.

Table 2.1: Panel Analysis of International Financial Integration, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	4.26 (10.47)***	4.26 (10.52)***	2.98 (5.88)***	2.97 (5.92)***	3.05 (5.99)***
Log GNI per capita		-1.34 (-1.39)	-1.20 (-1.36)	-1.29 (-1.47)	-1.17 (-1.29)
Financial depth			0.17 (0.78)	0.20 (0.96)	0.15 (0.74)
Stock market capitalisation			0.20 (1.93)*	0.16 (1.58)	0.18 (1.72)*
Tax rate				-0.35 (-1.64)	-0.34 (-1.57)
Capital control					-0.11 (-1.04)
Adjusted R ²	0.43	0.44	0.27	0.28	0.29
Number of observations	182	182	156	156	156

Note: Fixed effect panel estimation. t-statistics in parentheses. Dependent variable is first difference of IFI_{it} . *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively. Countries: USA, UK, Japan, Germany, Canada, France, Italy, Switzerland, Sweden, Spain, New Zealand, Netherlands, Australia.

(ii) Panel Analysis of Cross Border Equity Holdings

Table 2.2 shows the pool panel data analysis for the cross border equity holdings measure, $\Delta(EQ_{it})$ as the dependent variable for the years 1990 to 2003. From these results, it is evident that trade openness is both a positive and highly significant variable in explaining cross border equity holdings with an overall explanatory power of 0.48 in the column. The average trade openness coefficient in the columns (1) to (5) is 1.57. This indicates that a 10 - percentage point increase in trade openness increases $\Delta(EQ_{it})$ by 15.7 - percentage. The variable output per capita in columns (2) to (5) is marginally positive. Financial depth and stock market capitalisation variables

are introduced in the columns (3) to (5). The former variable is just positive for the columns (4) and (5) while the stock market capitalisation variable is positive and highly significant throughout indicating a strong positive influence on cross border equity holdings. For instance, a 10 - percentage point increase in stock market capitalisation is associated with a 2.4 - percentage point increase in cross border equity holdings. The tax rate variable is negative and insignificant throughout while the capital control variable is again insignificant in column (5). Countries less open to trade, with shallow domestic financial markets have smaller international cross holdings.

Table 2.2: Panel Analysis of Cross Border Equity Holdings, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	2.12 (10.81)***	2.13 (10.65)***	1.19 (4.96)***	1.20 (4.99)***	1.22 (5.02)***
Log GNI per capita		0.10 (0.21)	0.04 (0.09)	0.03 (0.07)	0.004 (0.01)
Financial depth			-0.005 (-0.06)	0.02 (0.19)	0.02 (0.24)
Stock market capitalisation			0.26 (5.56)***	0.24 (5.04)***	0.24 (5.06)***
Tax rate				-0.12 (-1.28)	-0.12 (-1.29)
Capital control					0.03 (0.63)
Adjusted R ²	0.48	0.47	0.38	0.38	0.37
Number of observations	182	182	151	151	151

Note: Fixed effect panel estimation. t-statistics in parentheses. Dependent variable is first difference of EQ_{it} . *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively. Countries: USA, UK, Japan, Germany, Canada, France, Italy, Switzerland, Sweden, Spain, New Zealand, Netherlands, Australia

(iii) Panel Analysis of Gross Equity Share, 1995-2003

Table 2.3 indicates the pool panel data analysis by taking the first difference of cross border equity share in total external holdings, $\Delta(EQSHARE_{it})$ as the dependent variable, for the years 1995 to 2003. The results here are generally weaker than the aggregate volume measure in the previous tables 2.1 and 2.2 above.

Table 2.3: Panel Analysis of Gross Equity Share, 1995-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	0.04 (0.76)	0.05 (1.03)	0.06 (1.23)	0.06 (1.17)	0.06 (1.12)
Log GNI per capita		0.48 (4.99)***	0.49 (5.14)***	0.49 (5.03)***	0.48 (4.9)***
Financial depth			-0.014 (-0.71)	-0.013 (-0.65)	-0.016 (-0.79)
Stock market capitalisation			0.018 (1.94)	0.017 (1.83)	0.019 (1.93)
Tax rate				-0.01 (-0.42)	-0.013 (-0.51)
Capital control					0.01 (0.75)
Adjusted R ²	0.32	0.52	0.57	0.56	0.55
Number of observations	117	117	94	94	94

Note: Fixed effect panel estimation. t-statistics in parentheses. Dependent variable is first difference of $EQSHARE_{it}$. *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively. Countries : USA, UK, Japan, Germany, Canada, France, Italy, Switzerland, Sweden, Spain, New Zealand, Netherlands, Australia

For example, trade openness does not exert a significant influence on $\Delta(EQSHARE_{it})$. Introducing financial depth and stock market capitalisation variables does not explain the overall change in cross border equity share in total external holdings. The negative value of financial depth variable implies that it increases international trade in debt instruments. The tax variable introduced in the column (4) and (5) is negative and insignificant. The capital control variable entered in column

(5) is also insignificant. Only the variable, output per capita in the columns (2) to (5) is positive and significant.

(iv) Panel Analysis of Equity Liabilities as a share of Stock Market Capitalisation

Table 2.4 illustrates the panel data analysis by taking the first difference of the ratio of foreign equity liabilities to stock market capitalisation, denoted by $\Delta(FELSTK_{it})$ as the dependent variable, for the years 1995 to 2003. Trade openness is positive and significant throughout. The average value of this variable is 1.85. A 10 - percentage point increase in the trade openness increases $\Delta(FELSTK_{it})$ by 18.5 - percentage points. Columns (2) to (5) introduce output per capita, this variable is positive throughout with an average value is 0.68. Financial depth variable is introduced in the column (3) to (5) where the effect in explaining foreign equity liability growth is both positive and significant throughout. The overall explanatory power rises from 0.09 to 0.50, on introducing this variable. The average value of the variable is 0.28 indicating that a 10 percentage point increase in the financial depth increases $\Delta(FELSTK_{it})$ by 2.8 - percentage. Finally introducing tax in columns (4) and (5) indicates positive but insignificant relationship with growth in foreign equity liabilities while the capital control variable in column (5) is also insignificant.

This section contributes to the existing literature on international financial integration by incorporating the measure of depth of equity markets viz. foreign equity liabilities as a fraction of total market capitalisation from Engel (2003) comment with respect to Lane and Milesi-Ferretti (2003). Results of Table 2.4 indicate that foreign investors

would hold equities in countries that are more open to trade and countries whose domestic financial markets are well developed.

Table 2.4: Panel Analysis of Equity Liabilities as a share of Stock Market Capitalisation, 1995-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	0.65 (3.2)**	0.64 (2.93)**	2.60 (8.09)***	2.64 (8.19)***	2.76 (8.61)***
Log GNI per capita		0.44 (1.63)	0.70 (1.13)	0.75 (1.18)	0.83 (1.23)
Financial depth			0.28 (3.16)**	0.29 (3.23)***	0.26 (2.92)***
Tax rate				0.04 (0.35)	0.04 (0.32)
Capital control					0.061 (0.86)
Adjusted R ²	0.09	0.09	0.50	0.51	0.52
Number of observations	113	113	91	91	91

Note: Fixed effect panel estimation. t-statistics in parentheses. Dependent variable is first difference of $FELSTK_{it}$. *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively. Countries: USA, UK, Japan, Germany, Canada, France, Italy, Switzerland, Sweden, Spain, New Zealand, Netherlands, Australia

(v) Australia's International Financial Integration

Turning attention to the application of the above estimated regressions at the aggregate multi country level to that at the individual country level namely Australia, research in this chapter shows how representative the results for a small open economy are as compared to those for the aggregate multi country case. Table 2.5 shows the regression results for the international financial integration proxy IFI_{it} on a range of explanatory variables similar to those in Table 2.1 above over the period 1990 to 2003. In column (1), the trade openness variable is significant and the overall explanatory power is 0.51. A 10 - percent increase in trade openness increases IFI_{it} by about 78 - percent. Column (2) adds output per capita variable, which turns out to

be positive; however, it is insignificant. Column (3) adds financial depth and stock market capitalisation variables. Trade openness changes sign and becomes insignificant. Output per capita variables also changes sign and significance. Financial depth and stock market capitalisation variables are both positive and significant. A 10 - percent increase in financial depth increases IFI_{it} by about 51 - percent and a 10 - percent increase in stock market capitalisation increases IFI_{it} by 5.3 - percent. Column (4) introduces the tax rate variable, which appears to be negative and significant. A 10 percent increase in tax rate decreases IFI_{it} by about 13.8 - percent. Other variables have similar sign and significance as in column (3). Column (5) introduces capital control variable, which is negative and insignificant. This implies that capital control has no direct impact on IFI_{it} .

Table 2.5: Analysis of Australia's International Financial Integration, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	7.83 (8.31)*	6.34 (2.43)**	-1.54 (-1.72)	-1.72 (-2.75)**	-1.84 (-2.70)**
Log GNI per capita		2.79 (0.62)	-2.57 (-5.36)*	-1.84 (-2.30)***	-0.88 (-0.96)
Financial depth			5.14 (7.69)*	4.78 (9.02)*	4.12 (6.73)*
Stock market capitalisation			0.53 (2.41)**	0.44 (2.35)**	0.29 (1.55)
Tax rate				-1.38 (-2.14)***	-2.14 (-2.64)**
Capital control					-2.56 (-1.47)
Adjusted R ²	0.51	0.51	0.98	0.98	0.98

Note: t-statistics in parentheses. Dependent variable is IFI_{it} . *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

(vi) Australia's International Equity Integration, 1990-2003

Table 2.6 shows the regression results of taking the cross border equity holdings measure EQ_{it} as the dependent variable for the years 1990 to 2003. Trade openness is positive and significant in columns (1) and (2) but loses significance in columns (3) to (5). Output per capita variable is positive in column (2) but changes sign in column (3). Both, financial depth and stock market capitalisation variables are positive and significant throughout. A 10 - percent increase in financial depth increases EQ_{it} on the average, by about 15 - percent and 10 - percent increase in stock market capitalisation increases EQ_{it} on the average, by about 36 - percent. Tax rate and capital control variables are negative and insignificant, implying that these variables have no direct impact on EQ_{it} .

Table 2.6: Analysis of Australia's International Equity Integration, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	4.53 (10.36)***	3.72 (3.37)***	0.29 (0.61)	-0.09 (-0.17)	-0.94 (-2.00)
Log GNI per capita		1.52 (0.80)	-1.11 (-3.67)***	-0.97 (-3.15)**	-0.35 (-0.82)
Financial depth			2.04 (3.12)**	2.36 (3.38)**	2.01 (2.98)**
Stock market capitalisation			0.32 (3.34)**	0.26 (2.44)*	0.16 (1.28)
Tax rate				-0.43 (-1.26)	-0.94 (-2.00)
Capital control					-1.60 (-1.71)
Adjusted R ²	0.64	0.65	0.98	0.98	0.98

Note: t-statistics in parentheses. Dependent variable is EQ_{it} . *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

(vii) Australia's Gross Equity Share

Table 2.7 shows the regression results for Australia, by taking the cross border equity holdings measure $EQSHARE_{it}$, as the dependent variable for the years 1990 to 2003. Column (1) introduces trade openness as an independent variable, which appears positive and significant. The average value of trade openness is 0.99, which is positive and significant throughout. A 10 - percentage point increase in the trade openness is associated with 9.9 - percentage point increase in $EQSHARE_{it}$. The overall explanatory power is 0.82 in the column (1). Output per capita is introduced in columns (2) to (5), which appears to be positive throughout. This variable is positive and significant in column (2), but it loses size and significance in columns (3) to (5). In column (2), the value of output per capita is 0.59. A 10 - percentage point increase in the output per capita is associated with 5.9 - percentage point increase in $EQSHARE_{it}$. The explanatory power rises from 0.82 to 0.86 upon introducing this variable.

Financial depth and stock market capitalisation variables are introduced in columns (3) to (5). The financial depth variable is negative and insignificant throughout, implying that this variable increases international trade in debt instruments. The stock market capitalisation is positive and significant throughout. The average value of stock market capitalisation is 0.17. A 10 - percentage point increase in stock market capitalisation is associated with 1.7 - percentage point increase in $IFIGDP_{it}$. The overall explanatory power rises from 0.86 to 0.96, upon introducing these variables.

Tax rate is introduced in columns (4) and (5). Tax rate has negative value and it is insignificant. Capital control is introduced in the column (5). This variable also has a negative value and it is insignificant.

Table 2.7: Analysis of Australia's Gross Equity Share, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade openness	1.58 (10.60)*	1.27 (7.13)*	0.71 (5.56)*	0.71 (5.22)*	0.70 (4.84)*
Log GNI per capita		0.59 (2.08)***	0.20 (1.44)	0.20 (1.15)	0.28 (1.36)
Financial depth			-0.20 (-1.35)	-0.20 (-1.08)	-0.26 (-1.32)
Stock market capitalisation			0.18 (4.06)*	0.18 (3.84)*	0.17 (2.67)**
Tax Rate				-0.00 (-0.01)	-0.07 (-0.24)
Capital control					-0.22 (-0.72)
Adjusted R ²	0.81	0.86	0.96	0.96	0.96

Note: t-statistics in parentheses. Dependent variable is $EQSHARE_{it}$. *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

(viii) Analysis of Australia's Equity Liabilities as a share of Stock Market Capitalisation, 1990-2003

Table 2.8 shows the results the regression results for Australia by taking the stock market capitalisation as share of equity liabilities as the dependent variable namely $FELSTK_{it}$ for the years 1990 to 2003. Trade openness is positive and significant as shown in columns (1) and (2) but changes sign and loses significance in columns (3) to (5). In column (1), a 10 - percent increase in trade openness increases $FELSTK_{it}$ by 7 - percent. The overall explanatory power is low at 0.23. Column (2) introduces Output per capita, which is positive; however it is insignificant. Trade openness remains positive; however it loses significance. Column (3) introduces financial depth variable, which is positive and significant. A 10 - percent increase in financial depth increases $FELSTK_{it}$ by 7.2 - percent. Trade openness changes sign and remains insignificant. Output per capita is positive; however it loses significance. Column (4) introduces tax rate variable which appears

to be negative and significant. Trade openness remains negative but it gains significance. Financial depth variable is positive but it loses significance. Tax rate variable is negative and significant. Column (5) introduces capital control, which is negative and insignificant. Tax rate variable is negative and significant. Other variables have similar sign and significance as column (4). Output per capita becomes significant.

Table 2.8: Analysis of Equity Liabilities as a share of Stock Market Capitalisation, 1990-2003

	(1)	(2)	(3)	(4)	(5)
Trade Openness	0.70 (3.04)**	0.40 (1.10)	-0.39 (-1.28)	-0.52 (-2.89)**	-0.64 (-2.26)***
Log GNI per capita		0.56 (0.93)	0.02 (0.06)	0.37 (0.89)	0.82 (2.18)***
Financial Depth			0.72 (3.37)*	0.40 (1.50)	-0.19 (-0.57)
Tax Rate				-0.72 (-2.30)**	-1.07 (-3.06)**
Capital control					-1.44 (-1.46)
Adjusted R ²	0.23	0.27	0.59	0.67	0.71

Note: t-statistics in parentheses. Dependent variable is $FELSTK_{it}$. *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

In summary, at the individual Australian level, the above results indicate that variables such as trade openness, financial depth, GNI per capita, tax rate and stock market capitalization are reasonably successful in explaining the degree of international financial integration. At aggregate country level, variables such as trade openness and stock market capitalization explain the variation over time in the degree of international financial integration. Capital control does not have a direct effect on the international financial integration. In small open economy like Australia, tax policy plays a vital role in attracting foreign investments as compared to international

level. This may have implication towards formulation of suitable tax policy for attracting foreign investments.

2.5 Empirical Model and Results – Rates of Return

2.5.1 Empirical Model

This section investigates the rates of returns on foreign assets and liabilities. First, the country wise rates of returns on external assets (liabilities) and portfolio equity share in external assets (liabilities) are described. Second, the linkage between the rates of returns and various market indices are determined. If a country allocates its equity investment across countries in proportion to relative stock market capitalizations, the rate of return on foreign equity assets would just follow a global market index. Third, whether foreign rates of return provide diversification against variation in domestic financial returns is investigated. Fourth, the co - movement between local and foreign real rates of return and real exchange rates is examined. This extends research in section 2.5 to study the behaviour of rates of return on foreign assets and liabilities. It is important because there are substantial differences in rates of return on external assets and liabilities across countries (Lane and Milesi-Ferretti, 2002a, 2002b). For instance, in case of United States rates of return on external assets have systematically exceeded those on external liabilities, so that the US investment income position stayed positive for a number of years even when the net foreign asset position had turned negative.

For a country i , the real return (on foreign assets or liabilities) in domestic and in US currency are linked as

$$(1 + r_{it}^{US}) = (1 + r_{it}) * \frac{rer_{it}}{rer_{it-1}} \quad (2.34)$$

where, r_{it}^{US} is the real rate of return in US dollars.

r_{it} is the real rate of return in domestic currency.

rer is the bilateral CPI-based real exchange rate between the domestic currency and the US dollar.

$$r_{ijt} = r_{ijt}^* + \mu_{ijt} \quad (2.35)$$

Returns in each investment category depend on some country component plus an idiosyncratic factor to the extent that the investment pattern deviates from overall market patterns.

For example, the return from foreign portfolio equity assets will deviate from the return on global stock market index to the extent that a country pursues an idiosyncratic investment strategy for the foreign component of its portfolio.

$$r_{ijt}^{FA} = \alpha_i + \beta * r_{ikt}^M + v_{ijt} \quad (2.36)$$

Co-movement between the rate of return on foreign assets and various financial returns varies as per: if $\beta = 1$, holding foreign assets provides no diversification against fluctuations in domestic financial returns. The weaker is the positive co - movement, the greater is the scope for risk sharing.

The relation between domestic and dollar based ex post-real returns and the real exchange rate may be shown as:

$$r_{it}^{US} = r_{it} + drer_{it} \quad (2.37)$$

where $drer_{it}$ is the rate of real appreciation vis-à-vis the United States.

If returns were entirely driven by domestic factors (orthogonal to exchange rate movements), the domestic real return and the real exchange rate would be uncorrelated and real exchange rate movements would fully pass through into dollar returns. If instead returns were entirely driven by external factors, the correlation between the dollar real return and the real exchange rate would be zero and real exchange rate movements would fully pass through into domestic real returns.

The rate of return on a given category of international investment position r_{ijt}^{BOP} as calculated from the Balance of Payments data i.e. Australian Bureau of Statistics (ABS), International Financial Statistics (IFS) and r_{ijt}^M is the estimated rate of return on some market portfolio eg MSCI.

$$r_{ijt}^{BOP} = \alpha_i + \gamma * r_{ijt}^M + \varepsilon_{ijt} \quad (2.38)$$

where α_i is country fixed effect, r_{ijt}^{BOP} is the rate of return i.e. real rate of return on portfolio equity assets, portfolio equity liabilities, real yield on assets, real yield on liabilities, as calculated from the balance of payments data. r_{ijt}^M is an estimated rate of return on some observable market portfolio i.e. stock returns computed from MSCI world stock indices and bond yield on ten year government bonds.

This chapter investigates whether the returns on foreign assets provide diversification against variation in domestic financial returns by employing the following specification;

$$r_{ijt}^{BOP,FA} = \alpha_i + \beta * r_{ijt}^M + \varepsilon_{ijt} \quad (2.39)$$

where $r_{ijt}^{BOP,FA}$ is the rate of return on foreign assets, as calculated from the balance of payments data and r_{ijt}^M is the return on some category of foreign liabilities.

This thesis addresses the relation between rates of return and real exchange rate movements. The co-variation between real returns in home currency and foreign currency depends on their correlations with real exchange rate fluctuations. Therefore, this thesis reports these correlations as $\rho(r_{it}, r_{it}^{US})$; $\rho(r_{it}, drerus_{it})$; $\rho(r_{it}^{US}, drerus_{it})$.

2.5.2 Results

(i) Rates of Return on Foreign Assets and Market Returns

Table 2.9 illustrates the fixed effect panel regression for rates of return on foreign assets and market returns over the years 1990 to 2003. In column (1), the real return on portfolio equity is the dependent variable and rate of return on stocks is the independent variable. The stock return variable has positive value of 0.78. The explanatory power is 0.52 as shown in column (1). A 10 - percentage point increase in the stock returns is associated with 7.8 - percentage point increase in real return of portfolio equity. This indicates that foreign investors may hold equity baskets in a given country that differ in composition from the country's broad market index.

In the column (2), the dependent variable is real return on debt assets and the independent variable is bond yield. The bond yield has a positive value of 0.21. The explanatory power is 0.56 as shown in column (2). A 10 - percentage point increase in the bond yield is associated with 2.1 - percentage point increase in real return of debt assets. The bond yield measure closely tracks the real return on debt assets.

The dependent variable in column (3) is real yield on debt assets and the independent variable is bond yield. The bond yield has a positive value of 0.11 and it is significant. The explanatory power is 0.12 as shown in column (3). A 10 - percentage point increase in the bond yield is associated with 1.1 - percentage point increase in real yield on debt assets. The bond yield measure tracks the real yield on debt assets.

Table 2.9: Rates of Return on Foreign Assets and Market Returns, 1990-2003

	Real Return Portfolio Equity (1)	Real Return Debt (2)	Real Yield Debt (3)
Stock return	0.78 (1.58)		
Bond yield		0.21 (0.96)	0.11*** (4.23)
Adjusted R ²	0.52	0.56	0.12
Observations	183	106	125

Note: Fixed effect panel estimation. t-statistics in parentheses. *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

Table 2.10 illustrates the fixed effect panel regression for rates of return on foreign liabilities and market returns over the years 1990 to 2003. In column (1), the real return on portfolio equity is the dependent variable and the rate of return on stocks is the independent variable. The stock return variable has positive value of 0.09 and it is significant. The explanatory power is 0.51 as shown in column (1). A 10 - percentage point increase in the stock returns is associated with 0.9 - percentage point increase in real return of portfolio equity. This relationship illustrates international risk sharing mechanism i.e. selling shares to foreign investors' hedges the risk of fluctuations in domestic equity returns.

In the column (2), the dependent variable is real return on debt liabilities and the independent variable is bond yield. The bond yield has a positive value of 0.82. A 10 -

percentage point increase in the bond yield is associated with 8.2 - percentage point increase in real return of debt liabilities. The explanatory power is 0.75 as shown in column (2). Bond yield explains 75 - percentage of returns on debt liabilities.

The dependent variable in column (3) is real yield on debt liabilities and the independent variable is bond yield. The bond yield has a positive value of 1.49 and it is significant. A 10 - percentage point increase in the bond yield is associated with 14.9 - percentage point increase in real yield on debt liabilities. The explanatory power is 0.84 as shown in column (3). The yield on foreign debt liabilities is well tracked by domestic bond yield.

Table 2.10: Rates of Return on Foreign Liabilities and Market Returns, 1990-2003

	Real Return Equity	Portfolio (1)	Real Return Debt (2)	Real Yield Debt (3)
Stock return	0.09 (1.94)*			
Bond yield			0.82*** (3.54)	1.49*** (4.78)
Adjusted R ²	0.51		0.75	0.84
Observations	189		107	120

Note: Fixed effect panel estimation. t-statistics in parentheses. *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

Table 2.11 illustrates the fixed effect panel regression for rates of return on foreign aggregate and market returns over the years 1990 to 2003. In Column (1), the real return on foreign aggregate asset is the dependent variable and rate of return on stocks is the independent variable. The stock return variable has positive value of 11.39 and it is significant. The explanatory power is 0.53 as shown in column (1). This indicates

that holding foreign assets provides diversification against fluctuations in the local stock market.

In the column (2), the dependent variable is real return on foreign aggregate asset and the independent variable is bond yield. The bond yield has a positive value of 0.96. The explanatory power is 0.63 as shown in column (2). This indicates that holding foreign assets provides diversification against fluctuations in the local bond market.

The dependent variable in column (3) is real return on foreign portfolio equity asset and the independent variable is stock return. The stock return has a positive value of 1.18 and it is significant. The explanatory power is 0.53 as shown in column (3). This indicates that holding foreign equity assets provides some diversification against fluctuations in the local stock market.

Table 2.11: Foreign Assets and Market Returns, 1990-2003

	Real Return Foreign Asset (1)	Real Return Foreign Asset (2)	Real Return Portfolio Equity Asset (3)	Real Return Portfolio Equity Asset (4)
Stock Return	11.39 (2.19)**		1.18 (2.84)***	
Bond Yield		0.96 (1.25)		-0.45*** (-8.24)
Adjusted R ²	0.53	0.63	0.53	0.73
Observations	189	135	156	156

Note: Fixed effect panel estimation. t-statistics in parentheses. *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence level, respectively.

In the column (4), the dependent variable is real return on foreign portfolio equity asset and the independent variable is bond yield. The bond yield has a negative value of 0.45 and it is significant. The explanatory power is 0.0.73 as shown in column (4).

This indicates that foreign portfolio equity assets and domestic bond yield are negatively associated with each other.

Table 2.12 indicates the relation between domestic and foreign currency ex post real returns and exchange rates. Column (1) indicates the correlations between domestic and foreign currency real returns on aggregate foreign assets. The mean correlation is positive – an increase in the local currency real return is associated with an increase in the dollar real return. In column (2), the mean correlation is negative, which implies that domestic real returns are lower during periods of real appreciation. This may happen due to the influence of several external factors. Column (3) shows a marginal negative correlation between dollar real returns on foreign assets and the real exchange rate, suggesting that there is minor influence of domestic factors on some of the returns on foreign assets. Column (4) indicates a positive correlation between domestic and dollar real returns on foreign liabilities. In column (5), the mean correlation is negative, which implies that domestic real returns are lower during periods of real appreciation. Column (6) shows a marginal negative correlation between dollar real returns on foreign liabilities and the real exchange rate, suggesting that there is minor influence of domestic factors on some of the returns on foreign liabilities.

The impact of exchange rate movements on ex post returns depends on whether it is denominated in domestic currency or foreign currency. The domestic currency return on a foreign currency nominal asset or liability is negatively related to capital appreciation. For positions denominated in domestic currency; on one side, real appreciation may proxy for good fundamentals and so be associated with high

domestic currency returns; real appreciation also boosts profits by lowering costs of imported inputs if these are priced in foreign currency. On the other hand, real appreciation may reduce returns by a loss of competitiveness, or by lowering the terms of trade if local currency pricing in good markets prevail.

Table 2.12: Rates of Return and Real Exchange Rates

Correlations	Assets $\rho(r_t, r_t^{US})$	Assets $\rho(r_t, drer_t)$	Assets $\rho(r_t^{US}, drer_t)$	Liabilities $\rho(r_t, r_t^{US})$	Liabilities $\rho(r_t, drer_t)$	Liabilities $\rho(r_t^{US}, drer_t)$
Australia	0.55	-0.27	-0.05	0.59	-0.09	0.07
France	0.18	0.22	0.001	0.04	0.27	0.05
Germany	0.20	0.09	-0.20	0.42	0.06	-0.19
Italy	0.23	0.33	0.07	0.30	0.25	-0.14
Canada	0.69	-0.59	-0.18	0.30	-0.47	0.20
Japan	0.20	0.50	0.24	0.54	0.65	0.31
Netherlands	0.14	-0.02	-0.11	0.35	0.16	0.22
New Zealand	0.92	0.10	0.23	0.76	0.34	0.45
Spain	0.28	0.14	-0.13	0.06	0.14	-0.25
Sweden	0.97	-0.98	-0.95	0.97	-0.98	-0.96
Switzerland	0.18	-0.39	0.33	0.59	-0.30	0.23
UK	0.64	-0.59	-0.11	0.73	-0.60	-0.26
Mean	0.43	-0.12	-0.07	0.47	-0.05	-0.02

Note: r_t, r_t^{US} are real returns on foreign holdings in domestic currency and in US dollars respectively, $drer_t$ is the percentage change in bilateral end of period exchange rate vis-à-vis the United States.

This section provides an initial investigation into rates of return and yields for our chosen group of countries. Overall the results indicate that market indices co-vary with these returns however for several asset categories there are significant unexplained differences. Finally international cross holdings provide diversification against fluctuations in domestic market returns. The dynamics of real exchange rates imply that the properties of real returns are different for home and foreign investors.

2.6 Summary and Conclusions

This chapter provides some insights into the empirical features of the growth in international cross holdings of foreign assets and liabilities. Broad trends of international financial integration suggest that there has a remarkable increase in the size of countries' external portfolios and the magnitude of the underlying gross capital flows, over the period from 1990 to 2003.

The results show that the growth in goods trade and stock market capitalisation are the key determinants of the growth in the scale of international balance sheets. Taxes and capital controls do not appear as significant variables in explaining movements in dependent variables. In the Australian context; trade openness, financial depth, income per capita, tax rate and stock market capitalization are reasonably successful in explaining the degree of international financial integration. These factors may not have uniform effects on the different components of the international balance sheet. For example, if the greatest barriers to trade have been with respect to portfolio equity and FDI, then policy implications towards cost reducing steps will have a larger impact on these components.

The analysis of the properties of the rates of return on foreign assets and liabilities suggest that international cross holdings provide diversification opportunities against fluctuations in domestic market returns. Exchange rate fluctuations and changes in stock market values cause capital gains and losses that explain the dynamics of the external position.

Trade openness is a significant explanatory variable in determining the movement in all our dependent variables viz. international financial integration, cross border equity holdings as a share of external holdings and foreign liability holdings as a ratio of stock market capitalisation. Positive and significant trade openness implies that those factors that stimulate trade in goods also stimulate trade in assets and in addition, trades in goods and in assets are complementary activities.

The dependent variables viz. total foreign assets and liabilities as a ratio of GDP; sum of portfolio equity and FDI assets and liabilities as a ratio of GDP; cross border equity share in total external holdings are strongly correlated with stock market capitalisation as a share of GDP. In addition, the dependent variables viz. total foreign assets and liabilities as a ratio of GDP; sum of portfolio equity and FDI assets and liabilities as a ratio of GDP and foreign equity liabilities as a share of stock market capitalisation is strongly correlated with financial depth (ratio of M2 to GDP). This implies that, in the process of financial integration the size of national financial systems should increase (relative to domestic GDP) in the countries starting with less developed financial markets.

Financial integration may be associated with local financial development for various reasons. First, financial integration is likely to increase the efficiency of the financial intermediaries and markets of less financially developed countries by stimulating the demand for funds and for financial services. There will be increased competition with more sophisticated and cheaper foreign intermediaries, associated with financial integration. The competition from these intermediaries may reduce the cost of financial services to the firms and households of countries with less developed

financial systems, and thus expand the quantity of the local financial markets. In some cases, the additional supply of financial services may be provided by foreign intermediaries who may enter the local market by acquiring local banks or merging with them. The increase in competition may lead to better credit conditions and hence stimulate investment and economic growth. Second, financial integration may require improvements in national regulation i.e. accounting standards, securities law, bank supervision, corporate governance to bring it in line with best-practice regulation in the integrating area. This convergence in regulatory standards will result in an improvement in the regulatory standards of less developed financial markets. This improvement may help promote their development, by reducing adverse selection and agency costs as well as the distortions induced by inadequate regulation.

In a fully integrated market, the total size of the financial market of the integrating area matters i.e. firms of a given country may have equal access to financial services as those of all other countries even if their domestic financial sectors (scaled by GDP) differs from that in other countries.

Overall results indicate that among industrial countries, greater trade openness and more developed financial markets lead to larger stocks of external assets and external liabilities i.e. more external diversification. These results are in accordance to Lane (2000), Lane and Milesi-Ferretti (2003, 2004) and Mishra and Daly (2005a, 2006b).

CHAPTER 3.

INTERNATIONAL EQUITY INVESTMENT PATTERNS

3.1 Introduction

Chapter 2 described financial integration in the global and Australian context. Research in this chapter determines portfolio equity investment patterns in both the international and Australian context by presenting a simple theoretical model that highlights trade as an important potential determinant of bilateral equity holdings. Research in this chapter also investigates the role of bilateral factors in explaining portfolio equity investment patterns and the role of country characteristics in explaining the determinants of aggregate portfolio equity assets and liabilities. The bilateral host and source countries considered are Australia, Canada, France, Germany, Hong Kong, Indonesia, Italy, Japan, Malaysia, New Zealand, Singapore, Spain, Sweden, Switzerland, Thailand, United Kingdom and United States. This chapter includes OECD and Asian countries with which Australia has trading relations.

International parity relations suggest that in a fully-integrated global economy without frictions in product or asset markets, investors should hold identical portfolios, regardless of nationality. However, it is observed that in international equity investment patterns, there is a strong bilateral variation in portfolio allocations, i.e. source countries invest disproportionately in various host countries. Research in this chapter focuses on identifying the bilateral factors that explain these asymmetries in portfolio allocations.

The study of asymmetries in 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 chapter answers these questions both, in the international context and the Australian context.

The geographical location of countries' may also matter in receiving foreign equity investments, i.e. a financially remote country will receive less inward investment and faces a higher cost of equity capital than countries' in close proximities. Asymmetries in the geography of international investment may also shape international risk sharing patterns. For instance, a negative shock in host country C will have a higher negative effect on investor country A than investor country B, if country A's portfolio is more heavily geared towards country C.

The pattern of bilateral financial linkages may influence the matrix of correlations in asset prices (Forbes and Chinn, 2003) and may also affect business cycle synchronization (Imbs 2004a, 2004b). The pattern of bilateral financial linkages may also affect the covariance structure of real exchange rates. If for instance, countries A and B have extensive bilateral financial holdings, whereas country C is financially

isolated, then there may be larger real exchange rate movements between countries A and C than between countries A and B.

Research here contributes to the existing literature in the field on both the theoretical and empirical front. This chapter employs 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, and includes virtually all major international investors' economies. Further, research in this chapter contributes to the existing literature in the field, by extending Fisher's (1930) model to the N country generalized, Obstfeld and Rogoff's (2001) model and includes the informational and financial frictions similar to those employed by Lane and Milesi-Ferretti (2004) and Portes and Rey (2005). The model links bilateral equity holdings to bilateral trade in goods and services after allowing for financial frictions highlighted in previous studies. The empirical analysis focuses on the roles played by financial and informational frictions in explaining countries' equity investment patterns. The empirical analysis also highlights the role of aggregate country characteristics in explaining the overall size of countries' foreign equity asset and liability positions. Research in this chapter analyses the portfolio equity international investment patterns exclusively, in the international and Australian context. This is first of its kind of study in the Australian context.

The structure of this chapter is as follows. Section 3.2 describes the literature review. Section 3.3 describes IMF's Coordinated Portfolio Investment Survey (CPIS). Section 3.4 develops model for cross-border equity investment. Section 3.5 describes the

empirical strategy. Section 3.6 describes the data and stylized facts. Section 3.7 describes the empirical analysis and results. Finally, section 3.8 concludes.

3.2 Literature Review

There are some studies related to 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 et al (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. Mishra and Daly (2007) examine the effect of quality of institutions on outward foreign direct investment.

These studies have used the OECD and BIS database on direct investment and bank lending, respectively. BIS data measure the gross claims and liabilities of all banks located in a reporting country vis-à-vis entities located in other countries. In addition, BIS data also measures the foreign claims of the banks' head office and all its branches and subsidiaries on a worldwide consolidated basis, excluding positions between offices of the same group. OECD data measures international direct investment to and from the OECD area. Research in this chapter employs a new IMF's CPIS dataset on portfolio equity investment. CPIS collects information on the stock of cross border holdings of equities, long and short term debt securities valued

at market prices prevailing at the time of the CPIS, and broken down by the economy of residence of the issuer. CPIS data focuses on bilateral equity holdings as against BIS dataset which does not differentiate between equities, bonds and cross-border bank lending. This is important because informational costs differ for different types of assets (Portes et al, 2001). Research in this chapter also employs International Investment Position (IIP) data. IIP is the balance sheet of the stock of external assets and liabilities of an economy. IIP data focuses on countries' external assets and liabilities as against OECD dataset which focuses only on OECD countries' international direct investment.

In addition, these studies have used the empirical methods similar to those employed in traditional gravity models of international goods trade. Research in this chapter develops an empirical model that links bilateral equity holdings to bilateral trade in goods and services after allowing for financial frictions.

Some authors have focussed specifically on the pattern of bilateral equity investment. Portes and Rey (2005) use panel data set on bilateral gross cross-border equity flows among 14 countries, for the period from 1989 to 1996. They find 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 focus on a single source country. For instance, studies by Ahearne et al. (2004), Mane and Meade (2002), Dahlquist et al (2003) focus on United States; Coval and Moskowitz (1999) and Huberman (2001) study the regional investment patterns within the United States; Honohan and Lane (2000) have focus their research on Ireland. However, the papers

by Yildirim (2003) and Lane and Milesi-Ferretti (2004) are exceptions. Yildirim (2003) examines 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) analyse the bilateral, source and host factors driving portfolio equity investment across countries (50 sources and 172 host countries), using 2001 CPIS data.

Other researchers have adopted different 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 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.

The Martin and Rey (2004) 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 costs¹ 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 et al (2001) conduct 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

¹ Martin and Rey (2004) model transaction cost (that is incurred when agents trade assets) as an iceberg cost: part of the share and part of the dividend “melt” during the transit. The presence of international transaction costs on trade in assets includes different types of costs: banking commissions and variable fees, exchange rate transaction costs, exchange rate changes related risk that is costly to insure, and some information costs.

correlation with domestic labour income and its correlation with the domestic risky asset. In their model, the gains to international financial trade in risky assets depend on these correlations.

Chapter 2 describes financial development and international financial integration in the Australian context. Research in this chapter extends the research of Chapter 2 by focussing exclusively on portfolio equity investment patterns in the Australian context. Australia has major portfolio equity investments in its major OECD trading partners' viz. US and UK. Australia has trading relations with Asian countries like Japan, China, Indonesia, Malaysia, India etc; however its equity investment in these countries is low. This thesis contributes to the existing literature by investigating the role played by informational and financial frictions viz. correlation of GDP growth rates; correlation of stock returns; correlation of GDP growth rates, stock returns; phone costs; language; legal origin; imports in Australian investors cross border portfolio equity investment. In addition, research in this chapter also performs instrumental variable tests to support the robustness of results. There are no similar studies on portfolio equity investment patterns, exclusively in the Australian context.

3.3 Coordinated Portfolio Investment Survey (CPIS)

Research in this thesis employs a new dataset on bilateral equity investment. The new dataset on bilateral portfolio equity investment has been developed by IMF's Coordinated Portfolio Investment Survey (CPIS). The CPIS dataset has been employed in the Australian context for the first time. Appendix A3 briefly describes the CPIS dataset.

3.3.1 Purpose of the CPIS

The purpose of the CPIS was to improve statistics of holdings of portfolio investment assets viz. equity, long term debt, and short term debt. The primary objectives were: to collect 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 for use in the compilation or improvement of international investment position (IIP) statistics on portfolio investment capital. The IIP statistics would 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. The second objective was to exchange the bilateral data among the participating and other countries. This data exchange would enable the participating countries to improve their statistics of non-resident holdings of their portfolio investment liabilities and associated financial flows and investment income data.

3.4 Modelling Cross-Border Equity Investment

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 chapter extends Fisher's (1930) model to the N country generalized, Obstfeld and Rogoff's (2001) model and includes the informational and financial frictions similar to those employed by Lane and Milesi-Ferretti (2004). Consider first 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 . Utility U_1^i depends on period consumption levels, c^i :

$$U_1^i = u(c_1^i) + \beta u(c_2^i), \quad 0 < \beta < 1 \quad (3.1)$$

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

Assume that the period utility function $u(c^i)$ is strictly increasing in consumption and strictly concave such that $u'(c^i) > 0$ and $u''(c^i) < 0$. Assume that there are $s = 1, 2, \dots, S$ possible date 2 states of nature. The lifetime utility is

$$U_1 = u(C_1) + \beta u\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\} \quad (3.2)$$

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

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

$$\left[\nu^{\frac{1}{\theta}} C_T^{\frac{\theta-1}{\theta}} + (1-\nu)^{\frac{1}{\theta}} C_N^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \quad \nu \in (0,1), \theta > 0 \quad (3.3)$$

where, C_T, C_N denote consumption of tradable and non-tradable goods respectively.

θ is the intratemporal substitution elasticity between tradable and non-tradable goods.

ν and $1-\nu$ 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

$$u(C) = \frac{C^{1-\rho}}{1-\rho} \quad (\rho > 0, \rho \neq 1) \quad (3.4)$$

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

where, ρ is the coefficient of relative risk aversion. These equations fit the iso-elastic

class if σ , the intertemporal substitution of elasticity, equals $\frac{1}{\rho}$.

Replace the intratemporal substitution elasticity θ in equation (3.3) by $\frac{1}{\rho}$.

$$\{\Omega[C_2(1), \dots, C_2(S); \pi(1), \dots, \pi(S)]\} = \left[\sum_{s=1}^S \pi(s) C_2(s)^{1-\rho} \right]^{\frac{1}{1-\rho}} \quad (3.5)$$

The variable $u(C)$ (in equation (3.1) is iso-elastic), alongwith the equation (3.4), leads to an intertemporal utility function that generalizes both isoelastic and CRRA utility

by allowing σ , to differ from $\frac{1}{\rho}$

$$U_1 = \frac{C_1^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} + \beta \frac{\left\{ \left[\sum_{s=1}^S \pi(s) C_2(s)^{1-\rho} \right]^{\frac{1}{1-\rho}} \right\}^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}} \quad (3.6)$$

When $\sigma = \frac{1}{\rho}$, equation (3.6) reduces to the expected life time utility,

$$U_1 = \frac{C_1^{1-\rho}}{1-\rho} + \beta \sum_{s=1}^S \pi(s) \frac{C_2(s)^{1-\rho}}{1-\rho} \quad (3.7)$$

There are inherent uncertainties that underlie consumption decisions. Therefore we consider a stochastic model wherein we make the 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. Assume that the representative individual, faced with this uncertainty, maximizes the expected value of lifetime utility,

$$U_1 = E_t \left\{ \frac{C_1}{1-\rho} + \beta \sum_{s=1}^S \pi(s) \frac{C_2(s)^{1-\rho}}{1-\rho} \right\} \quad (3.8)$$

The operator $E_t \{ \cdot \}$ 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 (3.7) reduces to,

$$U_1 = E_t \frac{C_1}{1-\rho} \quad (3.9)$$

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.

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

There are N countries and there is symmetric joint distribution across (Y_1, \dots, Y_N) . There is a complete set of Arrow Debreu securities². Consider a one period portfolio problem. An individual i seeks to maximize the expected utility from consumption,

$$EU_j = E \left\{ \frac{1}{1-\rho} \left[\left(\sum_{i=1}^{i=N} \omega_{ij} C_{ij}^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}} \right]^{1-\rho} \right\} = E \frac{C_j^{1-\rho}}{1-\rho} \quad (3.10)$$

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. Due to shipping costs, only a fraction $(1-\tau_{ij})$ of a unit of a good shipped from country i to country j survives the journey. Normalizing leads to,

$$\omega_{ij} = 1, \tau_{jj} = 0 \quad \forall j$$

$$P_{ii} = (1-\tau_{ij}) P_{ij} \quad (3.11)$$

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

² See Obstfeld and Rogoff (1996), Chapter 5, for a discussion on Arrow Debreu securities.

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 :

$$\frac{1}{P_{ii}} \frac{\partial U}{\partial C_{ii}} = \frac{1}{P_{ij}} \frac{\partial U}{\partial C_{ij}} \quad \forall i, j \quad (3.12)$$

$$C_{ii}^{-1/\theta} C_i^{1/\theta-\rho} = (1-\tau_{ij}) \omega_{ij} C_{ij}^{-1/\theta} C_j^{1/\theta-\rho} \quad (3.13)$$

For $\rho = 1/\theta$, the equation (3.13) reduces to,

$$[1-\tau_{ij}]^\theta \omega_{ij}^\theta C_{ii} = C_{ij} \quad (3.14)$$

In goods market, for output clearing

$$Y_i = \sum_{j=1}^N \left[\frac{C_{ij}}{(1-\tau_{ij})} \right] \quad (3.15)$$

The portfolio allocations required to generate equilibrium consumption shares are of the form,

$$x_{ij}^* = \left\{ \frac{(1-\tau_{ij})^{\theta-1} \omega_{ij}^\theta}{\sum_{j=1}^N (1-\tau_{ij})^{\theta-1} \omega_{ij}^\theta} \right\} Y_i \quad (3.16)$$

This allocation can be attained in equity trade, by assuming that $\rho = 1/\theta$. This implies that if the country j holds a larger share in the equity of country i , the lower is the transport cost between countries i and j , relative to the average transport cost

between country i and all other countries, and the greater is the relevant importance attached to good i in the consumption preferences of country j .

$$\log(x_{ij}^*) = (\theta - 1)\log(1 - \tau_{ij}) + \theta\log(\omega_{ij}) - \log\left(\sum_{j=1}^N \left[(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta}\right]\right) + \log Y_i \quad (3.17)$$

The latter two terms are fixed i across all pairs (i, j) . They are represented by country - i constant.

$$\log(x_{ij}^*) = \alpha_i + (\theta - 1)\log(1 - \tau_{ij}) + \theta\log(\omega_{ij}) \quad (3.18)$$

$$x_{ij}^* = \left\{ \frac{(1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta}}{\left(\sum_{j=1}^N (1 - \tau_{ij})^{\theta-1} \omega_{ij}^{\theta}\right)} \right\} Y_i \left[\frac{W_j}{\sum_{j=1}^N W_j} \right] \quad (3.19)$$

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,

$$\log(x_{ij}^*) = \alpha_i + \alpha_j + (\theta - 1)\log(1 - \tau_{ij}) + \theta\log(\omega_{ij}) + \nu_{ij} \quad (3.20)$$

Transport costs and consumer preferences are not directly observable. In this model, the volume of imports to country j from country i captures the impact of these variables. The theoretical relationship between equity holdings and imports is,

$$\log(x_{ij}^*) = \log(IMP_{ij}) \quad (3.21)$$

Other bilateral factors in addition to the level of imports matter for the pattern of international equity investment. Equation (3.18) gives the benchmark portfolio

allocation. However, incorporating frictions in financial markets, information asymmetries or behavioural finance factors, causes deviations from this benchmark.

These factors can be represented by,

$$\log(x_{ij}) - \log(x_{ij}^*) = \phi_i + \phi_j + \gamma F_{ij} + \eta_{ij} \quad (3.22)$$

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.

Equation (3.22) along with equation (3.21) yield,

$$\log(x_{ij}) = \phi_i + \phi_j + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_{ij} \quad (3.23)$$

Equation (3.23) guides the empirical work. Incorporate α_i and α_j in equation (3.23),

$$\alpha_i = \rho H_i + u_i \quad (3.24)$$

$$\alpha_j = \rho S_j + u_j \quad (3.25)$$

where H_i and S_j are vectors of country characteristics that explain variation in aggregate levels of portfolio positions for host and source countries respectively.

3.5 Empirical Strategy

Research in this chapter focuses on single cross sectional observations for the structure of external equity portfolios for the years 1997, 2001 and 2002 respectively.

In a two country setting, Obstfeld and Rogoff (2001) show that the existence of trading costs in the goods market naturally generates a home bias in equity positions, even if global financial markets are complete. These authors also state that an additional potential source of variation in bilateral investment patterns is

heterogeneity in consumption preferences. The empirical strategy is to isolate the relative contributions of bilateral factors, source country factors, and host country factors. Bilateral factors may explain 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.

3.5.1 Bilateral Factors

Research in this chapter employs a set of gravity type variables viz. telephone cost, common language, common legal origin, correlation in GDP growth rates, correlation in stock returns, correlation in GDP growth rates and stock returns to proxy for information costs, similarity in institutions and financial frictions. Portes and Rey (2005) explore a panel data set on bilateral gross cross-border equity flows between 14 countries for a period from 1989 to 1996. They find that gross transaction flows depend on market size in source and destination country as well as trading costs, in which both information and the transaction technology play a role. The geography of information is the main determinant of the pattern of international transactions.

Portes et al (2001) find that information asymmetries are responsible for the strong negative relationship between asset trade and distance. Information frictions are positively correlated with distance. Geographical distance is a barrier to interaction among economic agents and to cultural exchange. Cultural affinities are a component of the network effects that influence international economic relations (Rauch, 2001).

This chapter uses phone cost as a proxy for distance. Phone cost reflects both the cost component of the information friction (price of calls) and a cultural one (links between two countries because of immigration, tourism, etc.). The cost of information gathering would likely to increase with distance, as familiarity with the host country's investment opportunities, customs and culture decreases. Higher telephone costs imply greater distance between host and source countries. Traders might be more influenced by their information about fundamentals, which are more closely correlated; the closer is a pair of countries geographically.

A common language variable is used as a dummy for familiarity. Sharing a common language can be viewed as a common cultural link. In one Finnish study Grinblatt and Keloharju (2001) find that investors are more likely to hold, buy and sell the stocks of firms that are located close to the investor, that communicate in the investor's native tongue, and that have chief executives of the same cultural background. The influence of distance, language and culture is less prominent among the most investment savvy institutions than among both households and less savvy institutions.

Common origin to the legal system uses a dummy variable for similarity in institutions. Laws in different countries are typically not written from scratch, but rather transplanted from a few legal families or traditions. In general, commercial laws come from two broad traditions: common law, which is English in origin and civil law, which derives from Roman law. In the civil tradition French, German and Scandinavian are the three major families from which the modern commercial laws originate. The English common law and the French and German civil law are the three major law tradition families that have global impact either through conquest,

imperialism, outright borrowing and imitation. In case of individual countries, the resulting laws reflect both the influence of their families and country specific law characteristics.

The proxies for financial frictions are some bilateral financial correlations that may influence asset holdings in an incomplete market environment. These bilateral financial correlations are correlations in stock market returns and correlation in GDP growth rates. Further, following Davis et al (2001), research in this chapter 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. These correlations are calculated using historical data and since much of the foreign portfolio equity investment occurred since mid-1990s, the endogeneity of financial correlations to the level of bilateral financial holdings may not be a major concern. However, as a robustness check, research in this chapter reports instrumental-variables estimates that allow for the potential endogeneity of a number of regressors.

3.5.2 Source and Host Country Factors

Research in Chapter 2 and Lane and Milesi-Ferretti (2003) consider the determinants of the sum of equity assets and liabilities, as a measure of general international financial integration. Research in this chapter examines separately the determinants of equity assets and equity liabilities, by including various source and host factors viz. country size, domestic stock market capitalisation, trade openness and capital control. Separate examination of equity assets and equity liabilities side of international

balance sheet will provide a more complete picture of international financial integration.

Country size (G) matters in international portfolio allocations. The establishment of domestic financial markets may involve fixed set up costs such that 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) influences the tendency to engage in international asset trade. Higher income per capita is associated with lower risk aversion and international asset trade is perceived as riskier than domestic trade; this may also raise international asset trade. 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) affects 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, 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 chapter 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.

In accordance with the above discussion, research in this chapter employs the following empirical model to determine the equity assets and equity liabilities,

$$\log(x_{ij}) = \log(G) + \log(I) + \log(T) + \log(S) + C + \varepsilon_{ij} \quad (3.26)$$

where

x_{ij} is assets/liabilities of source country i in host country j .

G : country size measured as GDP.

I : income per capita

T : log of exports for assets and log of imports for liabilities.

S : log of stock market capitalisation.

C : measure of capital control (Miniane, 2004).

3.6 Data and Stylized Facts

Table 3.1 lists the ten largest foreign investors, both in absolute terms and as ratios of domestic GDP. In absolute levels, the largest foreign investors are the main OECD economies; with the exception of Luxembourg, a very small economy with a large financial centre. The largest foreign investors in terms of ratios of GDPs are the financial and offshore centres. Total reported portfolio equity investment by offshore

centres and small economies with financial centres (including Ireland, Luxembourg, Hong Kong and Singapore, but excluding Switzerland) amounts to over US\$700 billion.

Table 3.1: 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	0.61

Source: Lane and Milesi-Ferretti (2004)

Table 3.2 lists the ten largest geographical destinations for portfolio equity investment. CPIS does not directly measure liabilities. However, liabilities have been derived from the asset claims of the countries participating in the CPIS. The first column reports in brackets the total amount of portfolio equity liabilities reported by countries in their International Investment Position. The first column indicates that the largest OECD economies are the main destination countries for portfolio equity investment, with the exception of Luxembourg and Bermuda. The largest derived liabilities in terms of ratios of domestic GDPs are the offshore centres and small economies with financial centres. The total amount of derived equity liabilities of offshore centres and small economies with financial centres is US\$870 billion, which is greater than reported offshore centre assets. This may be because of several reasons. First, not all offshore centres participated in the CPIS. Second, the derived

equity liabilities of these centres often represent shares in mutual funds that may invest these funds in portfolio debt instruments and not exclusively in equities.

Table 3.2: 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
Luxemborg	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

Note: N.A. implies data not available. **Source:** Lane and Milesi-Ferretti (2004)

Table 3.3 indicates that the United Kingdom and the United States stock market capitalisation largely exceeded their aggregate weight in world GDP. 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 United States (13 percent) and Japan (17 percent).

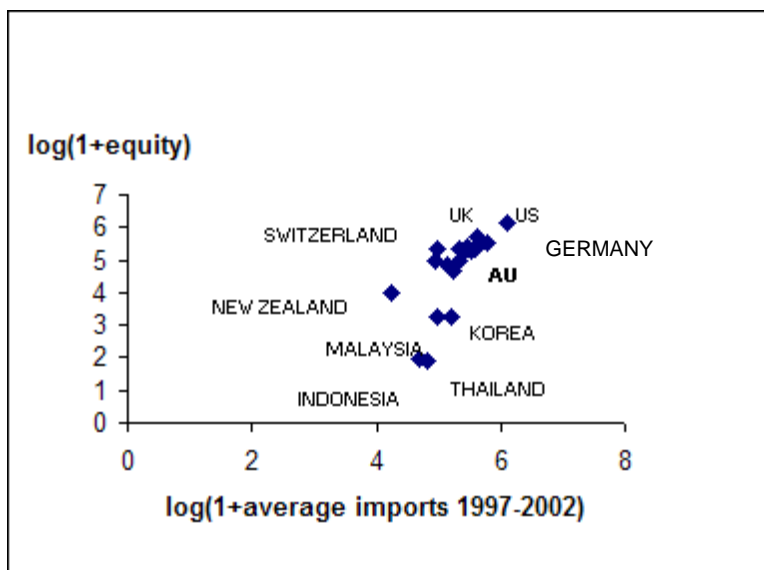
Table 3.3: Stock Market Size and Foreign Ownership (2001)

Country	Domestic stock market capitalisation in percent of world stock market capitalisation	Percent of domestic stock market capitalisation 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: N.A. implies data not available. **Source:** Lane and Milesi-Ferretti (2004)

Figure 3.1 illustrates the scatter plot of equity holdings versus imports for the year 2002. The plot indicates that United States has both highest value of imports and equity holdings. On the other hand, Indonesia has the lowest value of both, imports and equity holdings. Developed countries have both, large value of equity holdings and imports. Larger economies will have correspondingly larger international equity asset and liability positions. 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 and may provide a reason why high income level countries involve more in international asset trade.

Fig 3.1: Scatter of Equity Holdings versus Imports (2002)



Note: AU-Australia. **Source:** CPIS data for equity and author's own calculations.

The plot also supports the hypothesis that trade linkages heavily influence investment patterns (Honohan and Lane, 2000; Mishra and Daly, 2006a). At one end of the spectrum, international trade in goods and services itself may generate financial flows

and at the other end, 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.

3.7 Empirical Analysis and Results

This chapter 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. Research in this chapter considers a wide range of explanatory variables in the empirical analysis.

3.7.1 Bilateral Equity Holdings

Tables 3.4, 3.5 and 3.6 present regression results for international bilateral portfolio equity holdings for the years 1997, 2001 and 2002, respectively. Table 3.7 provides the regression results for cross border portfolio equity holdings by Australians. The dependent variable is $\log(1+\text{equity})$. The equity positions are measured in U.S. dollars; adding 1 to the equity position does not distort the results, but rather allows including any zero observations in the log specification.

In Tables 3.4 to 3.6, column (1) includes source country imports from the host country, as an explanatory variable. A one percent increase in imports is related to an increase of about 0.93 percent in portfolio equity holdings. These results indicate a strong link between bilateral imports and bilateral investment holdings. This is in accordance with Lane and Milesi-Ferretti (2004). 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 country'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 (2004). They use 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) of Tables 3.4 to 3.6 adds phone cost to take into account informational asymmetries. This variable is significant and negative, supporting the theoretical result that phone cost increases with distance. For the year 2001, a one - percent increase in phone cost is associated with a decrease in the cross border portfolio equity holdings of 0.92 percent. Column (2) also includes the correlation in GDP growth rates between the source and host country; and a dummy for common language. The GDP growth rate variable is a proxy for the gains from bilateral diversification, along the lines of Davis et al (2001). The correlation between GDP growth rates of source and host countries is significantly positive for the years 1997 and 2001. The positive sign of GDP growth rate is unexpected. This indicates that

investors hold equity in destinations with similar business cycles. The common language dummy variable is positive for all the years and both positive and significant for the years 1997 and 2002. The results indicate that speaking a common language raises equity holdings by approximately 35 percent (for the years 1997 and 2002). The import variable is positive and significant.

Table 3.4: Bilateral Portfolio Equity Holdings Regressions (1997)

	(1)	(2)	(3)	(4)	(5)
IMP	0.94* (153.71)	0.89* (51.58)	0.88* (52.20)	0.88* (40.47)	0.87* (43.09)
Phone Cost		-0.80*** (-1.65)	-0.89** (-1.97)	-0.82 (-1.65)	-0.93** (-2.02)
G		0.43*** (1.68)	0.40 (1.63)	0.42 (1.58)	0.37 (1.45)
S				0.08 (0.27)	0.17 (0.58)
GS				-0.18 (-0.73)	-0.22 (-0.95)
Lan		0.32** (2.00)	0.17 (0.63)	0.34** (2.14)	0.16 (0.59)
Leg			0.22 (0.76)		0.27 (0.91)
Obs	408	224	224	224	224
Host	6	14	14	14	14
Source	70	16	16	16	16
Adj R ²	0.34	0.25	0.25	0.24	0.24

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 0.01, 0.05 and 0.1 confidence level, respectively. IMP: imports; G: correlation of GDP growth rates; S: correlation of stock market returns; GS: correlation of GDP growth, stock returns; Lan: dummy variable for language; Leg: dummy variable for legal origin; Obs: observations; Host: host countries; Source: source countries.

Column (3) of Tables 3.4 to 3.6 adds a dummy for common origins to the legal system. The legal origin dummy is positive and insignificant for the years 1997 and 2002, however it is negative for the year 2001. The common language variable is positive, for all the three years; but it is insignificant. This may be due to the fact that

both the common language variable and the legal origin variable are associated with the countries cultural similarities. For all the three years, the import variable is both, positive and significant; the phone cost variable is both, negative and significant; and the GDP growth variable is positive.

Table 3.5: Bilateral Portfolio Equity Holdings Regressions (2001)

	(1)	(2)	(3)	(4)	(5)
IMP	0.93* (164.44)	0.90* (52.44)	0.90* (49.94)	0.88* (47.03)	0.88* (43.35)
Phone Cost		-0.92*** (-1.86)	-0.89*** (-1.77)	-0.75 (-1.51)	-0.75 (-1.50)
G		0.58** (2.29)	0.60** (2.37)	0.40*** (1.74)	0.39*** (1.68)
S				0.99* (2.66)	1.00* (2.66)
GS				-0.80* (-2.69)	-0.81* (-2.75)
Lan		0.16 (1.18)	0.23 (0.98)	0.24* (1.73)	0.21 (0.93)
Leg			-0.10 (-0.45)		0.03 (0.16)
Obs	424	272	272	272	272
Host	6	17	17	17	17
Source	71	16	16	16	16
Adj R ²	0.45	0.19	0.19	0.22	0.22

Note: Refer note of Table 3.4

Along with import, phone cost and GDP growth variables; column (4) includes 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). The correlation between stock market returns in the source and host country, and the correlation between source country GDP and host country equity returns variables are proxies for the gains to bilateral diversification.

The correlation of GDP growth rates is positive for the years 1997 and 2001, and both positive and significant for the year 2001. However, it loses its significance and is negative for the year 2002. The positive sign of GDP growth rate is unexpected. This indicates that investors hold equity in destinations with similar business cycles (consistent with results in column (2)).

The correlation of stock returns is positive for all the three years, and both positive and significant for the years 2001 and 2002. The positive sign of the correlation of stock return coefficient is against the predictions of standard diversification arguments. This implies 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 negative for all the three years and it is significantly negative for the years 2001 and 2002. This indicates that the GDP growth rate in host country and stock market return of source countries move in opposite directions. This suggests that 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.

The common language dummy is positive and significant for all three years. This indicates that speaking a common language raises equity holdings. For all three years, the import variable is positive and significant while the phone cost variable loses statistical significance for the years 2001 and 2002. This implies that once trade is controlled, the phone cost may help predict whether a given source country is going to invest in a given host country rather than the size of investment.

Table 3.6: Bilateral Portfolio Equity Holdings Regressions (2002)

	(1)	(2)	(3)	(4)	(5)	(6) IV
IMP	0.93* (160.02)	0.91* (65.17)	0.91* (62.76)	0.88* (54.29)	0.87* (50.52)	0.91* (41.31)
Phone Cost		-0.59 (-1.61)	-0.63*** (-1.77)	-0.28 (-0.78)	-0.37 (-1.05)	
G		0.11 (0.49)	0.08 (0.39)	-0.14 (-0.72)	-0.23 (-1.16)	-0.22 (-0.90)
S				1.28* (4.62)	1.38* (4.86)	0.97* (3.02)
GS				-0.78* (-3.20)	-0.89* (-3.61)	-0.73*** (-1.86)
Lan		0.39* (3.18)	0.31 (1.61)	0.47* (3.94)	0.27 (1.43)	0.62 (0.84)
Leg			0.12 (0.57)		0.31 (1.41)	
Obs	391	272	272	272	272	272
Host	7	17	17	17	17	17
Source	66	16	16	16	16	16
Adj R ²	0.42	0.42	0.41	0.46	0.47	

Note: Refer note of Table 3.4

Column (5) of Tables 3.4 to 3.6 includes a dummy for common origins to the legal system to the column (4) variables. The results are similar to those just discussed for column (4), except that the common language variable loses its significance. The legal origin variable is positive for all the three years.

Column (6) of Table 3.6 presents two stage least squares results after incorporating instrumental variables viz. lagged values of correlation of GDP growth rates, lagged values of correlation of stock returns, lagged values of correlation of GDP growth - stock returns and phone costs. The correlations between growth rates prior to 1990 as well as the correlation between stock returns prior to 1995 are exogenous with respect to 2002 equity holdings, which reflect to a substantial degree the large flows of the

period 1995 to 2002. For this reason, lagged correlations are used, which have an exogenous overlap with the instrumented variables, as instruments. The use of lagged variables is in accordance with Lane and Milesi-Ferretti (2004). The import variable is positive and significant. The correlation of GDP growth rates variable is negative and insignificant. The correlation of source and host countries' stock returns variable is positive and significant. The correlation of source countries' GDP growth rates and host countries' stock returns variable is negative and significant. The dummy variable for Language appears to be positive, however it is insignificant. Overall, the two stage least squares result supports the robustness of the ordinary least squares results.

Table 3.7 furnishes the regression results for source country Australia's bilateral portfolio equity holdings. Column (1) includes source country Australia's imports from the host countries, as an explanatory variable. A one - percent increase in imports is related to an increase of about 1.05 - percent in portfolio equity holdings. These results indicate a strong link between bilateral imports and bilateral investment holdings. The phone cost variable is negative and significant. A one - percent increase in phone cost results in the decrease of bilateral equity investment by about 2.49 - percent. The correlation of GDP growth rates variable is negative and significant supporting the theoretical argument that investors hold equity in destinations with dissimilar business cycles. This is contrary to the results in Tables 3.5 and 3.6. The correlation of stock market returns variable is negative and insignificant. This implies low diversification motives of equity investors. The correlation of source country Australia's GDP growth rates and host countries stock returns is negative and insignificant. The language dummy variable is positive and insignificant.

Column (2) of Table 3.7 presents the source country Australia's bilateral portfolio equity holdings regression results for 2002. The results are similar to those in column (1). The two stage least squares regression results are mentioned in column (3). The instrumental variables employed are the lagged values of correlation of GDP growth rates, lagged values of correlation of stock returns, lagged values of correlation of GDP growth - stock returns and phone costs. Import variable appears to be positive and significant.

Table 3.7: Bilateral Portfolio Equity Holdings Regressions for Australia

	(1) 2001	(2) 2002	(3) 2002 IV
IMP	1.05* (11.10)	0.97* (15.46)	1.07* (9.13)
Phone Cost	-2.49*** (-1.90)	-3.08** (-3.20)	
G	-2.40*** (-2.22)	-1.84** (-2.60)	-4.44* (-2.42)
S	-0.99 (-0.96)	-0.34 (-0.41)	1.80 (0.48)
GS	-0.50 (-0.53)	-0.70 (-0.72)	-2.24 (-1.47)
Lan	0.38 (0.68)	0.68 (1.66)	2.51*** (1.91)
Obs	16	16	16
Adj R ²	0.52	0.67	

Note: Refer note of Table 3.4

The coefficient increases from 0.97 to 1.07. The correlation of GDP growth rates variable is negative and significant. The coefficient increases significantly from 1.84 to 0.44. The correlation of source and host countries stock returns variable is negative and insignificant. This indicates low diversification motives of Australian equity investors consistent with column (1) results. The correlation of source

countries GDP growth rates and host countries stock returns variable is negative and insignificant. The dummy variable for Language appears to be positive and significant. This indicates that Australian investors prefer equity holdings in English language speaking countries. Overall, the two - stage least squares result supports the robustness of the ordinary least squares results.

In the international and the Australian context, the results indicate that the geography of bilateral portfolio equity holdings is strongly related to bilateral trade, proxies for information asymmetries i.e. phone costs and cultural-institutional proximity, such as a common language and a common legal origin. Investors prefer investing in those destination countries with which they have trading relationships. Investors also prefer investing in countries that have common language and similar legal origin. Further, the results indicate that in the international context, the bilateral equity investments are taking place between countries with similar characteristics, including coordinated business cycles and correlated stock market returns, against the predictions of standard portfolio diversification theories.

3.7.2 Aggregate Asset Positions

This section empirically examines the factors explaining overall size of countries' portfolio investment holdings. Table 3.8 illustrates the panel regressions of the aggregate asset positions, for the years 1997, 2001 and 2002. The dependent variable is the 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.

The dominant factors explaining equity asset positions are GNI per capita and the size of domestic stock market. For the year 2001, the results indicate that a 1 - percent increase in GNI per capita would increase the portfolio equity assets by 1.41 - percent. This implies that income per capita influences 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 and may provide a reason why high income level countries involve more in international asset trade.

Table 3.8: Aggregate Portfolio Equity Assets

	(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 ²	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 0.01, 0.05 and 0.1 confidence level, respectively.

For the year 2001, the results indicate that 1 - percent increase in domestic stock market capitalisation would increase the portfolio equity assets by 1.22 - percent. This supports the notion that countries with well developed domestic financial markets are more likely to engage in international asset trade. Further, the importance of stock market development in explaining portfolio equity investment is in line with the findings of Di Giovanni (2005), who explains that countries with more developed

domestic financial market are more likely to engage in mergers and acquisitions abroad. 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.

The measure of capital controls is significantly negatively correlated to portfolio equity holdings. This supports the notion that a country may have a small foreign asset position if capital controls are in place or have been in recent past.

3.7.3 Aggregate Liability Positions

This section investigates what makes countries attractive as a destination for non-resident portfolio equity investors by employing similar set of explanatory variables as those employed for explaining asset holdings.

Table 3.9: Aggregate Portfolio Equity Liabilities

	(1) 1997	(2) 2001	(3) 2002
Log GDP	0.002 (0.06)	-0.19 (-0.68)	0.10 (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 ²	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 0.01, 0.05 and 0.1 confidence level, respectively.

Table 3.9 illustrates the panel regressions of the aggregate liability positions, for the years 1997, 2001 and 2002. The dependent variable is the log of portfolio equity liabilities. The liabilities are not measured directly by the CPIS, but are derived by summing the asset holdings that participating countries report in each destination country.

The size of the host country's domestic stock market is the key correlate of portfolio equity liabilities. For the year 2001, a 1 - percent increase in the domestic stock market capitalisation increases the portfolio equity liabilities by 1.15 - percent. This implies that a large domestic financial sector enables the issuing of liabilities to foreign investors and thus facilitating international risk sharing. The level of GNI per capita is positive for the years 2001 and 2002. The measure of capital controls is strongly negatively correlated with total equity liabilities; however, statistically insignificant.

3.8 Concluding Remarks

Research in this chapter analyses the bilateral, source and host factors driving portfolio equity investment across countries using the International Monetary Fund's new dataset on international equity holdings at the end of 1997, 2001 and 2002. Research in this chapter 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. This result supports the findings of Mishra (2005b, 2006c), Aviat and Coeurdacier (2004) and Lane and Milesi-Ferretti (2004). The information asymmetries and cultural-institutional proximity, such as a common language and a common legal

origin are also important for bilateral equity investment. These results are in accordance with those of Mishra (2005b, 2006c), Portes and Rey (2005) and Lane and Milesi-Ferretti (2004). Generally, the bilateral equity investments take place between countries with similar characteristics, including coordinated business cycles and correlated stock market returns, against the predictions of standard diversification arguments. Results also indicate low diversification motives for Australian investors, in accordance to Mishra (2006a) and Portes and Rey (2005).

Capital controls have a negative and significant impact on the countries' aggregate foreign portfolio equity asset positions. Income per capita has a positive and significant impact on the countries' aggregate cross-border portfolio equity asset positions. 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.

Capital controls and income per capita do not have a significant impact on countries' aggregate foreign portfolio equity liabilities positions. The size of domestic stock market is the key correlate of aggregate foreign portfolio equity liabilities. These results are in agreement with Lane and Milesi-Ferretti (2004) and Mishra (2005b, 2006c).

CHAPTER 4.

WHERE DO AUSTRALIANS INVEST?

4.1 Introduction

The rapid increase in international capital flows – both foreign direct investment and portfolio investment - is one of the most significant developments in the global economy in recent decades. The Australian investment environment has been progressively liberalised beginning with the removal of foreign exchange controls in 1987, and the movement to a floating exchange rate regime in 1983. Other milestones include the opening up of the banking sector to foreign competition. Compared to other countries Australia is quite outward looking in its investment behaviour, suggesting that Australian investors recognise the advantages of international diversification. Generally speaking, the benefits to individual investors from investing in international portfolios come about through the opportunities local investors are offered to insulate their portfolios from a down turn in local asset prices via investing in global markets. From a country's perspective, benefits from international diversification may also be captured via diversification across trade and investment (debt and equity). For instance, when a country's major trading partner experiences a decline in demand for traded goods this may be compensated by a corresponding upturn in the performance of that country's international investment position (IIP)³.

This chapter analyses the geography of Australia's international portfolio investment using the newly released International Monetary Fund's Coordinated Portfolio

³ The IIP is a central concept in international macroeconomics, since it lays out the international balance sheet of foreign assets and liabilities held by Australian residents. The financial items that comprise the IIP consist of claims on non-residents, liabilities to non-residents, monetary gold and SDR. The IIP at the end of a specific period reflects financial transactions, valuation changes and other adjustments that occurred during the period and affected the levels of assets and/or liabilities.

Investment Survey (CPIS) dataset. This chapter provides answers to some of the following questions: does the pattern of Australia's capital flows match that of its trade flows; which bilateral factors are responsible for explaining Australia's portfolio equity investment holdings; are cultural, informational factors important in explaining Australia's portfolio allocations and how regulatory and legal variables affect equity portfolio holdings. Answers to these questions are of interest for several fields in international macroeconomics, international finance, portfolio analysis and behavioural finance because they explain deviations from the theoretical considerations of fully integrated global economy and these deviations reveal the nature of current limitations on global economic integration and provide insight into the globalization process.

This chapter focuses on understanding the relationship between Australia's portfolio equity investment and trade based on data sourced from the CPIS 1997 and 2001. To begin investigation of the determinants of Australia's geographical allocation of portfolio investment, this chapter employs a series of multivariate regressions of Australia's destination country portfolio shares on the share of Australia's trade with each country, financial market shares and shares in world gross national income. Accordingly, research in this chapter uses variables for Australia's exports and imports as calculated from IMF's Direction of Trade Statistics; the value of bond and share trading are calculated from Federation Internationale des Bourses de Valeurs (FIBV) data; and Gross National Income is calculated from World Development Indicators.

To further the understanding of Australia's international investment portfolio research in this chapter follows a similar methodology to that employed by Obstfeld and Rogoff (2001) and Lane and Milesi-Ferretti (2004), by developing an empirical model which takes into consideration a number of variables which influences Australia's international investment patterns. In particular, research in this chapter contributes to the existing literature by including an array of gravity type variables to proxy information costs and quality of the regulatory environment in the host country viz. telephone cost, common language, rule of law, efficiency of judicial system, accounting standards and creditors rights variables. These variables are different from the financial frictions employed by Lane and Milesi-Ferretti (2004). This chapter focuses on Australia per se as opposed to Lane and Milesi-Ferretti (2004), which focuses on international investment patterns.

Research in this chapter follows the following format: Section 4.2 provides a brief literature review. Section 4.3 provides a summary account of Australia's (including major OECD countries) external holdings of debt and equity. This section also provides information on Australia's portfolio (equity and long term debt) investment share, Australia's trade share, countries' world's financial market share and countries' world's GNI share. Section 4.4 develops empirical models and furnishes results for Australia's cross-border portfolio equity investment. Section 4.5 explains Australia's equity and trade links. Section 4.6 explains the investment bias. Finally, section 4.7 provides concluding remarks.

4.2 Literature Review

There are a number of recent papers focused specifically on the patterns of bilateral equity investment. Davis et al (2001) develop a dynamic model to analyse international trade in risky financial assets under incomplete information. Ahearne et al (2004) test for home bias in US equity holdings. Martin and Rey (2000) investigate the impact of financial integration on asset returns, risk diversification and the breadth of financial markets. Portes et al (2001) test the relevance of informational barriers by estimating gravity models for trade in different financial assets. Their results suggest that trading in equities and corporate bonds requires a deeper knowledge of the host countries accounting practices, corporate culture, political events, and current business conditions. In a two country setting, Obstfeld and Rogoff (2001) show that the existence of trading costs in the goods market naturally generates a home bias in equity positions, even if global financial markets are complete. Portes and Rey (2005) show that gross transaction flows depend on market size in source and destination country as well as trading costs. They find that the geography of information is the main determinant of the pattern of international transactions. Aviat and Coeurdacier (2004) state that distance influences bilateral asset holdings primarily through its impact on trade in goods. Martin and Rey (2004) construct a gravity model which implies that gross asset flows will be greater the smaller the distance. They also find that geography plays an important role in explaining the volume and direction of international capital flows. Lane and Milesi-Ferretti (2004) extend the two country model of Obstfeld and Rogoff (2001) to an N country generalization and also incorporate informational and financial frictions. They find strong link between bilateral trade in goods and services and bilateral equity holdings. In addition, they

find that large bilateral equity positions are also associated with proxies for informational proximity.

However, absent from these is a study related to Australia's international investment patterns. Research in this chapter examines the degree of correspondence between Australia's trade and international investment position. Subsequent sections indicate that Australia's major portfolio equity investments are with its OECD trading partners viz US and UK. Australia has trading relations with Asian countries including Japan and China; however, Australia's portfolio equity investment in these countries is low. Research in this chapter investigates bilateral factors driving Australia's portfolio equity investments, by employing the newly released International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) data on cross border holdings. Prior to CPIS, research in the field of Australia's portfolio investment was constrained due to lack of high quality dataset on cross border portfolio holdings.

4.3 Australia's Aggregate External Portfolio – An Overview

Tables 4.1 and 4.2 below provide an overall view of external holdings of foreign equity, long-term and short-term debt for Australia and a number of industrial countries. The countries are ranked in descending order in terms of foreign portfolio holdings, when measured as a proportion to Gross National Income (GNI). According to Table 4.1 Australia's external holdings of equity and debt was approximately 10.6 percent of GNI in 1997, in contrast Table 4.2 shows that by 2001 the percentage of national income invested abroad had almost doubled to 20.59 - percent of GNI. However, it is noteworthy that Australia's international investment position as a percentage of national income is one of the lowest amongst the major OECD

countries. In fact, Australia's external investment position on the international ladder relative to other countries in the table had not changed by 2001. Australia's increased international investment position over 1997-2001 is almost entirely attributed to increased equity investment doubling from 8.7 - percent of GNI to 16.6 - percent of GNI over five years.

Table 4.1: Aggregate External Portfolio – Industrial Countries 1997

	Equity		Long Term Debt		Short Term Debt		Total	
	US \$ m	% GNI	US \$ m	% GNI	US \$ m	% GNI	US \$ m	% GNI
UK	461553	36.4	483354	38.10	27080	1.82	971987	76.68
Netherlands	127314	30.1	115425	27.30	---	---	242739	57.43
Sweden	52367	2.23	16451	0.70	2739	1.15	71557	28.93
Singapore	16199	15.6	4527	4.30	2061	2.36	22787	21.89
Italy	75233	6.35	172239	14.50	10391	0.92	257863	21.77
United States	1197446	14.50	542898	6.60	---	---	1740344	21.14
Canada	105920	17.30	17491	2.90	4859	0.71	128270	20.99
Germany	235648	10.10	255333	10.90	---	---	490981	20.95
France	99604	6.60	205938	13.70	---	---	305542	20.31
Japan	158771	3.20	712161	14.40	31324	0.69	902256	18.27
Australia	32870	8.70	7449	2.00	1217	0.32	41536	10.60
New Zealand	5002	8.00	1448	2.00	---	---	6450	10.36
Spain	22308	3.70	24771	4.10	---	---	4707	7.77
Korea	976	0.19	8101	1.50	4428	0.99	13505	2.58

Note: Data are for end 1997. --- Data unavailable. Data for Switzerland was unavailable. Data for Hong Kong was not disclosed due to reasons of confidentiality. **Source:** International Monetary Fund (2000a). For Germany data is from International Monetary Fund (2000b). GNI data from World Bank (1997).

Table 4.2: Aggregate External Portfolio – Industrial Countries 2001

	Equity		Long Term Debt		Short Term Debt		Total	
	US\$ million	% GNI	US\$ m	% GNI	US \$m	% GNI	US\$ m	% GNI
Switzerland	247409	93.00	227602	85.56	15494	5.82	490505	184.39
Netherlands	235023	61.00	244746	63.56	5900	1.53	485669	126.12
Singapore	30020	34.40	42943	49.27	33584	38.53	106547	122.25
Hong Kong	94615	54.57	85877	49.53	25108	14.48	205600	118.58
UK	558379	37.50	667303	44.79	78362	5.26	1304044	87.53
Sweden	103989	43.71	38981	16.39	1526	0.64	144496	60.74
France	201752	14.50	462133	33.16	46445	3.33	710330	50.97
Italy	239472	21.29	307580	27.35	4970	0.44	552022	49.09
Germany	381184	19.70	401582	20.72	8850	0.46	791616	40.85
Canada	200674	29.40	17663	2.59	5132	0.75	223469	32.79
Spain	58698	10.00	103395	17.56	11050	1.88	173143	29.40
Japan	227351	5.00	1004878	22.02	57525	1.26	1289754	28.26
New Zealand	7618	14.80	4733	9.18	71	0.14	12422	24.10
United States	1612669	16.30	500541	5.06	135309	1.37	2248519	22.75
Australia	64160	16.65	14396	3.73	796	0.21	79352	20.59
Korea	1300	0.29	5284	1.18	1451	0.32	8035	1.79

Note: Data are for end 2001. **Source:** Coordinated Portfolio Investment Survey data for 2001. GNI data from World Bank (2001).

Turning to the geographical spread of Australia's international portfolio investment position the CPIS data shows that Australia's holdings are primarily concentrated in a handful of countries. Table 4.3 and 4.4 below lists the major destination countries for Australia's portfolio investment in 1997 and 2001 respectively. In 1997 over half (approximately 58 - percent) of Australia's total investment was invested in the United States (44.31%) and the United Kingdom (14.15%), by 2001 the figure had climbed to 66 - percent. By contrast Australia's trade share (exports plus imports as a percentage of Australia's total world trade) with the USA and UK combined was approximately 19.75 - percent in 1997. By 2001, Australia's trade share with these countries remained approximately the same. Reflecting subdued investment conditions in Japan Australia's total equity investment position declined substantially from 10.7 - percent of total investment in 1997 to 5.8 - percent in 2001. By contrast

Australia' trade share with Japan remained constant over 1997 – 2001 at approximately 16 - percent.

Table 4.3: Australia's Foreign Investment: Major Destination Countries 1997

% Share	Australia's total investment (%)	Australia's equity investment (%)	Australia's debt* investment (%)	Australia's trade (%)	World's domestic equity and bond markets (%)	World GNI (%)
US	44.31	43.47	49.31	15.06	47.31	27.72
UK	14.15	15.45	9.95	4.69	8.20	4.27
Japan	9.49	10.69	5.40	16.58	6.80	16.63
Netherlands	1.84	2.22	0.46	0.87	1.29	1.42
France	3.63	4.11	2.08	1.70	4.40	5.07
Germany	5.08	4.04	10.44	3.53	7.90	7.89
Switzerland	2.69	3.40	(c)	0.80	1.49	1.05
Hong Kong	2.17	2.43	1.40	5.17	1.07	0.55
Italy	2.40	2.49	2.36	2.40	1.30	3.99
Canada	1.35	1.21	2.16	1.43	0.84	2.06
Spain	0.95	0.92	1.22	0.54	1.80	2.04
NZ	1.18	0.26	2.15	5.77	0.02	0.21
Korea	0.42	0.21	1.44	5.59	0.41	1.76
Singapore	0.46	0.58	(c)	3.75	0.18	0.35
Sweden	1.38	1.37	1.62	1.04	0.37	0.83

Note: Data are for 1997. * Long term securities (c) indicates that a non-zero datum was not disclosed for reasons of confidentiality. **Source:** Investment shares calculated from IMF survey data. Trade share calculated from IMF's Direction of Trade Statistics. GNI share calculated from World Bank 2001 data. World's domestic share and bond market data calculated from FIBV data on value of domestic share trading and value of domestic bond trading.

The geographical spread of Australia's equity investment as a percentage of total portfolio investment overseas is approximately similar to the spread of total investment abroad as shown in Tables 4.3 and 4.4, however, debt is more concentrated in the US (50%) while the UK is the source of approximately 10 - percent of Australia's debt. What factors explain why these few countries (US, UK and Japan) should be the destination for such a substantial proportion (approximately 70 - percent in 1997 and 72 - percent in 2001) of Australia's overseas investment?

Firstly, two of these countries (US and Japan) are Australia's most significant trading partners with approximately 15 - percent and 16 - percent of total trade conducted with each respectively as indicated by the 1997 and 2001 CPIS data, with trade links providing much useful information about economic prospects in these economies. Secondly, these countries are among the largest economies in the world with major shares of the world's share and bond markets. Thirdly, these countries have well developed accounting standards and legal environment.

Table 4.4: Australia's Foreign Investment: Major Destination Countries 2001

% Share in	Australia's total investment (%)	Australia's equity investment (%)	Australia's debt* investment (%)	Australia's trade (%)	World's domestic share and bond markets (%)	World GNI (%)
US	56.01	58.26	48.28	14.13	53.61	31.29
UK	9.98	9.05	14.30	4.78	8.59	4.72
Japan	5.82	5.79	5.81	16.03	4.76	14.44
Netherlands	4.59	5.53	0.67	1.10	1.49**	1.22
France	3.66	3.99	2.37	1.61	4.90**	4.41
Germany	3.07	2.60	5.38	3.50	3.93	6.13
Switzerland	1.56	1.87	0.29	0.67	1.66	0.84
Hong Kong	2.75	2.17	5.49	7.50	0.61	0.55
Italy	1.26	1.10	2.05	2.37	5.90	3.56
Canada	1.12	0.96	1.51	1.47	1.19	2.16
Spain	0.80	0.81	0.78	0.65	2.30	1.86
NZ	1.03	0.09	3.67	4.87	0.02	0.16
Korea	0.54	0.63	0.15	5.81	1.01	1.42
Singapore	0.98	0.68	2.36	3.86	0.18 ^t	0.28
Sweden	0.52	0.54	0.44	0.75	0.78	0.75

Note: Data are for 2001. * Long term securities. ** Data for Netherlands and France has been estimated due to non-availability of data. Total stock and bond value has been taken for Singapore due to non-availability of domestic stock and bond value.

To further investigate the factors responsible for certain countries holding such a substantial proportion of Australia's overseas investments, research in this chapter

next turns to an empirical investigation of Australia's international investment and trading position.

4.4. Modelling Australia's Investments

This chapter begins the investigation of the determinants of Australia's geographical allocation of portfolio investment by performing a multivariate regression of Australia's destination country portfolio shares on the share of Australia's trade with each country, financial market share and share in world GNI respectively. In accordance with Mishra and Daly (2006a, 2004) and Honohan and Lane (2000), this chapter employs the following empirical specification:

$$S_{1997,2001} = \alpha + \alpha_1 T \quad (4.1)$$

$$S_{1997,2001} = \alpha + \alpha_2 M \quad (4.2)$$

$$S_{1997,2001} = \alpha + \alpha_1 T + \alpha_2 M \quad (4.3)$$

$$S_{1997,2001} = \alpha + \alpha_1 T + \alpha_2 M + \alpha_3 G \quad (4.4)$$

where,

S = Destination country's portfolio share in Australia (1997, 2001)

T = Share of Australia's trade with each country (1997, 2001)

M = Financial Market share of each country in World Financial Markets (1997, 2001). Financial Market share is the sum value of domestic share and bond trading.

G = Country's share in World GNI (1997, 2001)

Equation (4.1) indicates Australia's portfolio share of the destination country in terms of the share of Australia's trade with destination country. Equation (4.2) represents Australia's portfolio share of the destination country in terms of destination country's share of the world financial markets (capitalised value). Equation (4.3) considers the Australia's portfolio share of the destination country in terms of the share of

Australia's trade with destination country and destination country's share of the world financial markets. Finally, equation (4.4) represents the Australia's portfolio share of the destination country in terms of the share of Australia's trade with destination country; destination country's share of the world financial markets and destination country's GNP shares as explanatory variables.

Table 4.5 reports the multivariate regression results for Australia's destination country portfolio shares on the share of Australia's trade with each country, financial market share and share in world GNI. Column (1) shows that when only trade share is included in the regression approximately 46 - percent of the cross-country variations in the share of Australia's investment portfolio can be explained by trade patterns alone. Column (2) indicates a broad correspondence between the stock market capitalisations of destination countries and the allocation of Australian investment. In particular the share of the destination country in terms of their share of the world financial markets (capitalised value) explain almost the entire (96%) of the geographic pattern of Australia' foreign portfolio investment. Column (3) combines the trade share and the world financial markets share variables together these two variables explain 97 per cent of portfolio investment patterns. Adding GNP shares in column (4) to the previous set of explanatory variables adds no further explanatory power to our results. For 2001; the results show no appreciable difference over those for 1997.

Table 4.5: Regression Analysis

Destination country's portfolio share in Australia	Equation (1)	Equation (2)	Equation (3)	Equation (4)
1997				
Australia's trade	1.45 (2.17)**		0.22 (5.26)*	0.37 (1.96)***
World financial market		0.96 (28.41)*	0.87 (44.11)*	0.97 (9.57)*
World GNI				-0.24 (-1.00)
Adjusted R ²	0.46	0.96	0.97	0.97
2001				
Australia's trade	1.56 (1.66)		0.08 (1.98)***	0.21 (2.66)**
World financial market		1.03 (75.63)***	1.00 (50.51)*	1.11 (22.32)*
World GNI				-0.24 (-2.24)**
Adjusted R ²	0.35	0.98	0.98	0.98

Note: Dependent variable is portfolio share of each country. Ordinary least squares regressions. White corrected t-statistics in parentheses. R² is percentage of total variation explained by independent variables. *, **, *** denote significance level at 1, 5 and 10 percent respectively.

Column (2) shows a very close correspondence between investment shares and the share of each destination in global market capitalization. Since this overwhelms everything else a more appropriate specification is to attempt to explain the deviation in investment shares from the benchmark of shares in global market capitalization. To represent the latter, research in this chapter develops the following specification:

$$INVSHARE_i - CAPSHARE_i = \alpha + \beta X_i + \varepsilon \quad (4.5)$$

where $INVSHARE_i - CAPSHARE_i = DEVIATION_i$

X_i includes Australia's trade share in destination countries, distance between the capital cities of Australia and destination countries, common language dummy, correlation of stock return, regulatory and accounting variables.

Table 4.6 also shows the regression results from equation (4.5) for 2001. Column (1) shows that trade share variable is positive (but not significant) implying that deviations from global market capitalisation shares is positively associated with trade shares. In column (2) distance and language variables are added, here again the trade variable appears positive and significant, the distance variable is significantly negative while the language variable is significantly positive. An increase in trade enhances the deviation in investment shares from benchmark shares in global market capitalisation. An increase in distance reduces the deviation in investment shares from benchmark shares in global market capitalisation. Finally, an increase in common language increases the deviation in investment shares from benchmark shares in global market capitalisation. Column (2) results indicate that Australian investors would prefer making cross-border equity investments in countries that are its trading partners, countries' that are in geographical proximity and English speaking countries. In column (3), stock return variable is added, which is positive but insignificant. The insignificant stock return variable indicates lack of diversification motives among the Australian investors. In column (3), trade is positive and significant; distance and language variables have the same sign as in column (2), however these variables loose significance. The legal and accounting standard variables (columns 4 and 5) are positive which indicate that Australian residents are willing to hold equity in countries which have efficient judicial system and well developed accounting standards. The countries considered are Australia, United States, United Kingdom, Japan, France,

Germany, Switzerland, Hong Kong, Italy, Canada, Spain, New Zealand, Singapore, and Sweden.

Table 4.6: Deviation Regression Analysis for 2001

	(1)	(2)	(3)	(4)	(5)
Trade	0.12 (1.70)	0.22** (2.81)	0.20*** (1.84)	0.17 (1.51)	0.22** (2.48)
Distance		-0.40*** (-2.19)	-0.77 (-1.72)	-1.25 (-1.42)	-1.51 (-1.47)
Language		1.46*** (2.06)	1.16 (1.29)	0.97 (1.32)	1.01 (1.57)
Stock Markets			3.58 (1.10)		
Efficiency (Legal)				0.42 (1.06)	
Accounting Standards					0.06 (1.21)
Adjusted R ²	0.14	0.43	0.45	0.47	0.44

Note: Dependent variable is the deviation in investment shares from the benchmark of shares in global market capitalisation. White corrected t-statistics in parentheses. *, ** and *** indicate the significance level at 0.01, 0.05 and 0.10 respectively.⁴

4.5 Australia's Equity and Trade Links

To investigate the links between Australia's bilateral equity holdings and bilateral trade in goods and services, research in this chapter, next studies the relationship between Australia's bilateral equity holdings and proxies for quality of information and the regulatory environment. Following the model developed in Chapter 3,

⁴ **Sources:** Independent variable Trade is the ratio of sum of countries' Australian exports and imports to total sum of Australia's exports and imports. Trade data is from IMF's Direction of Trade Statistics. Stock Markets is the correlation of stock returns of Australia and other countries. Stock Markets is calculated from Morgan Stanley Capital International (MSCI) stock indices. Efficiency (Legal) is the efficiency of judicial system; Accounting Standards is accounting standards in countries. Efficiency (Legal) and Accounting Standards data is from La Porta et al. (1998). Distance is the distance between the capital cities of Australia and destination countries' as calculated from <http://www.indo.com/distance/>. Language is the common language dummy variable (dummy =1 if the official language in countries is English otherwise 0). Language is taken from <http://www.cia.gov/cia/publications/factbook/>.

research in this chapter employs the following empirical specification for Australia's bilateral equity holdings,

$$\log(x_{ij}) = \phi_j + \beta X_i + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_i \quad (4.6)$$

where

x_{ij} is the source country j 's (Australia's) share of equity holdings in host countries i ;

ϕ_j denotes aggregate financial frictions that apply at the level of the source country j ;

X_i is a set of host countries' characteristics;

IMP_{ij} is the volume of source country's imports from the host countries;

F_{ij} denotes a set of factors that generate financial frictions at the bilateral level.

Table 4.7 illustrates the regression results of bilateral portfolio equity holdings wherein Australia is the source country. Austria, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, US are the host countries. The host countries' sample includes developed and developing countries for which the data on portfolio holdings are available for 2001. The dependent variable is $\log(1 + \text{portfolio equity})$ of source country (Australia) in the host country. Column (1) includes imports of goods by source country (Australia) from host countries. This variable is positive and significant implying a strong link

between bilateral imports and bilateral investment holdings. Australian investors are better able to attain accounting and regulatory information on foreign markets through trade. Australian investors may be inclined to hold stocks of foreign companies with whose products they are most familiar. A 1 - percent increase in Australia's imports leads to an increase in Australian investors' cross-border equity holdings by 3.05 - percent.

Column (2) adds information cost proxies viz. telephone cost and common language dummy. The telephone cost variable is significantly negative. Telephone cost is a function of information cost and is positively correlated with distance, i.e. the greater the distance among the countries the lesser the interaction among the economic agents and lesser the cultural exchange. Higher telephone costs imply that countries are geographically apart from each other and therefore, investors have comparatively less information regarding investment opportunities in distant countries. This in turn has a negative impact on Australian investors' cross-border equity holdings. A 1 - percent increase in telephone cost leads to a decline in Australian investors' cross-border portfolio equity investments by 6.09 - percent. Speaking a common language has a positive and significant impact on Australian investors' cross-border equity holdings. A 1 - percent increase in English speaking foreign residents' leads to an increase in Australian investors' cross-border portfolio equity investments by 2.36 - percent. Overall the adjusted R^2 significance increases from 0.26 to 0.55. Column (3) adds a proxy for the efficiency of the judicial system. This variable assesses the efficiency and integrity of the legal environment as it affects business, particularly foreign firms. This variable appears with a positive and significant coefficient implying that Australian residents are willing to hold equity portfolios in host countries where the

judicial system is recognised as efficient. A 1 - percent increase in the efficiency of judicial system leads to an increase in Australian investors' cross-border equity holdings by 0.63 - percent.

Column (4) adds a legal variable to represent the rule of law. This variable assesses the law and order tradition in the country. This variable is also positive and significant implying that Australian residents are willing to hold international shares in their portfolios if the judicial systems in the host countries are seen to uphold the enforcement of the rule of law. A 1 - percent increase in enforcement of rule of law increases the Australian investors' cross-border equity holdings by 0.64 - percent.

Column (5) adds the accounting standard variable. Australian investors' have to translate and interpret host countries' accounting practices in light of the relevant legal and business environment which leads to additional costs. The accounting standard variable appears positive and significant. This implies that Australian investors' are willing to hold equity in host countries which have similar and well developed accounting standards. A 1 - percent increase in the similarity of accounting standards leads to an increase in the Australian investors' cross-border equity holdings by 0.13 - percent. Finally, in column (6), a variable, *Average*, is introduced. This variable capture's the combined effects of efficiency of judicial system, rule of law and accounting standards on the portfolio equity investment. This variable is positive and significant implying that Australians appear to invest in countries that have an efficient judicial system, high tradition of law and order and high accounting standards. A 1 - percent increase in *Average*, leads to an increase in Australian investors' cross-border equity holdings by 0.15 - percent.

Table 4.7: Portfolio Equity Investment Held by Australians (2001)

	(1)	(2)	(3)	(4)	(5)	(6)
Import	3.05 (4.40)*	2.00 (2.60)**	2.04 (3.04)*	1.84 (2.32)**	1.31 (1.59)	1.87 (2.69)**
Telephone cost		-6.09 (-5.58)*	-4.31 (-2.88)*	-3.53 (-2.29)**	-5.66 (-5.48)*	-5.55 (-4.95)*
Language		2.36 (2.49)**	1.49 (1.53)	1.88 (1.82)***	0.87 (1.09)	1.94 (2.10)**
Efficiency of judicial system			0.63 (2.46)**			
Rule of law				0.64 (2.34)**		
Accounting standards					0.13 (3.42)*	
Average						0.15 (2.24)**
Constant	-21.40 (-3.59)*	-8.54 (-1.24)	-14.66 (-2.12)**	-13.34 (-1.68)	-10.90 (-1.54)	-11.24 (-1.59)
Adjusted R ²	0.26	0.55	0.71	0.68	0.69	0.68

Note: Dependent variable is $\log(1+\text{portfolio equity})$ of source country (Australia) in host countries. *, **, *** indicate significance level at 1%, 5% and 10%.⁵

Following the model developed in Chapter 3, research in this chapter also employs the following model for Australia's bilateral equity holdings,

$$\log(x_{ij}) = \phi_i + \beta X_j + \sigma \log(IMP_{ij}) + \gamma F_{ij} + \varepsilon_j \quad (4.7)$$

where

x_{ij} is the host countries i share of equity holdings in source country j (Australia);

ϕ_i denotes aggregate financial frictions that apply at the level of the host countries;

X_j is a set of source country characteristics;

⁵ **Data Sources:** Independent variable Import is the imports of goods by source country (Australia) from host countries. Import data is from IMF's Direction of Trade Statistics. Telephone cost is the five minute telephone charges between capital cities of host and source countries. Telephone cost data is from <http://www.phone-rate-calculator.com/>. Efficiency of judicial system, rule of law and accounting standards are the host country variables (La Porta et. al. (1998)). Average is the average of the La Porta et al. (1998) variables viz. Efficiency of judicial system, rule of law and accounting standards.

IMP_{ij} is the volume of source country's imports from the host countries;

F_{ij} denotes a set of factors that generate financial frictions at the bilateral level.

Table 4.8 illustrates the regression results of bilateral portfolio equity holdings wherein Australia is the host country. The source countries are the same countries as per Table 4.7. The dependent variable is log (1+ portfolio equity) of source country in the host country (Australia).

Column (1) includes the imports of goods by source countries from the host country (Australia). In line with the previous results, this variable is positive and significant implying a strong link between bilateral imports and bilateral investment holdings. Column (2) introduces proxies for information cost viz. telephone cost and common language dummies. Again, in line with the previous results, the telephone cost variable is significantly negative while the common language variable is significantly positive. The adjusted R^2 significance increases from 0.30 to 0.51.

Table 4.8: Australia's Portfolio Equity Investment Held by Other Countries (2001)

	(1)	(2)
Import	0.74 (4.25)*	0.70 (4.69)*
Telephone cost		-1.26 (-4.81)*
Language		0.21 (0.62)
Constant	1.77 (1.22)	2.86 (2.30)**
Adjusted R^2	0.30	0.51

Note: Dependent variable is log(1+portfolio equity) of source country in host country (Australia). *, **, *** indicate significance level at 1%, 5% and 10%. **Data Sources:** Refer footnote 10.

4.6 Explaining the Investment Bias

Findings in section 4.4 imply that Australian investors' prefer holding cross-border equities in countries' that are in geographical proximity, countries' having cultural, language and regulatory similarities. One possible explanation relates to the costs of information acquisition. In contrast to the textbook assumptions of free and perfect information learning about international investment opportunities is a costly activity in the real world. One suggestion is that Australia's disproportionate investment in countries which hold the majority of the world's stock market capitalisation and which we are familiar with through trading and other links (culture) can be attributable to lower costs of acquiring information about investment opportunities in those countries (Ghosh and Wolf, 2001; Portes and Rey, 2005). However this should not be overemphasised when it comes to explaining the bias in portfolio investment. The costs of holding a geographically 'neutral' world portfolio can be greatly reduced through the use of global index funds marketed by international financial intermediaries.

The bias towards investing in three of the worlds developed capital markets namely the US, UK and Japan with some deviations from that baseline with countries due to Australian trading patterns may be interpreted as an extension of the home bias puzzle that has been observed by many researchers. As pointed out by French and Porteba (1991) and others, the home bias puzzle is the phenomenon that the disproportionate bulk of investment portfolios consist of domestic equities and bonds, despite the observable gains to international diversification. Huberman's (1997) work on geographical distribution of shareholders in US telephone companies indicates

familiarity bias even within countries. A propensity to invest in familiar locations may reflect psychological factors in determining investment decisions (Shleifer, 2000).

Finally the lack of a significant correspondence between investment and trade flows associated with Australia and Asian markets requires some comment. At the beginning of 1990s, Japan fell back into the period of slow growth. In mid 1997, Asian crisis took place and lasted for about 18 months, which resulted in low confidence of Australian and other international investors in Asian markets. The Asian crisis had profound influence for three or four years. Australian and other international investors believed that Asian crisis was the result of severe governance deficiencies in Asian countries and these deficiencies would hold back the economic development. In the late 1990s, during the technology boom, perceptions of Asia suffered again as its economy was unfavourably compared with more technologically advanced countries, particularly US.

Australia's exports to Asia rose in 1980s to peak at 59 – percent in 1996/97, then fell back slightly during Asian crisis to a figure of 55 – percent in 2001/02. Even though Australia has close trading relationship with Asia; however Australia lacks closeness in financial integration with Asia. Australia's foreign direct investment in US increased from 28 – percent to 47.8 – percent. However, Australia's foreign direct investment in Asia slumped from 12.9 – percent to 7.6 – percent. At a global level, Asia is a very small recipient of portfolio investment. One area to consider here is that many financial markets in Asia including China's are not well developed. This lack of development is reflected in the low weights for the region in the global market indices which drive so much of the allocation of portfolio investment in the world i.e. Asia's

account in the Morgan Stanley MSCI global equity index for less than 4% and is even smaller for the global bond market indices. The shares are very much smaller than the region's 25% share in world GDP. The share of Australia's outward portfolio investment going to Asia accounts for only 10.9% of the total portfolio investment in 2002 (Reserve Bank of Australia Bulletin, November 2003).

4.7 Concluding Remarks

Research in this chapter takes a preliminary examination of Australia's data for the period 1997 and 2001 reported in the International Monetary Fund's Coordinated Portfolio Investment Survey by providing an analysis of the geography of international portfolio investment (equity and long-term bonds).

This chapter provides answers to some of the following questions; are there linkages between Australia's portfolio equity investment patterns and trade patterns, which bilateral factors are responsible for explaining Australia's portfolio equity investment holdings, are cultural, informational factors important in explaining Australia's portfolio allocations and how regulatory and legal variables affect equity portfolio holdings do.

Preliminary results suggest that Australia's external holdings of equity and debt as a percentage of national income almost doubled between 1997 and 2001. This increase is almost entirely attributed to increased equity investment. However, it is noteworthy that Australia's international investment position as a percentage of national income is one of the lowest amongst the major OECD countries. In 1997 over half of Australia's total investments were invested in the United States and the United Kingdom

(combined) this fraction climbing to approximately two thirds by 2001. By contrast Australia's trade share (exports plus imports as a percentage of Australia's total world trade) with the USA and UK (combined) was approximately twenty percent in 1997 and 2001 respectively. Reflecting subdued investment conditions in Japan Australia's total equity investment position declined substantially from 1997 to 2001. By contrast Australia's trade share with Japan remained constant over 1997 – 2001.

This chapter began investigation into the determinants of Australia's geographical allocation of portfolio investment by performing a series of regression tests to determine the factors driving Australia's investment patterns. Major findings indicate a broad correspondence between the stock market capitalisations of destination countries and the allocation of Australian investment but with some deviations from that baseline, where the deviations are correlated with Australian trade patterns.

To shed more light on factors responsible for Australia's bilateral equity holdings, this chapter next developed a model of the relationship between Australia's bilateral equity holdings and proxies for quality of information and the regulatory environment. Results here suggest that source country residents are willing to hold equity portfolios in countries where the judicial system is recognised as efficient and appears to uphold enforcement of the rule of law. Finally, an accounting standard variable also appears positive and significant implying that residents of source countries are willing to hold equity in countries which have well developed accounting standards.

The bias towards investing in three of the worlds developed capital markets namely the US, UK and Japan with some deviations from that baseline with countries due to Australian trading patterns may be interpreted as an extension of the home bias puzzle that has been observed by many researchers.

Finally the lack of a significant correspondence between investment and trade flows between Australia and Asian markets (except Japan) requires some comment. One area to consider here is that many financial markets in Asia including China's are not well developed.

CHAPTER 5.
DETERMINANTS OF PORTFOLIO EQUITY INVESTMENT AND
GEOGRAPHICAL BIAS

5.1 Introduction.

Chapter 3 discussed portfolio equity investment patterns, both in the international and Australian context. Chapter 4 highlighted Australia's portfolio equity investment position in the global context. Research in this chapter follows to investigate the phenomenon of geographical bias in portfolio equity investment, both in the international and Australian context. This chapter also discusses determinants of portfolio equity investments, both in the international and Australian context.

This chapter is organised as follows: Section 5.2 describes the literature review. Section 5.3 describes the significance and relevant contribution. Section 5.4 develops the empirical framework. Section 5.5 describes the data. Section 5.6 furnishes the results and finally, section 5.7 concludes.

5.2 Literature Review.

There are several papers that focus on information based asymmetries in the portfolio investment patterns. French and Poterba (1991) use a model of investor preferences and behaviour to show that current portfolio patterns imply that investors in each nation expect returns in their domestic equity market to be several hundred points higher than returns in other markets. Tesar and Werner (1995) study international portfolio investment in five OECD countries. They find that geographical proximity is an important factor that affects the international portfolio flows. Ghosh and Wolf

(2001) study the international capital flows of the G-7 economies and conclude that geographical distance is inversely related to the amount of capital flow. Portes et al (2001) find that information asymmetries are responsible for the strong negative relationship between asset trade and distance. They investigate the roles of explicit informational variables, as well as distance, in explaining separately cross-border trade in corporate equities, corporate bonds, and government bonds. Portes and Rey (2005) explore a new panel data set on bilateral gross cross-border equity flows between 14 countries, 1989-1996. They show that gross transaction flows depend on market size in the source and destination country as well as trading costs, in which both information and the transaction technology play a role. In their model, distance proxies some information costs, and other variables explicitly represent information transmission, an information asymmetry between domestic and foreign investors, and the efficiency of transactions. They find that the geography of information is the main determinant of the pattern of international transactions, while there is weak support for the diversification motive, once they control for informational friction. Martin and Rey (2004) construct a gravity model where assets are imperfect substitutes and supply of assets is endogenous. Their model implies that gross asset flows will be greater the smaller the distance. They find for a large cross section of countries that the geographical component in explaining the volume and direction of international capital flows dominates. Aviat and Coeurdacier (2004) state that distance affects bilateral asset holdings mainly through its impact on trade in goods. Once the impact of trade in goods on equity holdings is taken into account, distance loses its significance in explaining equity holdings. Faruquee et al (2004) find that market size, transaction cost and information asymmetry are major determinants of cross border portfolio choice.

Information advantages may also arise due to similarity in institutions and legal structures. The legal rights of investors may differ very much across countries mainly due to legal origin. This applies to commercial laws for the financing of firms, for investment and also for law enforcement (La Porta et al 1997, 1998). Countries can be classified as per German, French and Scandinavian civil law families, the English common law and the Socialist law family to account for reduced information asymmetries between countries belonging to the same legal origin. In a gravity model framework, Vlachos (2004) investigates the effect of regulatory harmonization. He states that bilateral differences in securities regulation and investor protection have large effects on the integration of securities markets. The similarity of institutions can also be proxied by the fact that two countries share a common colonial background. Colonialism explains the building of institutions for several countries (Acemoglu et al 2002).

A number of papers investigate bias in equity investments related specifically to individual countries viz Japan (Kang and Stulz, 1997); Sweden (Dahlquist and Robertsson, 2001; Dahlquist et al, 2003); Korea, Kim and Wei (2002); United States, (Ahearne et al, 2004). But absent from these is a study on Australian investors' determinants of portfolio equity investment and their geographical bias towards portfolio equity holdings. This chapter fills in the gap in the literature by investigating the determinants and geographical bias of portfolio equities based on the unique IMF's dataset in the Australian context.

One striking similarity among the international portfolio holdings of the majority of countries is that they hold the largest share of their cross border portfolio holdings in

the countries that are geographically closest to them. For instance, in the year 1997, 56.71% of the Canada's cross border holding was in United States, 17.98% of Finland's cross border holding was in Sweden, 50.79% of Malaysia's cross border holding was in Singapore and 33.88% of Singapore's cross border holding was in Malaysia. This indicates that there are factors which are highly correlated with physical distance that determine cross border portfolio holdings. Information cost is positively correlated with distance, as the cost of travelling is higher with longer distance, cultural differences are larger and business links are weaker (Portes and Rey, 2005).

5.3 Significance

Research in this chapter is important for several reasons: First, asset flows have increased greatly in the past two decades and the equity portfolios are a major component of international capital flows. The determinants of portfolio equity investments throw some light on the frictions economic agents encounter when trading assets and the degree of market segmentation. These frictions may help to interpret the herding and contagion effects, and the functioning of international capital markets at large. It may also help to understand when arbitrage across markets takes place and when it does not.

Second, on-going financial market integration at the global level, particularly in the Euro area will have a significant impact on the asset trade. As such, knowledge regarding the determinants of portfolio equity investments will enable us to analyse how the various aspects of integration will affect international portfolio equity investments. Third, the portfolio equity investments are associated with the liquidity

of the relevant markets. Finally, the knowledge of the determinants of portfolio equity investments will facilitate a better understanding of geographical and home bias puzzle.

5.3.1 Contribution

This chapter investigates geographical bias by developing an empirical model from a consumption based asset pricing model that includes both, information and transaction costs. The model explores the role of information asymmetries that arise from differences in accounting standards, disclosure requirements, and regulatory environments across countries by investigating the impact of legal indices (La Porta et al, 1998; Kaufmann et al, 2003) on foreign equity holdings. A contribution of this study is that it fills the gap in the literature by investigating the geographical bias in cross border portfolio equity holdings by utilizing the high quality CPIS dataset and World Bank's governance indicators both, in the international and the Australian context.

5.4 Empirical Framework

This chapter contributes to the existing literature by developing a model that considers both information and transaction costs to explain international investment pattern of cross-border portfolio equity holdings and geographical bias. The model developed in this chapter relaxes the assumptions of Martin and Rey (2004) two country model and extends it to N countries.

Martin and Rey (2004) present a two country model with an endogenous number of financial assets, where the interaction of a risk diversification motive and market

segmentation explains the following facts: (a) demand and market size effects play an important role for international trade in assets and determination of asset prices; (b) financial integration decreases the cost of capital, asset prices increase with investors base and market size determines international financial flows. The Martin and Rey (2004) model is based on the following assumptions: (i) the number of financial assets is endogenous; (ii) assets are imperfect substitutes; (iii) cross-border asset trade entails some transaction costs and (iv) the investment technology is indivisible.

The N countries model considers n risk averse immobile identical agents in each country. There are two periods. In the first period, each agent $h_i \in \{1, \dots, n\}$ in country i is endowed with y units of a freely traded good and a risky project h_i . The agents can choose to consume, invest in fixed size risky projects or buy shares of projects developed by others. In the second period there are M exogenously determined and equally likely states of nature.

Project h_i pays dividend d if state $m \in \{1, \dots, M\}$ occurs, otherwise it pays no dividend. These dividends are the sole source of consumption in the second period. Shares of these projects are traded on the countries stock markets in first period. The risky project h_i is an Arrow Debreu security with payoff $\delta_{xm}d$ in state m , $m \in \{1, \dots, M\}$, where $\delta_{xm} = 1$ if $x = m$ and $\delta_{xm} = 0$ if $x \neq m$. This assumption implies that different projects and assets are imperfectly correlated so that assets are imperfect substitutes and there is an incentive to diversify. All projects are traded in a competitive market with exogenous prices. Let P be the total number of projects in the world. It is assumed that M , the total states of the world is always bigger than P , which implies that the market is imperfect and agents cannot eliminate all of the risk

by holding a portfolio of all traded assets. The total number of projects in the world is

$$P = \sum_{i=1}^N \sum_{h_i=1}^n x_{h_i} = \sum_{i=1}^N n_i \text{ as } x_{h_i} = 1, \text{ where } x_{h_i} \text{ denotes the number of projects that are}$$

developed by agent h_i .

In the first period, agents raise capital by selling shares of their projects and they buy shares of other projects. In the second period, agents consume their shares of the payoffs of the projects that they bought in the first period. In the first period, when agents trade assets, the buyers of the assets bear transaction cost. The amount paid by an agent h_i located in country i to buy x_j asset sold on the stock market in country j is $p_i^j x_j (1 + \tau_i^j)$, where p_i^j is the price of a share of a project developed by agent h_j located in country j , and τ_i^j is the transaction cost in asset markets between country i and country j . The value of transaction costs on assets captures different types of costs viz. banking commissions and variable fees, exchange-rate transaction costs and taxes. In the second period, when the stochastic dividend is shifted from country j to country i , there is an iceberg cost (transportation cost) of ψ_j^i involved. If an agent in country i holds an asset sold in country j which pays a dividend d in period 2, the shareholder in country i will receive only $(1 - \psi_j^i)d$ per share. It is assumed that the transaction and information costs between two countries are symmetric i.e. $\tau_i^j = \tau_j^i$ and $\psi_j^i = \psi_i^j$.

The budget constraint at period 1 for an agent h_i in country i is given as

$$c_{1,h_i} + \sum_{j=1}^N (1 + \tau_i^j) n_j p_i^j x_j = y + p_i^i \quad (5.1)$$

where τ_i^j is the international transaction cost on financial market $\tau_i > 0$ if $j \neq i$ and $\tau_i = 0$ if $j = i$.

Each agent h_i in country i maximizes the following utility,

$$\text{Max}_{c_{1,h_i}, c_{2,h_i}} EU_{h_i} = c_{1,h_i} + \beta E \left(\frac{c_{2,h_i}^{1-1/\sigma}}{1-1/\sigma} \right) \quad (5.2)$$

where c_{1,h_i} and c_{2,h_i} are the period 1 and period 2 consumption of country's i agent h_i .

The second period consumption c_{2,h_i} is stochastic,

$$c_{2,h_i} = \sum_{j=1}^N \sum_{h_j=1}^{n_j} x_j (1 - \psi_j^i) \delta_{xm} d \text{ for all state } m \in \{1, \dots, M\} \quad (5.3)$$

where x_j is the demand of an agent h_i for an asset that has been developed by agent h_j ; ψ_j^i is the iceberg costs in trade $\psi_j^i > 0$ if $j \neq i$ and $\psi_j^i = 0$ if $j = i$ and δ_{xm} is an indicator function, where $\delta_{xm} = 1$ if $x = m$ and $\delta_{xm} = 0$ if $x \neq m$.

The expected utility of agent h_i is,

$$E[U_{h_i}] = c_{1,h_i} + \beta \frac{1}{P} \sum_{j=1}^N \left[n_j \left((1 - \psi_j^i) dx_j \right)^{1-1/\sigma} \left(1 - \frac{1}{\sigma} \right) \right] \quad (5.4)$$

The expected utility function of agent h_i is strictly increasing in relation to c_{1,h_i} . The budget constraint equation (5.1) trivially binds at the optimal solution. $c_{1,h_i} > 0$ at optimal. Thus, c_{1,h_i} can be solved from equation (5.1) and substituted in the utility function of agent h_i . The optimization problem, given the description of the payoff structure of different projects, is

$$\text{Max}_{\{x_i^j\}_{j=1, \dots, N}, \{h_j\}_{j=1, \dots, n_j}} y + p_i^i - \sum_{j=1}^N (1 + \tau_i^j) n_j p_i^j x_i^j + \frac{\beta}{P} \sum_{j=1}^N \frac{n_j \left((1 - \psi_j^i) dx_i^j \right)^{1-1/\sigma}}{1 - 1/\sigma} \quad (5.5)$$

By the first order condition

$$x_i^i = \left(\frac{\beta}{P}\right)^\sigma \frac{d^{\sigma-1}}{p_i^{i\sigma}} \quad (5.6)$$

and

$$x_i^j = \left(\frac{\beta}{P}\right)^\sigma \frac{d^{\sigma-1} (1-\psi_j)^{\sigma-1}}{p_i^{j\sigma} (1+\tau_i^j)^\sigma} \quad (5.7)$$

The asset market clearing condition requires that the demand of agent h_i located in country i must equal the supply for an asset developed by agent h_j located in country j .

The market clearing conditions are

$$\sum_{i=1}^N n_i x_i^j = 1, \text{ for } j = 1, \dots, N \quad (5.8)$$

Combining the first order and market clearing conditions, the optimization problem can be solved. The cross border equity holdings of country i in country j , is given by

$$eq_i^j = n_i n_j p_j x_j \quad (5.9)$$

$$eq_i^j = n_i n_j p_j \left(\frac{\beta}{P}\right)^\sigma \frac{d^{\sigma-1} (1-\psi_j)^{\sigma-1}}{p_j^\sigma (1+\tau_i^j)^\sigma} \quad (5.10)$$

$$eq_i^j = \left(\frac{\beta}{P}\right)^\sigma (mcp_i)(mcp_j) \left(\frac{1}{TC_i^j}\right) (R_j^{\sigma-1}) \frac{1}{p_i p_j} \quad (5.11)$$

$$TC_i^j = \frac{(1+\tau_j)^\sigma}{(1-\psi_j)^{\sigma-1}} \quad (5.12)$$

where $mcp_i = n_i p_i$ and $mcp_j = n_j p_j$ are the market capitalization of country i and j respectively and TC_i^j is the international transaction and information costs.

Equation (5.11) is the gravity model for cross border equity holdings. The cross border equity holdings are positively correlated with the market capitalisations of

countries i and j but inversely correlated with the international transaction and information costs in the financial markets. Further, the equity holding in country j is positively correlated with the return R_j in country j .

Equation (5.11) can be simplified as

$$eq_i^j = \left(\frac{\beta}{P}\right)^\sigma n_i n_j \left(\frac{1}{TC_i^j}\right) (R_j^{\sigma-1}) \quad (5.13)$$

where n_i refers to the number of economic agents in country i , and $R_j = \frac{d}{p_j}$ is the

rate of real equity return in country j .

The information and transaction technology function TC_i^j is in Cobb-Douglas form

$$\log(TC_i^j) = \delta \log(X_i^j) \quad (5.14)$$

where X_i^j is a $K \times 1$ vector that contains the information and transaction cost variables and δ is a $1 \times K$ coefficient vector. The variables include distance, the reciprocal of bilateral openness, the number of telephone lines in the source and destination countries, the international phone cost to call from country i to country j , dummy variables for common language and legal origin, financial development variable, La Porta et. al (1998) and Kaufmann et. al (2003) legal variables.

Taking logarithm of the equation (5.13)

$$\begin{aligned} \log(eq_{i,t}^j) &= \alpha_i + \gamma_t + \beta_1 \log(GDP_{i,t}) + \beta_2 \log(GDP_{j,t}) + \beta_3 \log(X_{ij,t}) \\ &+ \beta_4 return_{j,t} + \varepsilon_{i,t}^j \end{aligned} \quad (5.15)$$

where $eq_{i,t}^j$ is the stock of country j 's equities that is held by the residents of country i ; α_i and γ_t are the country specific and time specific fixed effect coefficients respectively; GDP_i and GDP_j are the measures of the number of economic agents in countries i and j respectively; $X_{ij,t}$ refers to the information cost and transaction cost variables; $return_{j,t}$ refers to the average monthly return in country j during the year t .

The information and transaction cost variables include the distance, phone cost, the number of telephone lines in the source and destination countries, dummy variables for common language and legal origin, financial development variable, La Porta et al, 1998 and Kaufmann et al, 2003 legal indicators;

For the single source country, Australia the equation (5.15) is modified as under,

$$\log(eq_{i,t}^j) = \alpha_i + \gamma_t + \beta_1 \log(GDP_{j,t}) + \beta_2 \log(X_{ij,t}) + \beta_3 return_{j,t} + \varepsilon_{i,t}^j \quad (5.16)$$

5.5 Data Description

Table 5.1 lists the determinants of portfolio equity investment viz. country size, distance, language, legal origin, phone cost, phone line, trade, financial development, diversification and legal variables. Appendix A 5 describes the determinants of cross border portfolio equity investment.

Table 5.1: Determinants of Cross Border Equity Investment

Determinants	Description
Country Size (Appendix A 5.1)	<i>GDP</i> is a measure of country size. <i>GDP</i> data is from the World Development Indicators (2002). Cross border holdings are positively correlated with each country's <i>GDP</i> .
Distance (Appendix A 5.2)	The variable <i>Dis</i> represents the distance between the capital cities of country <i>i</i> and country <i>j</i> . ⁶ This variable is expected to have a negative impact of foreign equity holdings.
Language (Appendix A 5.3)	<i>Lan</i> is the common language dummy variable which is equal to one if countries <i>i</i> and <i>j</i> share a common language; otherwise its value is zero. ⁷ This variable is expected to have a positive impact of foreign equity holdings.
Legal Origin (Appendix A 5.4)	<i>Legal</i> is the common legal origin dummy variable which is equal to one if countries <i>i</i> and <i>j</i> have the same legal origin; otherwise its value is zero. ⁸ This variable is expected to have a positive impact of foreign equity holdings.
Phone Cost (Appendix A 5.5)	<i>Pcost</i> is the phone cost between the capital cities of the source and destination countries. ⁹ This variable is expected to have a negative impact of foreign equity holdings.
Phone Line (Appendix A 5.6)	<i>PhoneLine_i</i> and <i>PhoneLine_j</i> ¹⁰ represent the number of main phone lines in use per 1000 inhabitants in countries <i>i</i> and <i>j</i> respectively. This variable is expected to have a positive impact of foreign equity holdings.
Trade (Appendix A 5.7)	<i>TRADE</i> is the average of imports and exports normalised by the source and destination countries' GDPs. This variable is expected to have a positive impact on foreign equity holdings.
Financial Development (Appendix A 5.8)	<i>Credit_{i,t}</i> and <i>Credit_{j,t}</i> ¹¹ are proxies for financial development for countries <i>i</i> and <i>j</i> respectively. A common proxy for financial development as measured by the size and depth of the domestic capital market is the ratio of M2 to GDP (Edison and Warnock, 2004; Portes and Rey, 2005). This variable is expected to have positive impact on foreign equity holdings.
Diversification (Appendix A5.9)	The variable <i>r_{j,t}</i> ¹² is the average monthly equity return in country <i>j</i> . This variable is expected to have a positive sign.
Legal Variables ¹³ (Appendix A 5.10)	These legal indicators are expected to have a positive impact on foreign equity holdings.

Note: Appendix A 5 briefly describes the determinants of cross border equity investment.

⁶ <http://www.indo.com/distance/>

⁷ <http://www.cia.gov/cia/publications/factbook/>

⁸ La Porta et al (1998)

⁹ <http://www.phone-rate-calculator.com>

¹⁰ World Competitiveness Yearbook (2001)

¹¹ International Financial Statistics database

¹² MSCI stock indices

¹³ La Porta et al (1998) indices and Kaufmann et al (2003) indicators

A major hindrance in research on determinants of international portfolio investments has been the lack of reliable cross border holdings data. Most empirical studies use flow data instead of stock data on cross border equity holdings positions. Flow data is a poor measure of cross border equity holdings position as it is confounded by the turnover rate.

There is no reliable measure of the turnover rate, therefore flow data provides only little information on the determinants of international asset holdings. In addition, flow data is classified as domestic or foreign according to where the security is traded but not the location of the issuer (Lane, 2000; Warnock, 2002). Flow data may also overestimate the loss from missing international diversification opportunities because some of the gains from international diversification can be achieved by trading portfolios of foreign securities (such as those of multinational corporations and closed end country funds) on domestic trading floor without actually trading abroad (Errunza et al, 1999). Tesar and Werner (1995) study portfolio rates based on the portfolio flow data and find that the turnover rates are much higher for foreign assets than for domestic assets. They conclude that variable transaction costs do not provide explanation for home bias because a higher transaction cost on foreign investment should lead to lower turnover rates on the foreign components of the asset portfolios as the foreign investors tend to adopt 'buy and hold' strategies. Warnock (2002) argues that this underweighted but overtraded puzzle in foreign equities is due to the underestimation of cross-border equity holdings (a stock measure) based on the capital flow data (a flow measure) in the Bureau of Economic Analysis survey. The underestimation is as much as 80 %.

A contribution of this research is to fill gap in the literature by employing the International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset for the year 2001 that provides a high quality stock measure of the bilateral equity holdings for major developed and developing countries. The countries are Australia, Austria, Brazil, Chile, China, Hong Kong, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom and United States. The sample includes major developing and developed countries for which data on cross border portfolio equity holdings is available from 2001 CPIS dataset. Appendix presents detailed description of CPIS dataset.

5.6 Results

This section tests the implications of the asymmetric information hypothesis on the stock of international portfolio holdings by employing the CPIS dataset for the year 2001. The results indicate that by explicitly introducing the information and transaction technology variables into the regression, a significant part of the heterogeneity of cross border holdings can be explained.

Table 5.2 presents the ordinary least squares regression results. Column (1) contains the dependent variables viz. GDP_i , GDP_j and Dis . In line with expectations, the GDP_i and GDP_j variables are positive and significant. This implies that investors prefer to hold foreign portfolio equities in economies that are relatively larger in size. The variable Dis is negative and significant. A 1 - percent increase in distance lowers

the cross border equity holdings by 0.64 - percent. In column (2), the common language dummy variable is introduced. The variable *Lan* is positive and significant. This implies that speaking the same language raises the portfolio equity holdings by 0.80 percent. In column (3), $r_{j,t}$ is introduced. In contrast to theorized result, this variable is negative and significant. This implies that investors prefer holdings in foreign countries that have negative mean monthly returns. In column (4), $rcorr_{ij,t}$ is introduced. In contrast to theorized result, this variable is positive and significant. This implies that investors prefer holdings in foreign countries with similar business cycles and correlated stock returns. This is in accordance with Aviat and Coeurdacier (2004), who term this result as the “Correlation Puzzle”. In column (5), trade variable is introduced. *TRADE* is positive and significant. This implies that investors prefer holding shares in foreign firms whose products they are familiar through trade. The distance variable is negative but it loses significance. In order to further test the impact of trade on distance, Column (6) considers the GDP_i , GDP_j , *Dis* and *TRADE* variables. *TRADE* is positive and significant while *Dis* is negative and it loses significance.

Table 5.2: Cross Border Portfolio Equity Holdings

	(1)	(2)	(3)	(4)	(5)	(6)
GDP_i	0.841* (12.516)	0.847* (13.734)	0.851* (14.025)	0.923* (18.817)	0.566* (6.022)	0.197*** (1.939)
GDP_j	1.303* (23.004)	0.847* (13.734)	1.270* (23.162)	1.140* (21.988)	0.806* (9.479)	0.655* (7.045)
Dis	-0.643* (-8.704)	-0.650* (-9.216)	-0.614* (-8.627)	-0.319* (-4.420)	-0.031* (-0.334)	-0.047 (-0.469)
Lan		0.805* (8.156)		0.446* (5.088)	0.295* (3.287)	
$r_{j,t}$			-0.540* (-3.513)		-0.182 (-1.269)	
$rcorr_{ij,t}$				2.572* (10.974)	2.220* (8.974)	
$TRADE$					0.462* (4.631)	0.860* (8.313)
Constant	-13.863* (-12.423)	-13.916* (-13.243)	-13.465* (-12.864)	-15.292* (-16.950)	-12.286* (-11.208)	-8.927* (-7.383)
Observation	444	444	444	444	444	444
Adj. R ²	0.54	0.58	0.59	0.68	0.70	0.60

Note: *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

Table 5.3 checks the robustness of the Table 5.2 results. In Table 5.3, the language variable is replaced with the legal origin variable. *Legal* is positive and significant. Column (1) results imply that countries having same legal origin, raises their portfolio equity holdings by 0.24 - percent. In column (2), $r_{j,t}$ is introduced. In contrast to theorized result, this variable is negative and significant. This implies that investors prefer holdings in foreign countries that have negative mean monthly returns. In column (3), $rcorr_{ij,t}$ is introduced. In contrast to theorized result, this variable is positive and significant. The distance variable is negative and significant throughout. However, the distance variable loses its significance and changes sign, once *TRADE* variable is introduced in column (4). The positive sign of distance variable implies that there is a possibility the international equity flows may be driven by international trade flows so that the distance variable picks up the effect of trade

linkages rather than information. The diversification variable $r_{j,t}$ is negative and insignificant. This implies weak diversification motives of portfolio equity investors. The correlation variable $rcorr_{ij,t}$ is positive. This implies that investors prefer holdings in foreign countries with similar business cycles and correlated stock returns. This is in accordance with Aviat and Coeurdacier (2004), who term this result as the “Correlation Puzzle”. Overall, the results show that GDP_i and GDP_j are positive and significant, throughout. Table 5.2 results support the robustness of Table 5.1 results.

Table 5.3: Robustness Results

	(1)	(2)	(3)	(4)
GDP_i	0.834* (12.786)	0.840* (13.205)	0.922* (18.547)	0.521* (5.519)
GDP_j	1.310* (23.468)	1.276* (22.721)	1.135* (21.559)	0.754* (8.769)
Dis	-0.644* (-8.791)	-0.601* (-8.114)	-0.294* (-3.955)	0.025 (0.271)
$Legal$	0.248* (2.785)	0.238* (2.784)	0.115 (1.574)	0.022 (0.311)
$r_{j,t}$		-0.661* (-4.138)		-0.221 (-1.532)
$rcorr_{ij,t}$			2.752* (11.801)	2.294* (9.269)
$TRADE$				0.524* (5.210)
Constant	-13.916* (-12.629)	-13.361* (-12.286)	-15.375* (-16.929)	-11.913* (-10.775)
Obs	444	444	444	444
Adj. R ²	0.55	0.57	0.67	0.69

Note: *,**,**** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

Table 5.4 introduces other measures of information and transaction costs, along with the distance variable. As per theory, if investors seek to diversify their portfolios, they may want to buy equities in distant countries whose business cycles have a low or negative correlation with their own country’s business cycle. In that case, distance

should have a positive effect on asset trade because of the diversification motive. However, the negative effect of distance may be due to its positive correlation with informational frictions. Geographical distance is a barrier to interaction among economic agents and to cultural exchange. Research in this chapter considers other information and transaction variables viz. phone cost, phone lines in source and destination countries' that might more directly represent information flows.

In Column (1) of Table 5.4, GDP_i and GDP_j are positive and significant. Dis is negative and significant. A 1 - percent increase in distance decreases the equity holdings by 0.28 - percent. $Pcost$ is negative and significant. A 1 - percent increase in phone cost decreases the equity holdings by 1.05 - percent. $PhoneLine_i$ and $PhoneLine_j$ are positive and significant. A 1 - percent increase in the number of telephone lines per 1000 persons of the source countries raises the cross border equity holdings by 4.12 - percent. In the case of destination countries, a 1 - percent increase in the number of telephone lines per 1000 persons raises the cross border equity holdings by 0.63 - percent. In column (2), Lan variable is added. Lan is positive and significant. All other variables have the same sign and the significance level as column (1). In column (3), legal variable replaces the language variable. $Legal$ is positive and significant. In column (4), financial development variables are introduced for the source and host countries. $Credit_{i,t}$ is positive but not significant. $Credit_{j,t}$ is both positive and significant. A 1 - percent increase in the source country's financial development, leads to 0.35 - percent increase in the destination country's cross border equity holdings. All other variables have the same sign as column (3). However, $Pcost$ and $PhoneLine_i$ losses significance. In column (5), $TRADE$ is introduced.

TRADE is positive and significant. GDP_i and GDP_j are positive and significant. $Pcost$ is negative and significant. $PhoneLine_i$ and $PhoneLine_j$ are positive and significant. Dis is significant but it changes sign and becomes positive. The positive sign of distance variable implies that there is a possibility the international equity flows may be driven by international trade flows so that the distance variable picks up the effect of trade linkages rather than information. Overall, these results provide additional robustness check and support the results of Tables 5.2 and 5.3.

Table 5.4: Additional Robustness Tests

	(1)	(2)	(3)	(4)	(5)
GDP_i	1.028* (16.127)	1.039* (18.019)	1.030* (16.936)	1.222* (18.078)	0.473* (5.076)
GDP_j	1.190* (22.054)	1.200* (23.315)	1.202* (22.713)	1.210* (15.810)	0.671* (8.652)
Dis	-0.284* (-3.555)	-0.281* (-3.679)	-0.265* (-3.379)	-0.231*** (-1.864)	0.201** (2.078)
$Pcost$	-1.054* (-3.621)	-0.877* (-3.221)	-1.034* (-3.527)	-0.403 (-1.162)	-0.694** (-2.460)
$PhoneLine_i$	4.121* (5.412)	4.693* (6.486)	4.568* (6.192)	1.267 (1.271)	4.125* (5.988)
$PhoneLine_j$	0.636* (4.190)	0.647* (4.365)	0.664* (4.421)	0.772* (3.847)	0.700* (4.613)
Lan		0.729* (9.024)			
$Legal$			0.333* (4.323)		
$Credit_{i,t}$				0.423 (1.478)	
$Credit_{j,t}$				0.351** (2.208)	
$TRADE$					0.716* (7.999)
Constant	-30.960* (-10.319)	-33.047* (-11.734)	-32.727* (-11.189)	-26.208* (-6.931)	-26.934* (-9.952)
Observations	444	444	444	444	444
Adj. R^2	0.66	0.69	0.67	0.80	0.70

Note: *, **, **** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

Table 5.5 incorporates investors diversification motives of cross border equity holdings. In column (1), the mean monthly return $r_{j,t}$ variable is negative and insignificant, which suggests weak diversification motives of international investors. In column (2), the $rcorr_{ij,t}$ variable is positive and significant. This implies that investors prefer holding equities in foreign markets, whose stock markets are highly correlated with their own. Again, this is at odds with the finance literature which predicts that greater the co movements between financial assets of two countries, the lower the benefit of diversification. $rcorr_{ij,t}$ remains positive even after controlling for distance and other informational variables. This is in accordance with Aviat and Coeurdacier (2004) who refer this result as “Correlation Puzzle”. Column (3), considers both, $r_{j,t}$ and $rcorr_{ij,t}$ variables. $r_{j,t}$ changes sign and becomes positive; however, it is insignificant. This suggests weak diversification motives of international investors. The $rcorr_{ij,t}$ variable remains positive and significant. In column (4), the *Lan* variable is added along with $r_{j,t}$ variable. The *Lan* variable is positive and significant implying that investors prefer investing in countries which speak same language. $r_{j,t}$ variable is negative and insignificant as in column (1). In column (5), the *Lan* variable is added along with $rcorr_{ij,t}$ variable. Again, *Lan* and $rcorr_{ij,t}$ are both positive and significant. In column (6), *TRADE* variable is added along with *Lan* and $r_{j,t}$ variables. *TRADE* is positive and significant. This implies that source country investors would prefer holding equities of foreign firms with which they are familiar through trade in goods and services. Following the inclusion of *TRADE*, *Dis* variable loses significance and becomes positive. This implies that there is a possibility the international equity flows may be driven by international

trade flows so that the distance variable picks up the effect of trade linkages rather than information. In column (7), *TRADE* variable is added and $rcorr_{ij,t}$ replaces $r_{j,t}$. *TRADE* remains positive and significant. Again, *Dis* and $rcorr_{ij,t}$ variables are both positive and significant.

Table 5.5: Diversification Motives of Cross Border Portfolio Equity Holdings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP_i	1.027* (16.112)	1.085* (19.696)	1.085* (19.709)	1.038* (17.965)	1.087* (20.923)	0.569* (6.090)	0.770* (8.526)
GDP_j	1.185* (22.011)	1.115* (21.747)	1.116* (21.709)	1.197* (23.247)	1.130* (22.555)	0.755* (9.537)	0.846* (11.302)
<i>Dis</i>	-0.278* (-3.489)	-0.048 (-0.587)	-0.048 (-0.584)	-0.277* (-3.637)	-0.070 (-0.876)	0.132 (1.383)	0.176*** (1.866)
<i>P cost</i>	-0.998* (-3.467)	-0.455*** (-1.755)	-0.458*** (-1.792)	-0.846* (-3.133)	-0.389 (-1.570)	-0.573** (-2.133)	-0.278 (-1.087)
$PhoneLine_i$	4.164* (5.492)	5.051* (6.957)	5.050* (6.949)	4.709* (6.516)	5.366* (7.674)	4.554* (6.709)	5.179* (7.666)
$PhoneLine_j$	0.609* (4.037)	0.390* (3.047)	0.391* (3.015)	0.630* (4.249)	0.423* (3.321)	0.669* (4.531)	0.482* (3.717)
<i>TRADE</i>						0.601* (6.652)	0.400* (4.492)
<i>Lan</i>				0.717* (8.871)	0.522* (6.771)	0.490* (6.223)	0.400* (5.199)
$r_{j,t}$	-0.225 (-1.607)		0.019 (0.148)	-0.136 (-0.993)		-0.235*** (-1.711)	
$rcorr_{ij,t}$		2.367* (9.498)	2.374* (9.269)		2.126* (8.546)		1.885* (7.370)
Constant	-30.831* (-10.329)	-34.688* (-12.440)	-34.710* (-12.378)	-33.047* (-11.734)	-35.805* (-13.313)	-28.849* (-10.756)	-32.829* (-12.312)
Observation	444	444	444	444	444	444	444
Adj. R ²	0.66	0.73	0.73	0.59	0.74	0.71	0.75

Note: *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

5.6.1 Result - Impact of legal indicators

Generally, investors gather information about the foreign firms by analysing their accounting statements and historical stock market data. Accounting information is based on accounting principles and disclosure requirements that may differ greatly

from those in their home countries. The credibility of this information is determined to a large extent by variation in regulatory environment from country to country. The cross country differences in accounting practices, disclosure requirements and regulatory environments give rise to information asymmetries between local and foreign investors. Foreign investors have to translate and interpret this information in light of the relevant legal and business environment which leads to additional costs. These information costs associated with investing in some countries may be significantly higher than in others. Research in this chapter explores the role of information asymmetries that arise from differences in accounting standards, disclosure requirements, and regulatory environments across countries by employing (i) La Porta et al (1998) legal indices and (ii) Kaufmann et al (2003) governance indicators.

(i) Impact of La Porta et al (1998) legal indices

Table 5.6 illustrates the impact of La Porta et al (1998) indices on the determinants of portfolio equity holdings. In column (1), the destination countries' efficiency of judicial system (*EFF*) indicator is considered. This variable is positive but insignificant. In column (2), the destination countries' rule of law (*RL*) index is considered. Again, this variable is positive but insignificant. Column (3) introduces the destination countries' rating of accounting standards (*RAS*) indicator. This variable is both positive and significant. GDP_i , GDP_j , $PhoneLine_i$ are positive and significant, throughout. $PhoneLine_j$ is positive but insignificant, throughout. The variables *Dis* and *Pcost* are both negative and significant, throughout. Overall, the results of Table 5.4 suggest that destination and source countries' size, the number of telephone lines per thousand residents of source and destination countries have

positive impact on the foreign equity holdings. The geographical proximity of source and host countries also matters for foreign equity investments. Investors prefer holding foreign equities in countries that are in close geographical proximity. The positive impact of legal indicators on foreign equity holdings suggest that investors prefer holding equities in countries that have a high level of accounting standards, efficient judiciary system and high degree of law and order.

Table 5.6: Impact of La Porta et al (1998) indices on Cross Border Equity Portfolio Holdings

	(1)	(2)	(3)
GDP_i	1.028* (17.377)	1.027* (17.193)	1.013* (17.628)
GDP_j	1.169* (22.734)	1.151* (20.721)	1.174* (23.608)
Dis	-0.461* (-5.987)	-0.447* (-5.761)	-0.473* (-6.160)
$Pcost$	-1.394* (-4.894)	-1.339* (-4.467)	-1.167* (-4.207)
$PhoneLine_i$	3.084* (4.302)	3.140* (4.367)	3.133* (4.419)
$PhoneLine_j$	0.218 (1.458)	0.178 (1.146)	0.186 (1.149)
EFF	0.024 (1.209)		
RL		0.035 (1.297)	
RAS			0.019* (5.795)
Constant	-25.820* (-9.345)	-25.774* (-9.285)	-26.718* (-9.653)
Observation	444	444	444
Adj. R^2	0.71	0.71	0.74

Note: *,**,**** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

(ii) Impact of Kaufmann et al (2003) governance indicators

Table 5.7 illustrates the impact of Kaufmann et al (2003) indicators on the determinants of portfolio equity holdings. All of the Kaufmann et al (2003) indicators

are positive and significant. Considering the size of indicators, regulatory quality (*RQ*) indicator is highly significant and positive. A 1 - percent increase in the destination countries' regulatory quality leads to an increase in 0.70 - percent of source countries' foreign equity holdings in these countries'. This is followed by government effectiveness (*GE*), control of corruption (*CC*), rule of law (*RL*), political stability (*PS*) and voice and accountability (*VACC*). The above exercise illustrates the individual effects of various institutional variables. However, if various institutional dimensions determine simultaneously the location of portfolio equity investment, then by including them individually might lead to an omitted variable bias. Therefore, regressions are also run by clustering these institutional variables into 'Political Stability and Freedom' (*PSF*) or 'Government Efficiency' (*GEFF*). Column (7) indicates that the 'Political Stability and Freedom' variable is negative and significant, while on the other hand, the 'Government Efficiency' variable is positive and significant. A 1 - percent improvement in 'Government Efficiency' would increase foreigners' portfolio equity investment by 0.69 - percent. 'Political Stability and Freedom' is negative and significant. Overall the results indicate that the quality of destination countries' institutions have positive effects on source countries' portfolio equity investments. Investors prefer holding foreign equities in countries that adopt policies promoting competition on both domestic and an international level; policies promoting open markets and effective and non-corrupt public institutions as well as by open and transparent legal and regulatory regimes, and effective delivery of government services.

Table 5.7: Impact of Kaufmann et al indicators on Cross Border Portfolio Equity Holdings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP_i	1.026 (16.133)*	1.006 (16.510)*	1.022 (15.994)*	1.005 (16.646)*	1.011 (16.589)*	1.015 (16.495)*	1.009 (16.907)*
GDP_j	1.183 (21.663)*	1.222 (23.844)*	1.215 (21.902)*	1.193 (23.284)*	1.320 (24.602)*	1.193 (22.727)*	1.220 (23.926)*
Dis	-0.255 (-3.105)*	-0.309 (-4.052)*	-0.273 (-3.426)*	-0.288 (-3.836)*	-0.295 (-3.879)*	-0.283 (-3.612)*	-0.338 (-4.447)*
P_{cost}	-0.931 (-3.167)*	-0.249 (-0.837)	-0.844 (-2.795)*	-0.168 (-0.560)	-0.292 (-1.035)	-0.543 (-1.853)***	-0.318 (-1.101)
$PhoneLine_i$	4.266 (5.521)*	4.301 (5.983)*	4.226 (5.568)*	4.396 (6.144)*	4.340 (6.135)*	4.281 (5.829)*	4.168 (5.830)*
$PhoneLine_j$	0.527 (3.242)*	0.087 (0.529)	0.504 (3.065)*	0.014 (0.091)	-0.276 (-1.405)	0.108 (0.607)	-0.036 (-0.207)
$VACC$	0.138 (1.769)***						
CC		0.387 (6.458)*					
PS			0.133 (2.302)**				
GE				0.524 (7.317)*			
RQ					0.705 (6.822)*		
RL						0.381 (4.724)*	
PSF							-0.272 (-2.727)*
$GEFF$							0.693 (7.132)*
Constant	-31.199 (-10.379)*	-30.177 (-10.795)*	-31.195 (-10.421)*	-30.144 (-10.814)*	-30.824 (-11.071)*	-30.103 (-10.486)*	-29.441 (-10.590)*
Observation	444	444	444	444	444	444	444
Adj. R^2	0.66	0.69	0.66	0.70	0.69	0.68	0.70

Note: *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

5.6.2 Result - Australian investors

Table 5.8 illustrates the regression results for Australia's portfolio equity holdings abroad. In column (1), the source country's size variable GDP_j is positive and significant. $PhoneLine_j$ is positive and significant implying that 1 - percent increase in the number of telephone lines per 1000 persons of the source countries would raise

Australian investors cross border equity holdings by 1.05 - percent. The variable *Dis* is negative and significant. A 1 - percent increase in distance would lead to a decrease in Australian investors' foreign equity holdings by about 0.91 - percent. The variable *Pcost* is negative but insignificant. In column (2), the *Lan* variable is introduced. Speaking the common language, English would raise Australian investors cross border equity holdings by 60 - percent. *PhoneLine_j* is positive and significant implying that 1 - percent increase in the number of telephone lines per 1000 persons of the source countries would raise Australian investors cross border equity holdings by 0.92 - percent. The *Dis* and *Pcost* variables are both negative but insignificant. Distance may have lost significance due to the introduction of common language variable which takes into account to some extent, the information cost asymmetries. Column (3) adds *Legal*, the common legal origin variable instead of the common language variable. The *Legal* is positive and significant. The *Dis* and *Pcost* variables are again both negative and insignificant. Column (4) adds *Credit_{j,t}*, the financial development variable. *Credit_{j,t}* is positive but insignificant, while *Dis* is negative and significant. However, the *Pcost* variable changes sign and becomes positive and insignificant, and *PhoneLine_j* is positive and significant. Column (5) introduces *TRADE*, which is positive and significant. This implies that Australian investors would prefer holding equities of foreign firms with which they are familiar through trade in goods and services. However, the *Dis* variable loses significance and becomes positive. This implies that there is a possibility that international equity flows may be driven by international trade flows so that the distance variable picks up the effect of trade linkages rather than information.

Table 5.8: Australia's Portfolio Equity Holdings Abroad

	(1)	(2)	(3)	(4)	(5)
GDP_j	1.286* (7.955)	1.260* (10.207)	1.305* (10.424)	1.410* (6.601)	0.259 (1.624)
Dis	-0.916*** (-1.967)	-0.312 (-0.782)	-0.465 (-1.156)	-1.106*** (-1.900)	1.873* (4.100)
$Pcost$	-0.279 (-0.435)	-0.193 (-0.316)	-0.205 (-0.370)	0.035 (0.041)	-0.016 (-0.030)
$PhoneLine_j$	1.057* (2.775)	0.929** (2.724)	1.037* (3.347)	1.087*** (2.078)	0.812** (2.430)
Lan		0.602* (3.701)			
$Legal$			0.524* (3.161)		
$Credit_{j,t}$				0.341 (0.790)	
$TRADE$					1.036* (7.435)
Constant	-5.887* (-3.075)	-7.793* (-4.637)	-8.036* (-4.668)	-7.151* (-3.474)	-13.795* (-7.756)
Observation	37	37	37	37	37
Adj. R^2	0.69	0.74	0.74	0.70	0.81

Note: *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

Table 5.9 illustrates the diversification motives of Australian investors in relation to their portfolio equity holdings. In column (1), the mean monthly return $r_{j,t}$ variable is negative and insignificant, which suggests weak diversification motives of Australian investors. In column (2), the $rcorr_{ij,t}$ variable is positive and significant. The sign of the variable is a function of the existing positive correlation between markets. Australian investors hold equities in foreign markets that are highly correlated with their own. This is at odds with the finance literature which predicts that greater the co movements between financial assets of two countries, the lower the benefit of diversification. The Dis variable is still negative but it loses its significance, while the $Pcost$ variable changes sign and becomes positive but insignificant. Column (3),

considers both, $r_{j,t}$ and $rcorr_{ij,t}$ variables. $r_{j,t}$ is negative and insignificant. This suggests weak diversification motives of Australian investors.

Table 5.9: Impact of Diversification on Australia's Equity Holdings Abroad

	(1)	(2)	(3)	(4)
GDP_j	1.284* (7.742)	1.241* (9.436)	1.241* (9.181)	0.344** (2.237)
Dis	-0.960*** (-1.953)	-0.256 (-0.464)	-0.296 (-0.510)	2.119* (4.516)
$Pcost$	-0.170 (-0.248)	0.205 (0.343)	0.245 (0.377)	0.335 (0.515)
$PhoneLine_j$	1.032* (2.761)	0.875** (2.488)	0.868** (2.420)	0.677** (2.311)
$TRADE$				0.912* (6.080)
Lan				0.172 (0.855)
$r_{j,t}$	-0.331 (-0.968)		-0.161 (-0.512)	-0.143 (-0.549)
$Credit_{j,t}$		2.172* (2.803)	2.110** (2.611)	1.396*** (1.749)
Constant	-5.390* (-2.859)	-8.344* (-3.647)	-8.031* (-3.398)	-14.763* (-8.604)
Observation	37	37	37	37
Adj. R ²	0.69	0.73	0.73	0.84

Note: *,**,*** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

The $rcorr_{ij,t}$ variable is positive and significant. This implies that Australian investors hold equities in foreign markets that are highly correlated with their own. The Dis variable is still negative and insignificant, while the $Pcost$ variable is still positive and insignificant. In column (4), the $TRADE$ variable is added along with the Lan , $r_{j,t}$ and $rcorr_{ij,t}$ variables. Lan is positive but insignificant, and $TRADE$ is positive and significant. This implies that source country investors would prefer holding equities of foreign firms with which they are familiar through trade in goods

and services. The variable $r_{j,t}$ is negative and insignificant. This suggests weak diversification motives of Australian investors. The $rcorr_{ij,t}$ variable is positive and significant. This implies that Australian investors hold equities in foreign markets that are highly correlated with their own. Dis is both positive and significant, while $Pcost$ variable is positive and insignificant. The positive sign of distance variable implies that there is a possibility the international equity flows may be driven by international trade flows so that the distance variable picks up the effect of trade linkages rather than information.

Table 5.10 illustrates the impact of La Porta et al (1998) indices on the determinants of portfolio equity holdings. In column (1), the destination countries' efficiency of judicial system is considered. This variable is positive and significant. In column (2), destination countries' rule of law is considered. This variable is positive but insignificant. Column (3) introduces the destination countries' rating of accounting standards indicator. This variable is both positive and significant. GDP_j and $PhoneLine_j$ are both positive and significant, throughout. Dis and $Pcost$ are both negative but insignificant, throughout. Overall, the results of Table 5.9 suggest that destination countries' size and the number of telephone lines per thousand residents of destination countries have positive impact on the foreign equity holdings. In contrast to the international scenario, the geographical proximity of source and host countries does not have a significant impact on Australian investors' foreign equity holdings. The positive impact of legal indicators on foreign equity holdings suggest that Australian investors prefer holding equities in countries' that have high degree of accounting standards, efficient judiciary system and high degree of law and order.

Table 5.10: Impact of La Porta et al (1998) indices on Australia's Equity Holdings Abroad

	(1)	(2)	(3)
GDP_j	1.196* (8.536)	1.195* (8.120)	1.141* (11.488)
Dis	-0.435 (-1.025)	-0.481 (-1.116)	-0.037 (-0.109)
P_{cost}	-0.474 (-0.737)	-0.749 (-1.158)	-0.607 (-1.156)
$PhoneLine_j$	0.530*** (2.005)	0.533*** (1.755)	0.426 (1.559)
EFF	0.076** (2.187)		
RL		0.036 (0.541)	
RAS			0.025* (2.828)
Constant	-5.847* (-3.444)	-5.378* (-3.145)	-7.618* (-5.510)
Observation	37	444	444
Adj. R^2	0.75	0.74	0.80

Note: *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

Table 5.11 illustrates the impact of Kaufmann et al (2003) indicators on the determinants of Australian investors' portfolio equity holdings. Considering the size of indicators, regulatory quality indicator is highly significant and positive. A 1 - percent increase in the destination countries' regulatory quality (RQ) leads to an increase in 0.76 - percent of source countries' foreign equity holdings in destination countries'. This is followed by government effectiveness (GE), control of corruption (CC), rule of law (RL), political stability (PS) and voice and accountability ($VACC$). Columns (1) to (6) illustrate the individual effects of various institutional variables. However, if various institutional dimensions determine simultaneously the location of portfolio equity investment, then by including them individually might lead to an omitted variable bias. Therefore, regressions are also run by clustering these

Table 5.11: Impact of Kaufmann et al (2003) indicators on Australia's Equity Holdings Abroad

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>GDP_j</i>	1.291* (7.881)	1.337* (10.018)*	1.305* (7.431)*	1.281* (11.542)*	1.274* (18.109)*	1.289* (8.719)*	1.312* (11.673)*
<i>Dis</i>	-1.099*** (-1.857)	-0.796 (-1.453)	-0.911*** (-1.881)	-0.603 (-1.283)	-0.424* (-5.093)	-0.804 (-1.521)	-0.585 (-1.380)
<i>Pcost</i>	0.022 (0.028)	1.178*** (2.014)	-0.097 (-0.133)	1.262** (2.079)	0.406 (1.133)	0.548 (-0.917)	0.934*** (1.990)
<i>PhoneLine_j</i>	0.907** (2.486)	0.406 (1.520)	0.979** (2.553)	0.251 (0.953)	-0.283 (-1.146)	0.366 (1.244)	0.201 (0.738)
<i>VACC</i>	0.248 (1.113)						
<i>CC</i>		0.560* (5.148)					
<i>PS</i>			0.091 (0.796)				
<i>GE</i>				0.758* (5.375)			
<i>RQ</i>					0.763* (6.084)		
<i>RL</i>						0.538* (3.629)	
<i>PSF</i>							-0.429*** (-1.821)
<i>GEFF</i>							1.007* (5.273)
Constant	-4.919*** (-1.969)	-5.312** (-2.324)	-5.911* (-2.923)	-5.249* (-2.977)	-4.196* (-4.351)	-4.736** (-2.183)	-5.501* (-3.315)
Observation	37	444	444	444	444	444	444
Adj. R ²	0.69	0.79	0.68	0.80	0.50	0.75	0.80

Note: *, **, *** indicate statistical significance at 0.01, 0.05 and 0.1 confidence interval, respectively.

institutional variables into 'Political Stability and Freedom' (*PSF*) or 'Government Efficiency' (*GEFF*). Column (7) indicates that the Political Stability and Freedom (*PSF*) variable is negative and significant; on the other hand, Government Efficiency (*GEFF*) variable is positive and significant. A 1 - percent improvement in Government Efficiency (*GEFF*) would increase foreigners' portfolio equity investment by 1 - percent.

Table 5.11 results indicate that indicators related to regulatory quality, government effectiveness, control of corruption and rule of law have a direct impact on the Australian investors foreign portfolio equity investments. There is no direct effect of civil liberties, civil rights and media independence on Australian investors' foreign portfolio equity holdings; however these variables may have an indirect effect. Overall the results indicate that the quality of destination countries' institutions has a positive effect on source countries' portfolio equity investments.

5.7 Conclusions

Research in this chapter has developed a model with explicit information and transaction costs. The model utilizes the high quality CPIS dataset to investigate the information asymmetries associated with portfolio equity holdings, both in the international and Australian context. The results indicate that by explicitly introducing the information and transaction technology variables, a significant part of the heterogeneity of cross border holdings can be explained. The empirical results show that asymmetric information is related to geographical bias. International capital markets are not frictionless but rather segmented by informational asymmetries or familiarity effects.

In both the international and Australian context, geographical distance remains significantly negative even after taking into account other information asymmetries viz. phone cost and number of phone lines in source and host countries. However, once the trade variable is introduced, distance loses significance and becomes positive. The positive sign of distance variable implies that there is a possibility that international equity flows may be driven by international trade flows so that the

distance variable picks up the effect of trade linkages rather than information. This also supports the theories that trade in assets is positively linked to trade in goods or theories in which diversification benefits are highly correlated with trade in goods do not capture all the informational dimensions of asset trade. Distance affects bilateral asset holdings mainly through its impact on trade in goods.

Both, the international and Australian investors exhibit a preference for nearby countries, same language and same culture countries. Investors acquire useful information about familiar firms from reading company statements in a language they understand, from general or acquired knowledge about local firms, or from the cultural groups they socialize within. The information based theory of the influence of distance, language, and culture leads to more active trading of these familiar firms and generates superior performance in these firms.

Both, international and Australian investors prefer holding equities of foreign firms with which they are familiar through trade in goods and services. Information flows positively affect both cross-border finance and trade. Trade in goods and trade in assets become complementary: firm managers learn about each other by trading goods and/or securities. Trading in goods market reduces informational asymmetries in the financial markets (and vice versa). Financial development measured as the amount of credit provided by the banking sector relative to GDP has positive effects on both the international and Australian investors.

The legal and governance indicators have a positive impact on portfolio equity investors both in the international and Australian context. In the international context,

La Porta et al (1998) indicators i.e. efficiency of judicial system and rule of law have positive impact; however these variables are not significant. Rating of accounting standards is both positive and significant. All the Kaufmann et al (2003) governance indicators have a positive and significant impact on the international investors' foreign equity holdings.

In the Australian context, La Porta et al (1998) indicator rule of law has positive impact; however this variable is not significant. La Porta et al (1998) indices i.e. efficiency of judicial system and rating of accounting standards are both positive and significant. All the Kaufmann et al (2003) governance indicators have a positive impact, however not all indicators have significant impact. Regulatory quality, government effectiveness, control of corruption and rule of law has a significant impact on the Australian investors' foreign portfolio equity holdings. There is no significant effect of civil liberties, civil rights and media independence on Australian investors' foreign portfolio equity holdings, however these variables may have an indirect effect. Overall, investors prefer holding equities in countries' that have high degree of accounting standards, efficient judiciary system and high degree of law and order.

This chapter indicates low diversification motives for both the international as well as Australian investors. Investors who choose to hold a large number of stocks, concentrating the portfolio in certain stocks because of distance, language, or culture effects may make quite a large difference to the risk profile of their investment holdings.

This chapter states that the higher the correlation between two countries stock returns, the larger the volume of asset trading between the two; which remains true even after controlling for trade in goods. This is in accordance with Aviat and Coeurdacier (2004), which they term as “Correlation Puzzle”. Further theoretical research is required to study the interactions between trade in goods, trade in assets and diversification.

This chapter provides a test of the validity of the theoretical models that are based on information asymmetry (French and Poterba, 1991; Gehrig, 1993 and Kang and Stulz, 1997), transaction costs (Tesar and Werner, 1995; Calvo and Mendoza, 1999) and market size (Martin and Rey, 2004).

CHAPTER 6.

HOME BIAS IN PORTFOLIO EQUITY INVESTMENT

6.1 Introduction.

Chapter 4 highlighted Australia's portfolio equity investment position in the global context. Research in this chapter follows to investigate Australia's home bias puzzle in portfolio equity investment and further extends the geographical bias (Chapter 5) to include the home bias puzzle.

The traditional international capital asset pricing model (ICAPM) based on Sharpe (1964) and Lintner (1965) predicts that investors should hold equities from countries around the world in proportion to each market's capitalisation. However, empirical facts suggest that international portfolios are heavily biased towards domestic assets (French and Poterba (1991), Cooper and Kaplanis (1994), Tesar and Werner (1995), Ahearne et al (2004), Chan et al (2005)). This phenomenon is known as the "home bias puzzle".

This chapter fills in the gap by empirically investigating the phenomenon of home bias both in the International and Australian context, using high quality IMF dataset. This chapter employs two models to study the impact of capital market frictions on international equity portfolios, using IMF's new dataset on bilateral equity holdings. This chapter empirically investigates the role of direct barriers to investment including transaction costs such as capital controls and indirect barriers based on information asymmetries including legal barriers and the development of financial markets in explaining the home bias puzzle. This is the first of its kind of study related to home bias puzzle in the Australian context.

Empirical investigation into the home bias puzzle is important for several reasons. First, globalization in general has increased capital mobility and foreign equity investments (Obstfeld, 1995). The identification of the relevance of capital market frictions promoting home bias give further insight into future changes in portfolios. Second, the ongoing integration process in the European Union is likely to lead a change in its portfolio composition due to the joining of the Eastern European countries. The financial integration process will also affect the international portfolio equity composition. Third, the severe demographic changes in the European countries and Japan are likely to lead to a change in the capital flows. It is important for the estimation and prediction of future investments to know more about the effect of capital market frictions and the extent of capital mobility. Fourth, due to lack of high quality data on cross border equity holdings, country specific studies are either limited to US foreign equity holdings or focus on countries' foreign equity holdings not subdivided into country pairs. There are no studies focussing on portfolio equity home bias in the Australian context.

Most of the countries had strong barriers to foreign investment for a number of years after World War II. The investment abroad was limited to only few currencies because most currencies were not convertible. Several countries had prohibitions on foreign investments by their own citizens and limits to ownership of domestic stocks by foreign investors. Foreign investors were at further disadvantage due to the imposition of tax on their equity investments, the necessity to acquire foreign exchange and the costs of hedging exchange rate risk. Investors as such were inclined to hold more domestic stocks than predicted by the ICAPM because barriers to international investment lessened benefits to international diversification.

This chapter is structured as follows: Section 6.2 provides a literature review of the home bias puzzle. Section 6.3 presents stylized facts about the home bias puzzle. Section 6.4 outlines the empirical framework and models. Section 6.5 refers to the data and describes the various explanatory variables employed in the models. The results are presented in section 6.6 and finally, section 6.7 concludes.

6.2 Literature Review

Black (1974) and Stulz (1981) develop a two country capital market equilibrium model where there are barriers to cross border investment and these barriers can be considered as tax on net foreign investment. This tax represents various kinds of barriers to international investment such as direct controls on the import or export of capital, the possibility of expropriation of foreign holdings, reserve requirements on bank deposits and other assets held by foreigners, and restrictions on the fraction of business that is owned by foreigners. It may also include barriers due to information asymmetries, i.e. unfamiliarity of residents of one country with the stock markets of other countries. Merton (1987) develops a model where investors hold stocks that they know. In this model, investors think that the risk of stocks they do not know is extremely high. Accordingly, the investors may overweight domestic stocks. Cooper and Kaplanis (1986) develop an international capital market equilibrium model which allows for differential taxes on foreign investment depending on the country of investment and the origin of investor. They obtain unique solutions for taxes under extreme assumptions that taxes depend on the country of investment, or on the origin of investor. Cooper and Kaplanis (1994) find that hedging against inflation risk cannot explain the home bias.

Several papers consider the effect of indirect barriers, i.e. information asymmetries on equity investment. French and Poterba (1991), for instance, find that information asymmetry can generate the same observed portfolio patterns as if investors expect domestic returns to be several hundred basis points higher than returns in foreign markets. Gehrig (1993) uses a noisy rational expectations model to investigate the effect of asymmetric information between domestic and foreign investors. Investors observe noisy signals with different degrees of precision. Domestic investors receive signals of future returns that are more precise. The investors remain incompletely informed, even in equilibrium. Domestic bias arises from better investor information about domestic stocks. Thus, on average foreign investments appear to be more risky. Hasan and Simaan (2000) derive the premium that an investor is willing to pay to buy the full information of the mean return vector and show that rational investors prefer home country dominated portfolios over diversified portfolios if the variability of estimation errors far exceeds the variability of the mean return vector. Coval and Moskowitz (1999, 2001) show that the weight of a United States (US) stock in US mutual funds is negatively related to the distance between the location of the fund and the location of the headquarters of the firm. The mutual fund managers do better with their holdings of stocks of firms which are located more closely to the location of mutual fund. Sarkissian and Schill (2004) find that geographic, economic, cultural, and industrial proximity plays a dominant role in the selection of overseas listing stock exchange. Their findings imply that proximity constraints that lead to home bias in investment portfolio decisions are similar to those which influence financing decisions. Chan et al (2005) examine how mutual funds from 26 developed and developing countries allocate their investment between domestic and foreign equity markets and what factors determine their asset allocation worldwide. They find robust

evidence that these funds in aggregate allocate a disproportionately larger fraction of investment to domestic stocks. They state that the stock market development and familiarity variables have significant but asymmetric, effects on domestic bias and foreign bias and that economic development, capital controls and withholding tax variables have significant effects only on the foreign bias. For Finland, Grinblatt and Keloharju (2001) show that Finnish investors whose native language is Swedish are more likely to own stocks of companies in Finland that have annual reports in Swedish and whose CEOs speak Swedish than those investors whose native language is Finnish. For Korea, Choe et al (2001) find that foreign investors buy at higher prices than resident investors and sell at lower prices. Shukla and Van Inwegen (1995) show that United Kingdom (UK) money managers under perform American money managers when picking US stocks. Hau (2001) finds that proprietary trades on the German stock market do better when they are geographically closer to Frankfurt.

There are several papers investigating the home bias puzzle related to individual countries. For Japan, Kang and Stulz (1997) find that foreign investors concentrate on equity investments in firms that are large; firms that export more and firms with good accounting performance. For Sweden, Dahlquist and Robertsson (2001) find that non-resident investors are mostly institutional investors and that the holdings of stocks by non-resident investors exhibit biases that are also typical of resident institutional investors. Their findings are consistent with Kang and Stulz (1997). In Korea, Kim and Wei (2002) find that a significant information asymmetry exists between the resident foreign investors and non-resident foreign investors. They base their finding by testing the hypothesis that non-resident foreign investors may herd more than resident foreign investors like Korean subsidiaries and branches of foreign institutions

as the latter have more timely information about the country they live in. For the US, Ahearne et al (2004) test the home bias puzzle by employing the data on US holdings of foreign equities. They find that information cost is a major determinant of a country's weight in US investor's portfolio. Dahlquist et al (2003) state that home bias is closely linked to corporate governance. They show that United States investors underweight those foreign countries in their portfolios which have closely held firms and construct an estimate of the world float portfolio. However, there is no similar study investigating the home bias puzzle in the Australian context. Research in this thesis fills in the gap by investigating the home bias puzzle in the Australian context.

6.3 Home Bias Puzzle: Some Stylized Facts

The most prominent feature of international portfolio holdings is the “home bias puzzle”, loosely defined as the situation where investors hold far too high a share of their wealth in domestic securities compared with the optimal share predicted by the traditional theory of portfolio choice. According to the ICAPM, investors should hold equities from countries around the world in proportion to their market capitalisation. However, empirical facts (Table 6.1) indicate that investors portfolios are heavily biased towards domestic equities. This phenomenon is termed as the ‘home bias puzzle’. Table 6.1 compares the actual share of domestic equities in the home portfolio with the benchmark share in the world portfolio as per the ICAPM model.

The home bias is measured as $1 - \frac{\text{share of foreign equities at domestic level}}{\text{share of foreign equities in world portfolio}}$.

Table 6.1 indicates that the actual percentage of domestic equity holdings is much greater than the benchmark percentage as computed from the ICAPM. For instance, the actual domestic equity holdings of Australia and New Zealand in 2002 were 78.08% and 81.67% respectively, whereas the ICAPM benchmark percentages were

1.84 and 0.10 respectively. This differential is very high and investors around the globe have a bias towards domestic securities.

Table 6.1: International Home Bias

Countries	Actual (%) of domestic equity held by domestic investors		Benchmark (%) as per ICAPM		Home Bias	
	2001	2002	2001	2002	2001	2002
Australia	75.35	78.08	1.47	1.84	0.74	0.77
Austria	71.71	80.40	0.08	0.16	0.71	0.80
Belgium	76.76	73.22	0.60	0.65	0.76	0.73
Canada	84.09	86.45	2.41	2.76	0.83	0.86
Denmark	79.14	77.11	0.34	0.38	0.79	0.77
Finland	42.55	39.35	0.77	0.70	0.42	0.38
France	66.72	69.86	4.61	4.70	0.65	0.68
Ireland	53.88	30.03	0.28	0.26	0.53	0.29
Italy	77.38	77.34	2.09	2.40	0.76	0.76
Japan	86.72	86.32	9.84	11.80	0.85	0.84
Malaysia	10.30	9.75	0.47	0.61	0.09	0.09
Netherlands	51.34	50.19	2.22	2.32	0.50	0.49
New Zealand	80.97	81.67	0.07	0.10	0.80	0.81
Norway	77.02	77.25	0.27	0.34	0.76	0.77
Portugal	73.62	73.21	0.20	0.21	0.73	0.73
Singapore	69.10	65.78	0.46	0.50	0.68	0.65
Spain	68.97	78.31	1.44	2.25	0.68	0.77
Sweden	68.20	75.54	0.93	0.99	0.67	0.75
UK	67.98	63.89	8.75	9.10	0.64	0.60
US	92.82	91.39	54.86	51.51	0.84	0.82

Source: Foreign equity investments from the IMF's CPIS, market capitalizations from FIBV

6.3.1 Australia's Share of Portfolio Equity Investment

Table 6.2 compares the actual share of domestic equities held by Australians in other countries with the benchmark share in the world portfolio as per the ICAPM model. Actual portfolio share is the foreign equity holdings of Australia in other countries relative to Australia's total holdings of foreign and domestic equities. The benchmark portfolio share is each country's market capitalization in the world market capitalization. These benchmarks are the shares of Australia's equity holdings by country in a hypothetical world in which global capital markets were complete and

investors in all countries had identical preferences and chose portfolios optimally based on standard portfolio theory.

Table 6.2: Australia's Share of Portfolio Equity Investment

Countries	(1) Actual (%) portfolio share 2001	(2) Benchmark (%) as per ICAPM 2001	(3) Actual over Benchmark
Denmark	0.04	0.34	0.11
Finland	0.09	0.77	0.11
France	0.67	4.61	0.14
Germany	0.44	4.02	0.10
Greece	0.01	0.31	0.03
Hungary	0.00	0.03	0.07
Hong Kong	0.37	1.90	0.19
Ireland	0.05	0.28	0.17
Italy	0.18	2.09	0.08
Japan	0.98	9.84	0.09
Korea	0.01	0.44	0.02
Malaysia	0.01	0.47	0.02
Netherlands	0.94	2.22	0.42
New Zealand	0.01	0.07	0.14
Norway	0.02	0.27	0.07
Singapore	0.11	0.46	0.23
South Africa	0.05	0.31	0.16
Spain	0.13	1.44	0.09
Sweden	0.09	0.93	0.09
Switzerland	0.31	2.35	0.13
UK	1.56	8.75	0.17
US	9.94	54.86	0.18

Source: Foreign equity investments from the IMF's CPIS, market capitalizations from FIBV

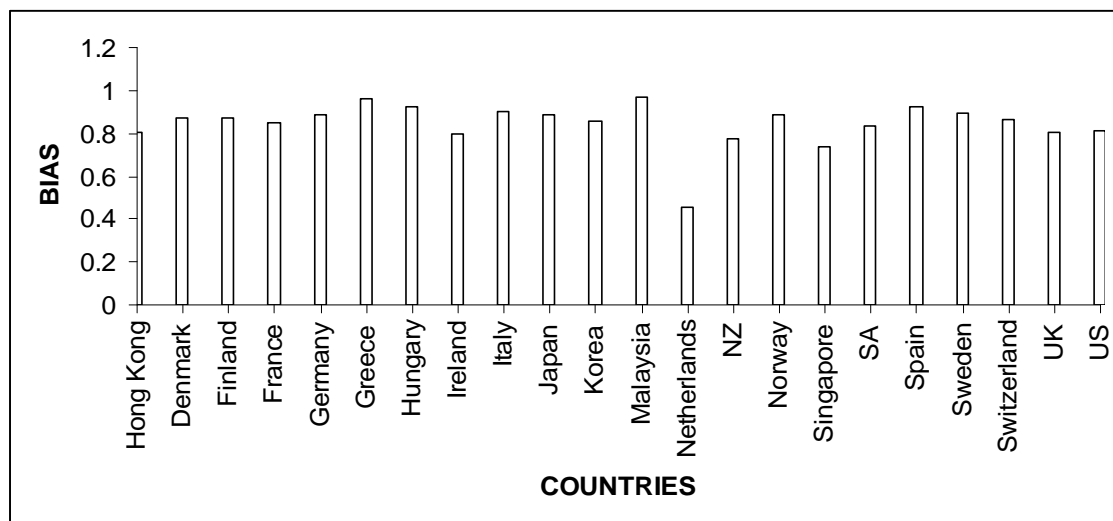
Table 6.2 indicates that Australia's actual portfolio share is the highest in US (9.94%) followed by UK (1.56%), Netherlands (0.94%), Japan (0.98%), France (0.67%), Germany (0.44%), Hong Kong (0.37%), Switzerland (0.31%) and then, the remaining countries of the world. The comparison of the actual holdings to the benchmark shares gives an indication of the degree to which Australian investors' underweight different

foreign countries. Column (3) presents the ratio of actual shares at the end of 2001 to the benchmark. Australian investors' holdings are less than those predicted by the ICAPM. There is a significant amount of variation in values across countries. The ratio of 0.42 for Netherlands indicates for instance that Australian investors' holding of stocks from Netherlands at end-2001 was 42 - percent of what portfolio theory would have predicted. The degree of underweighting is more severe against countries like Korea and Malaysia, where Australian investors hold 2 - percent of the shares as predicted by traditional ICAPM levels.

6.3.2 Country Bias in Australia's Equity Holdings

Figure 6.1 presents Australia's home bias measure for 22 foreign countries. The measure of Australian investors home bias against each country is constructed as one minus the ratio of actual to benchmark holdings.

Fig 6.1: Country Bias in Australia's Equity Holdings



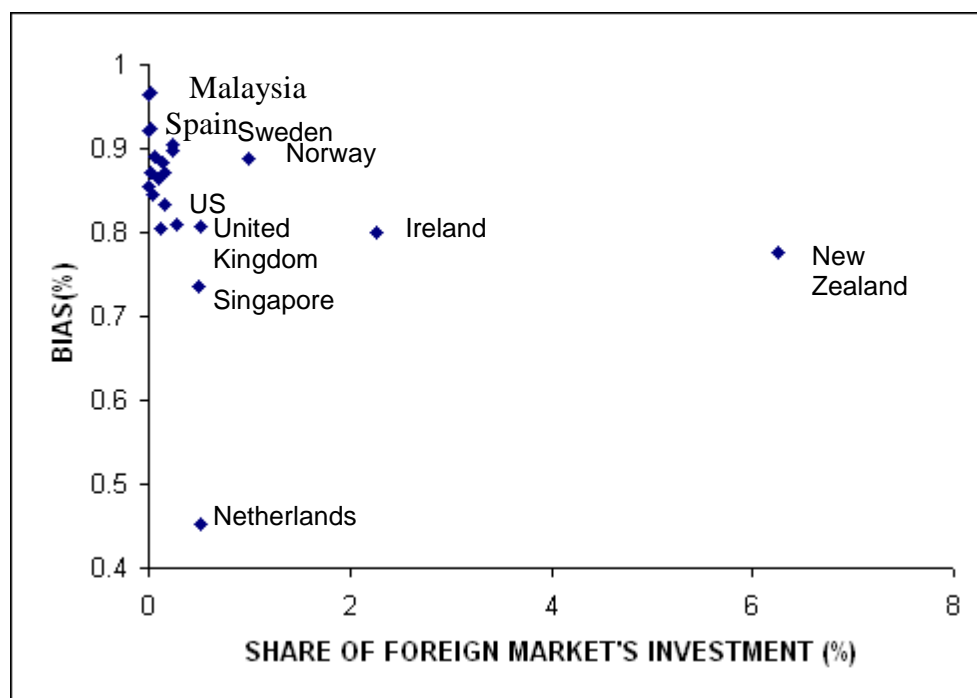
Source: Authors own calculations

The bias measure varies from 0.58 for Netherlands to 0.98 for Malaysia. Australia's actual share of portfolio equity holdings in Netherlands is 0.94 as compared to the predicted ICAPM share of 2.22; leading to a bias measure of 0.58. On the other hand, Australia's actual share of portfolio equity holdings in Malaysia is 0.01 as compared to the predicted ICAPM share of 0.47; leading to bias measure of 0.98. The bias measures clearly indicate that Australian investors prefer portfolio equity holdings in Netherlands vis-à-vis Malaysia.

6.3.3 Share of Foreign Market's Equity Investment in Australia versus Bias

Figure 6.2 illustrates foreign countries' share of portfolio investment in Australia as compared to each countries' market capitalisation versus Australia's equity investment home bias against those countries. New Zealand has a high share of portfolio equity investment in Australia, as compared its market capitalisation. On the other hand, Korea and Malaysia have a low share of portfolio equity investment in Australia as compared to their stock market capitalisations. The Australia's degree of home bias against New Zealand is lower as compared to those of Korea and Malaysia. A striking feature of the pattern in Figure 6.2 is a negative correlation between a country's propensity to invest in Australia and the degree of bias, implying that greater the degree of Australia's equity investment home bias against foreign countries, the lesser will foreign countries' share of portfolio investment in Australia.

Fig 6.2: Share of Foreign Market's Equity Investment in Australia versus Bias



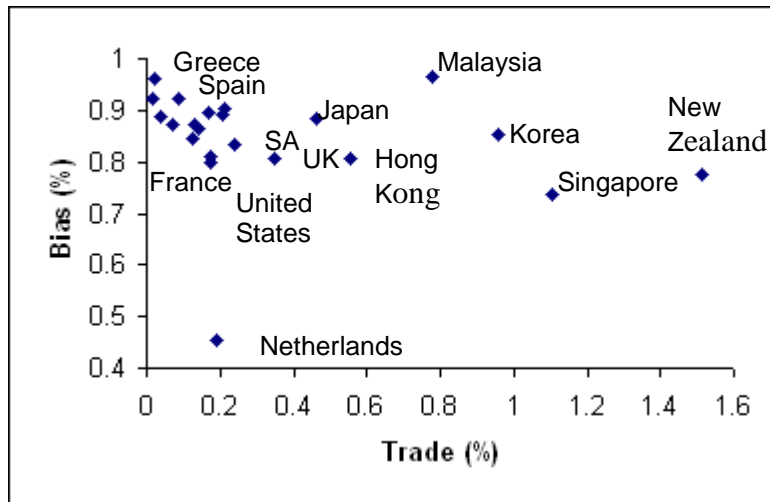
Source: Authors own calculations

6.3.4 Trade versus Australian investors' Home Bias

Australian investors are better informed about those foreign firms incorporated in countries with which Australia has trading relations. Australian investors may be more inclined to hold the stocks of foreign companies with whose products they are most familiar. To investigate this issue, research in this chapter includes a measure of the amount of country's trade with Australia as a share of that country's GDP, to control for the familiarity effects associated with trade. Figure 6.3 presents countries' trade share in Australia normalized by the countries' GDP, versus Australia's home bias against the countries' equity investment. The figure shows for example that New Zealand has a close geographical proximity and close affinity in terms of culture, language, legal origin, regulatory environment with Australia. Consequently, New Zealand has high trade share in Australia and consequently, Australian investors are

better informed about New Zealand's investment scenario through its trading relations. Australia has a low degree of equity home bias against New Zealand.

Fig 6.3: Relation between Trade and Australia's Bias

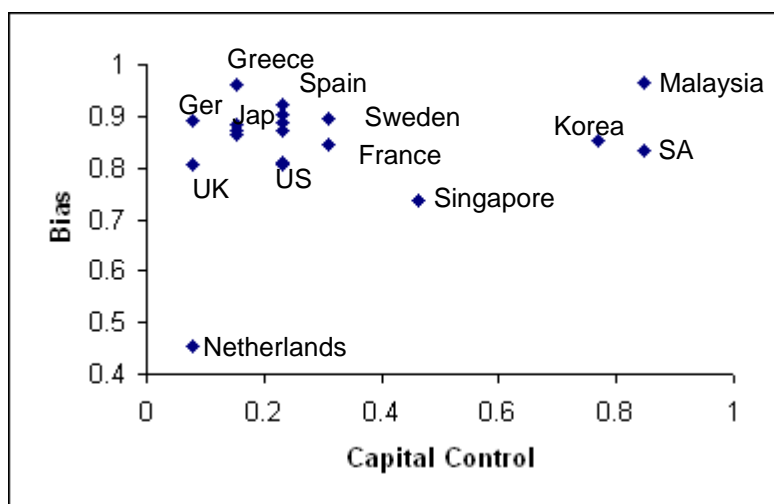


Source: Authors own calculations.

6.3.5 Capital Controls versus Australian investors' Home Bias

Capital controls have been greatly reduced in many countries, but they can still affect cross-border equity holdings. Figure 6.4 plots capital controls versus bias. Malaysia has high degree of capital controls as compared to United Kingdom and United States. Therefore, Australian investors may underweight Malaysia as compared to United Kingdom and United States in their portfolio equity. Australia has high degree of home bias against Malaysia as compared to United Kingdom and United States.

Fig 6.4: Relation between Capital Control and Australia's Bias

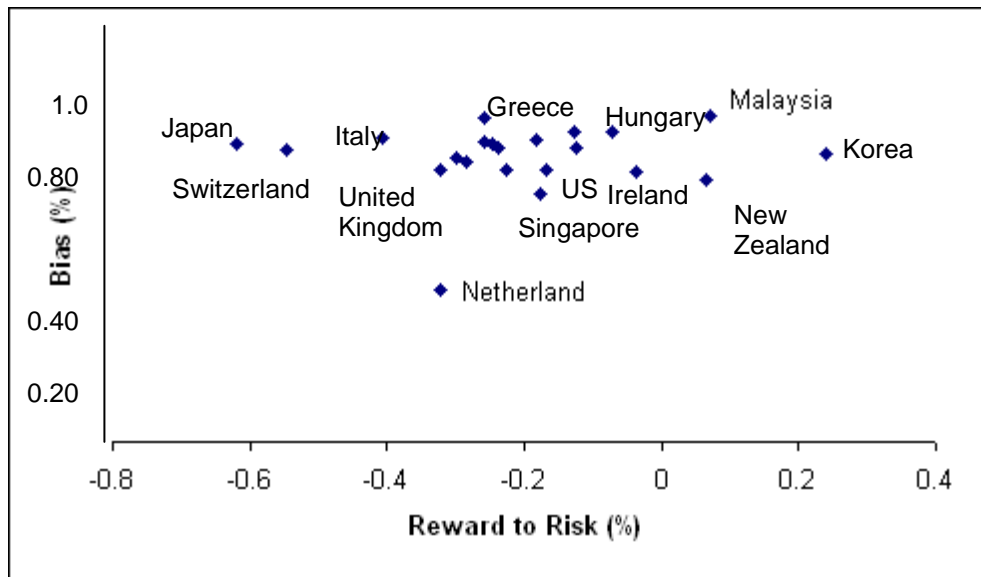


Note: Ger-Germany, Jap-Japan. **Source:** Authors own calculations

6.3.6 Risk to Reward ratio versus Australian investors' Home Bias

Australian investors might tend to underweight countries whose stock markets have performed poorly, if portfolio decisions are based partly on past returns. Research in this chapter constructs a reward to risk ratio, in order to capture the investors 'returns – chasing' behaviour. Figure 6.5 similarly plots the reward to risk ratio versus bias. The figure indicates a negative relationship between risk adjusted return and bias. Risk adjusted returns for New Zealand, Korea and Malaysia are positive. However, those for other countries in the sample including United States, United Kingdom and Japan are negative.

Fig 6.5: Relation between Reward to Risk Ratio and Australia's Bias

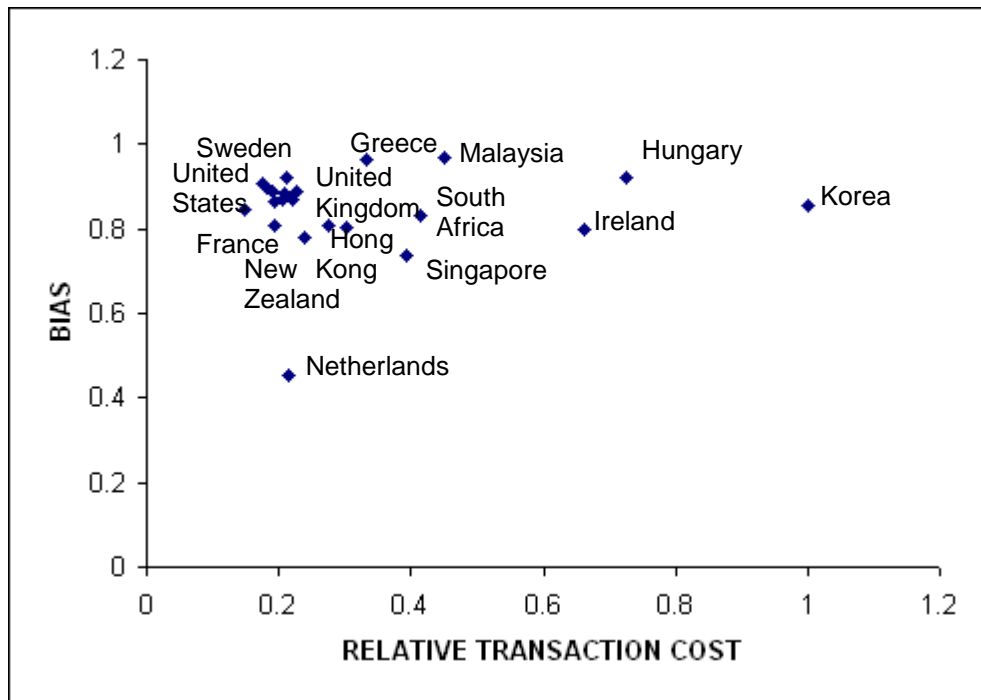


Note: Author's own calculations

6.3.7 Transaction Costs versus Australian investors' Home Bias

High transaction costs associated with trading foreign equities is a cause of home bias. Figure 6.6 plots relative transaction cost versus bias. Transaction costs are plotted relatively to Korea's transaction cost, which has been adjusted to 1. The relative transaction cost of US is very low as compared to Korea. Australian investors would underweight countries' with very high transaction costs in their portfolio equity holdings.

Fig 6.6: Relation between Relative Transaction Costs and Australia's Bias



Note: Author's own calculations

6.4 Modelling Home Bias

This chapter employs two models i.e. portfolio share and information cost models to investigate the home bias puzzle. Portfolio share model compares actual portfolio investment to that predicted by ICAPM; while the information cost model accounts for the costs associated with investing abroad.

6.4.1 Portfolio Share Model

This model compares the portfolio share of foreign equities as predicted by the ICAPM based on assumptions of perfectly integrated capital markets to the empirical share in a world with capital market frictions. The model then employs direct and indirect barriers to international investment at the country level, to explain the discrepancy between these two measures. The traditional version of the ICAPM is

built on the assumption that investment and consumption opportunity sets do not differ across countries. Investors are the same across countries with respect to risk aversion and information. The model also assumes perfect markets, such that there are no taxes, no tariffs, no information asymmetries, no restrictions on short sales and no barriers to international investment. Investors hold the world market portfolio of risky assets irrespective of their country of residence. Alternative models by Black (1974), Stulz (1981), Merton (1987) and Cooper and Kaplanis (1994) relax the assumptions of perfect markets and include frictions that are modelled as a deadweight cost or a tax on expected returns in the foreign country.

This chapter employs the following relationship between the observed portfolio shares, $W_{ij,t}^{act}$ and the market portfolio share, $W_{j,t}^{thoer}$

$$W_{ij,t}^{act} = \alpha_{0,t} + \alpha_{1,t}W_{j,t}^{thoer} + C'_{j,t}\beta_{1,t} + C'_{ij,t}\beta_{2,t} + Z_{ij,t}\gamma_t + \varepsilon_{ij,t} \quad (6.1)$$

where $W_{ij,t}^{act}$ is the actual portfolio share, calculated as foreign equity holdings of country i in country j , $eq_{ij,t}$, relative to country i 's total holdings of foreign as well

as domestic equities, $eq_{i,t}^{tot} = \sum_{i=1}^N eq_{ij,t}$

$$W_{ij,t}^{act} = \frac{eq_{ij,t}}{eq_{i,t}^{tot}} \quad (6.2)$$

$$eq_{i,t}^{tot} = MCAP_{i,t} - \sum_{j=1, j \neq i}^N eq_{ji,t} + \sum_{i=1, i \neq j}^N eq_{ij,t} \quad (6.3)$$

where

$MCAP_{i,t}$ is the market capitalisation of country i

$\sum_{j=1, j \neq i}^N eq_{ji,t}$ denotes all foreign assets of country i held in the rest of the world

$\sum_{i=1, i \neq j}^N eq_{ij,t}$ denotes the sum of all equity assets of the rest of the world held in country i

The optimal share of investment in the ICAPM with perfect markets, $W_{j,t}^{thoer}$ is given as

$$W_{j,t}^{thoer} = \frac{MCAP_{j,t}}{MCAP_{world,t}}, \quad \forall i \quad (6.4)$$

where

$MCAP_{j,t}$ denotes market capitalization of country j at time t

$MCAP_{world,t}$ denotes the world market capitalization at time t

The variable $C_{j,t}$ is an indicator vector for capital market frictions with respect to the country of destination j at time t . The variable $C_{j,t}$ includes: $restrict_{j,t}$ is an index of capital flow restrictions for the country of destination; $Credit_{j,t}$ is the logarithm of domestic credit provided by the banking sector as percentage of GDP for the country of destination; legal indices based on La Porta et al (1998) and Kaufmann et al (2003).

Similarly, the variable $C_{ij,t}$ is an indicator for capital market frictions with respect to the country pair i, j at time t . The variable Dis is the logarithm of distance between country i and country j ; $Pcost$ is the cost of phone call between country i and country j ; Lan is a language dummy variable and $Legal$ is a legal origin dummy variable.

The variable $Z_{ij,t}$ is a vector of control variables used to investigate whether diversification motives lead to higher foreign portfolio shares. The variable $Z_{ij,t}$

includes $r_{j,t}$, the mean monthly returns of the source country j , as calculated from Morgan Stanley Capital International (MSCI) stock indices; $rcorr_{ij,t}$, the correlation of the monthly return for country pair i, j ; $GDPgrow_j$, the GDP growth for the country of destination j , at time t .

6.4.2 Information Cost Model

This model is derived from Cooper and Kaplanis (1986). This model is based on the presumption that investors face both explicit and implicit costs investing abroad. The explicit costs are associated with transaction fees, taxes, commissions, and the costs of gathering information. The implicit costs include costs that arise from the extra risk of expropriation and information gathering costs incurred by foreign investors. These costs lower the expected net returns on foreign investment. It is difficult to compute an overall effective tax rate equivalent to the total cost.

Black's (1974) pricing relationship is

$$E(R_i) - \bar{R} - \bar{t}_i = b_i [E(R_m) - \bar{R} - t_m] \quad (6.5)$$

where

R_i is the return on security i

\bar{R} is a weighted average of the interest rates in two countries

\bar{t}_i is the weighted average of the tax rates applied to security i by the residents of two countries

R_m is the world market portfolio return

t_m is the weighted average of the tax rates on all securities

$$b_i = \text{cov}(R_i, R_m) / \text{var}(R_m)$$

According to Black, the estimator for t is the difference between the expected return of the minimum variance zero beta world portfolio of risky assets and a weighted average of the interest rates of the individual countries. Black assumes that all investors are faced with the same effective tax rates on foreign investment, regardless of their origin or the country of investment.

Cooper and Kaplanis (1986) derive efficient portfolios in a world where there are barriers to cross border investment, which depend both on the domicile of the investor and his country of investment. Their model is based on the following assumptions:

- (i) there are N countries indexed by n ;
- (ii) investors have homogenous expectations about gross real returns on risky securities;
- (iii) unlimited short sales are allowed with full proceeds;
- (iv) there is no domestic or international real risk free asset;
- (v) the deadweight costs of any investor are in the form of a tax which is proportional to his net investment in each foreign country;
- (vi) all investors consume the same bundle of goods and purchasing power parity holds for this bundle; and
- (vii) returns are normally distributed, so investors are mean-variance optimizers

The i investor's optimization problem is to maximize expected returns net of costs:

$$\text{Max}(x_i'R - x_i'c_i) \quad (6.6)$$

subject to

$$x_i'Vx_i = v$$

$$x_i' I = 1$$

where

x_i is a column vector

x_{in} is the n th element of x_i and is the proportion of individual i 's total wealth invested in risky securities of country n

R is a column vector of pre-tax expected returns

c_i is a column vector, the n th element of which is c_{in}

c_{in} is the deadweight cost to investor i of holding securities in country n

v is a constant

V is the variance/covariance matrix of the gross (pre-cost, pre-tax) returns of the risky securities

I is a unity column vector

The Lagrangean of above maximization problem is

$$L = (x_i' R - x_i' c_i) - \left(\frac{h}{2}\right) (x_i' V x_i - v) - k_i (x_i' I - 1) \quad (6.7)$$

where h and k_i are Lagrange multipliers. Equating the derivative of the objective function with respect to x_i equal to zero,

$$R - c_i - h V x_i - k_i I = 0 \quad (6.8)$$

Therefore the optimal portfolio for investor i is

$$x_i = \left(\frac{V^{-1}}{h}\right) (R - c_i - k_i I) \quad (6.9)$$

$$k_i = \frac{[I' V^{-1} R - I' V^{-1} c_i - h]}{I' V^{-1} I} \quad (6.10)$$

Investors hold the world market portfolio, the minimum variance zero beta portfolio and a fund with minimum variance for a specified level of deadweight cost. The world capital market equilibrium is the aggregation of the individual portfolio holdings. The clearing condition for the model is

$$\sum W_i x_i = M \quad (6.11)$$

where

W_i is the proportion of world wealth owned by country i

M is a column vector, the i th element of which is M_i

M_i is the proportion of world market capitalisation in country i 's market

Substituting equation (6.10) in equation (6.11),

$$R - \sum W_i c_i - \sum W_i k_i I = hVM \quad (6.12)$$

Subtracting equation (6.12) from equation (6.9),

$$hV(x_i - M) = (\sum W_i c_i - c_i) + I(\sum W_i k_i - k_i) \quad (6.13)$$

$$\sum W_i k_i - k_i = z'(c_i - \sum W_i c_i) \quad (6.14)$$

$$z = \frac{V^{-1}I}{(I'V^{-1}I)} \quad (6.15)$$

where

z is the global minimum variance portfolio.

Substituting (6.14) in (6.13) gives

$$hV(x_i - M) = (\sum W_i c_i - c_i) + z'(\sum W_i c_i - c_i)I \quad (6.16)$$

If dead weight costs are zero, then each investor holds the world market portfolio, since the right hand side of equation (6.16) equals zero.

Consider now the case when the covariance matrix V , is diagonal with all variances equal to s^2 and the deadweight cost of any country/investor pair is equal to c , except for domestic investment where it is equal to zero. The portfolio holdings of investor i in country n are

$$x_{in} = M_n - \left(\frac{W_n c}{hs^2} \right), \quad i \neq n$$

$$x_{in} = M_n - \left(\frac{W_n c}{hs^2} \right) + \left(\frac{c}{hs^2} \right), \quad i = n \quad (6.17)$$

Equation (6.17) indicates that the larger the marginal deadweight cost c , the greater the deviation of portfolio holdings from the world market portfolio. This deviation is negative for foreign investment and positive for domestic investment. Investors put a greater weight on domestic securities and less weight on foreign securities.

In the case of non-uniform deadweight costs, equation (6.16) can be expressed as,

$$p_i = q_i - z' q_i I$$

$$p_i = hV(x_i - M)$$

$$q_i = \sum M_j c_j - c_i \quad (6.18)$$

The n th equation of the system given by (6.18) can be expressed as,

$$p_{in} = -c_{in} + b_n + a_i - d, \quad i \neq n \quad (6.19)$$

$$p_{in} = b_n + a_i - d, \quad i = n \quad (6.20)$$

$$a_i = z' c_i$$

$$b_n = \sum M_j c_{jn}$$

$$d = z' \sum M_i c_i$$

where a_i is the weighted average marginal deadweight cost for investor i , b_n is the weighted marginal deadweight cost for investors investing in country n and d is the world weighted average marginal deadweight cost.

In case, where the covariance matrix is diagonal with all variances equal to s^2 , equations (6.19) and (6.20) can be expressed as,

$$hs^2(x_{in} - M_n) = -c_{in} + b_n + a_i - d, \quad i \neq n \quad (6.21)$$

$$hs^2(x_{in} - M_n) = b_n + a_i - d, \quad i = n \quad (6.22)$$

In the more general case with non-zero and non-uniform costs, if the actual cost to investor i of investing in country n (c_{in}) is high relative to investor i 's average cost to investing (a_i) or relative to all investors' costs to investing in country n (b_n), then the right hand side of (6.21) is likely negative and investor i will underweight country n in his portfolio. The higher are costs in a particular foreign market, the more severely underweighted that country will be in investor's portfolios. Since there are no barriers for investor i when investing domestically, the right hand side of equation (6.22) will be positive, and consequently the investor would be overweight relative to the market in domestic securities. The portfolio choice depends on the relative size of these costs to the weighted average marginal deadweight cost of the investor or of the country of investment. One implication is that investors are likely to underweight countries for which it is costly to gather and analyse firm-level information.

This chapter uses the following empirical specification,

$$BIAS_{ij,t} = \alpha + \beta X_j + \varepsilon \quad (6.23)$$

where $BIAS_{ij,t}$ is the degree of country i 's investors' home bias against country j

X_j is a vector of independent variables that includes: INV_j is country j 's investment share of its market capitalisation in country i , $TRADE$ represents trade between country i and j , $restrict_{j,t}$ represents index of capital control for the country j , $Riskrew_{j,t}$ represents historical risk adjusted returns for country j , legal indices based on La Porta et al (1998) and Kaufmann et al (2003) and $TRAN$ is the transaction cost that country i has to incur in order to invest in country j .

6.5 Data Description

One of the major problems in home bias research has been relatively poor quality of cross border holdings estimates. In the past, cross border holdings were estimated using accumulated capital flows and valuation adjustments (French and Poterba, 1991; Tesar and Werner, 1995; Cooper and Kaplanis, 1994). Warnock and Cleaver (2002) show that capital flows data are ill suited to estimate bilateral holdings. Capital flows data are designed for balance of payments purposes to track the flow of money between countries. The foreign country identified in flows is that of transactor or intermediary, not the issuer of the security. When the intermediary and issuer countries differ due to trades through financial centres, capital flow data will produce distorted holdings estimates. Research in this chapter employs the International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset on stock of bilateral equity holdings for the year 2001. Appendix presents detailed description of CPIS dataset.

The variables related to the empirical specification of Portfolio Share Model and Information Cost Model include market capitalisation, capital control, financial development, distance, language, legal origin, diversification, investment, trade and transaction cost. These variables are described in Appendix A6 and also tabulated below:

Determinants	Description
Market Capitalisation (Appendix A 6.1)	Market capitalization data, $MCAP_{j,t}$ and $MCAP_{world,t}$, is from the International Federation of Stock Exchanges (FIBV).
Capital Control (Appendix A 6.2)	The variable $Rstrict_{j,t}$ is based on the Miniane (2004) capital account measures. This index is expected to have negative impact on portfolio shares for the country of destination.
Financial Development (Appendix A 5.8)	The variable $Credit_{j,t}$ (ratio of M2 to GDP) is a proxy for financial development calculated from International Financial Statistics. This variable is expected to have positive impact on foreign equity holdings.
Distance (Appendix A 5.2)	The variable Dis represents the distance between capital city of country i and country j . ¹⁴ This variable is expected to have a negative impact of foreign equity holdings.
Language (Appendix A 5.3)	The variable Lan is the common language dummy variable which is equal to one if countries i and j share a common language; otherwise its value is zero. ¹⁵ This variable is expected to have a positive impact of foreign equity holdings.
Legal Origin (Appendix A 5.4)	The variable $Legal$ is a common legal origin dummy variable which is equal to one if countries i and j have the same legal origin; otherwise its value is zero. This variable is expected to have a positive impact of foreign equity holdings.
Diversification (Appendix A 6.4)	The variable $r_{j,t}$ is the average monthly equity return in country j . This variable is expected to have a positive sign. The variable $cor_{ij,t}$ represents the correlation between the monthly equity returns for the country i and j . The correlation variable should enter with a negative sign. The monthly equity return is computed from the MSCI stock indices. $GDPgrow_{j,t}$ is the GDP growth rate taken from World Development Indicators (2002) and it controls for profitable investment opportunities in growing economies. This variable is expected to have a positive impact on portfolio equity holdings.

¹⁴ <http://www.indo.com/distance/>

¹⁵ <http://www.cia.gov/cia/publications/factbook/>

	The variable $Riskreward_{j,t}$ is the ratio of mean monthly return to standard deviation. This variable is expected to have negative impact on $BIAS_{ij,t}$.
Investment (Appendix A 6.3)	The variable INV_j is the share of the country j 's market capitalisation that is invested in country i . This variable is expected to have negative impact on $BIAS_{ij,t}$. This variable is computed using data on bilateral equity holdings from the CPIS.
Trade (Appendix A 5.7)	The variable $Trade$ is the average of imports and exports normalised by the destination country's GDP. This variable is expected to have negative impact on $BIAS_{ij,t}$.
Transaction Cost (Appendix A 6.5)	The variable $Tran$ is a measure of transaction costs, derived from Elkins-McSherry Co. this variable is expected to have positive impact on $BIAS_{ij,t}$.
Legal Variables ¹⁶ (Appendix A 5.10)	These legal indicators are expected to have negative impact on $BIAS_{ij,t}$.

Note: Appendices A 5 and A6 briefly describe these measures.

6.6 Empirical Results

This chapter employs two models – Portfolio Share Model and Information Cost Model to investigate home bias puzzle. Tables 6.3 to 6.8 provide regression results for the Portfolio Share Model that compares actual portfolio investment to that predicted by ICAPM, as per equation (6.1). Tables 6.9 to 6.17 provide regression results for the Information Cost Model which accounts for the implicit and explicit costs in investing abroad, as per equation (6.23). In the international context, the source countries are Australia, France, Germany, Italy, Japan, Netherlands, New Zealand, Spain, Sweden, Switzerland, United Kingdom, and United States. The host countries are Australia, Austria, Brazil, Chile, China, Hong Kong, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, and United States.

¹⁶ La Porta et al (1998) indices and Kaufmann et al (2003) indicators

6.6.1 Result - Portfolio Share Home Bias Model

Column (1) of Table 6.3 incorporates both the direct barriers viz. capital controls and the indirect barriers viz. distance, legal origin, financial market development and GDP growth rate. The capital control variable for the destination country is negative but insignificant. The negative sign of the capital control implies that destination countries capital controls would, if significant, lead to a lower share of source countries foreign equity investment in the host countries. The low significance level may be due to the imprecise quality of capital control data and the problem of measuring the effectiveness of capital control. The distance variable is highly significant and has a large negative coefficient. A 1 - percent increase in the log of distance between two countries leads on average to a decrease in share of portfolio equity holdings of about 0.53 - percent. The legal origin variable is positive but insignificant. This implies that source countries would prefer holding foreign equities in the destination countries that are in close proximity and of similar legal origin. Geographical proximity and similarity in legal origin facilitate the knowledge of accounting practices, corporate culture, political events, and the structure of asset markets and their institutions. Cultural exchange and cultural affinities are a component of the network effects that influence international economic interactions. The degree of financial market development in the destination countries is positive but insignificant. The more developed the financial sector of the destination countries, the more informative are prices and investment opportunities. Accordingly, source countries investors are more inclined to hold equity shares in those destination countries. The GDP growth rate variable is positive and significant. A 1 - percent increase in the log of GDP growth rate leads to an increase in the share of foreign equity holdings of about 0.06 - percent. The coefficient of $W_{j,t}^{thoer}$ is positive and

highly significant. The low value of the $W_{j,t}^{thoer}$ coefficient implies that the implications of traditional ICAPM are hardly existent.

Table 6.3: Main Regression Results 2001

	(1)	(2)	(3)	(4)	(5)
$W_{j,t}^{thoer}$	0.185*** (4.984)	0.184*** (4.974)	0.185*** (4.968)	0.185*** (5.010)	0.185*** (4.994)
Dis	-0.535** (-2.000)	-0.587** (-2.270)	-0.536** (-1.981)	-0.432* (-1.877)	-0.430* (-1.852)
$Credit_{j,t}$	0.508 (1.530)	0.328 (0.823)	0.508 (1.511)	0.649* (1.776)	0.652* (1.764)
$Rstrict_{j,t}$	-0.570 (-1.606)	-0.364 (-1.276)	-0.565 (-1.331)	0.081 (0.112)	0.035 (0.048)
$GDPgrow_{j,t}$	0.063* (1.972)	0.065* (2.130)	0.062* (1.917)	0.054 (1.608)	0.056* (1.677)
$Legal$	0.531 (1.338)		0.531 (1.332)	0.384 (0.851)	0.384 (0.849)
Lan		0.827 (1.401)			
$R_{j,t}$			-0.008 (-0.033)		0.079 (0.296)
$Cor_{ij,t}$				2.240 (1.409)	2.248 (1.408)
Constant	1.381 (1.618)	1.809** (2.037)	1.385 (1.513)	-0.553 (-0.405)	-0.598 (-0.427)
Adj. R ²	0.63	0.63	0.63	0.64	0.63
Observation	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Column (2) introduces language variable instead of legal origin variable, keeping all other column (1) variables. The language variable is positive but insignificant. All other variables have similar signs to those in column (1). Column (3) incorporates the mean of monthly returns for the year 2001, to take into account the return chasing behaviour of foreign investors in destination countries. This variable is insignificant and negative implying weak diversification motives of the foreign investors. All other variables have similar sign and significance as those in column (1).

Column (4) incorporates the correlation between the monthly equity returns for the country i and j , during the year 2001. This variable is positive and insignificant. The positive sign implies that investors hold more financial assets from countries whose returns are positively correlated with their domestic stock returns. This is at odds with the finance literature predictions, but is consistent with the results of Aviat and Coeurdacier (2004). They state that “More surprisingly, even when we control for distance and informational variables, we find that a country will hold more financial assets from a country whose stock market is highly correlated with his own one. This effect is quite large, very significant and absolutely at odds with the finance literature predictions. We refer to this result as the Correlations Puzzle”. Column (5) incorporates both, the mean of monthly returns and the correlation between the monthly equity returns for the country i and j . The mean monthly return variable and the correlation variable are both, positive and insignificant. The results indicate a weak diversification motive for the foreign investors.

Table 6.4 takes into account the variable (phone cost) that might more directly represent information flows instead of distance. Phone cost is a function of information cost and is positively correlated with distance i.e. the cost of travelling is higher, cultural differences are likely to be stronger and business links weaker for longer distances. The model uses the dimension of phone cost instead of distance to capture the information cost. The greater the distance between the countries, the higher will be the phone call costs in terms of communicating between the countries.

Table 6.4: Basic Robustness Results

	(1)	(2)	(3)	(4)	(5)
$W_{j,t}^{theor}$	0.179*** (4.860)	0.180*** (4.876)	0.181*** (4.896)	0.180*** (4.862)	0.181*** (4.883)
P_{cost}	-0.876 (-1.522)	-0.743 (-1.232)	-0.377 (-0.661)	-0.743 (-1.229)	-0.376 (-0.659)
$Credit_{j,t}$	0.085*** (0.227)	0.269 (0.894)	0.469 (1.383)	0.272 (0.889)	0.477 (1.383)
$Rstrict_{j,t}$	-0.692** (-2.209)	-0.864** (-2.441)	-0.166 (-0.245)	-0.90** (-2.163)	-0.246 (-0.350)
$GDPgrow_{j,t}$	0.055 (1.487)	0.054 (1.463)	0.047 (1.237)	0.056 (1.557)	0.051 (1.405)
Lan	0.724 (1.218)				
$Legal$		0.457 (1.127)	0.325 (0.713)	0.458 (1.125)	0.326 (0.712)
$R_{j,t}$				0.068 (0.254)	0.147 (0.530)
$Cor_{ij,t}$			2.400 (1.440)		2.412 (1.439)
Constant	0.014 (0.021)	-0.206 (-0.340)	-1.865 (-1.314)	-0.234 (-0.371)	-1.934 (-1.342)
Adj R ²	0.63	0.63	0.63	0.62	0.63
Observation	444	444	444	444	444

Note: *, ** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

In column (1) of Table 6.4, the phone cost variable is consistently negative but insignificant. The financial market development variable is positive and significant, implying better investment opportunities and thereof greater investments from foreign investors. The capital control variable is negative and significant, implying that destination countries capital controls on incoming capital leads to a lower share of foreign equity into that country. The GDP growth variable is positive and insignificant, implying that investors prefer investing in countries that have higher GDP growth rate. The coefficient of $W_{j,t}^{theor}$ is positive, highly significant but has low value, indicating that the implications of traditional ICAPM are hardly existent. The language variable is positive but insignificant. The positive sign, if significant, would

imply that foreigners prefer investing in economies with which they are conversant in terms of language. In column (2), the legal variable is introduced in place of the language variable. The legal variable appears to be positive but insignificant. The positive sign implies that foreigners prefer investing in economies with similar legal institutional setup. All other variables have similar sign and significance as those in column (1). Column (3) introduces the correlation of stock returns variable, which appears to be positive and but insignificant. This implies that investors hold more financial assets from countries whose returns are positively correlated with their domestic stock returns, which is at odds with the finance literature. All other variables have similar sign and significance as those in column (1). Column (4) introduces the return variable in place of the correlation variable. This variable appears to be positive but insignificant; implying that foreign investors may prefer investing their equities in countries with positive returns on their investment. All other variables have similar sign and significance as those in column (1). Finally, column (5) of Table 6.4 indicates the foreign investors diversification motives by adding both, the return variable and correlation of stock returns variable. The diversification variables viz. return variable and correlation of stock returns variable are positive but insignificant. This implies weak diversification motives for foreign investors. All other variables have similar sign and significance as those in column (1). Overall, the robustness result in Table 6.4 indicates that the proxy (phone cost variable) used for distance variable in Table 6.3 is stable in terms of the size of coefficient but it loses significance. Distance variable may be capturing information asymmetries represented by phone cost and other information linkages associated with trade and cultural networks.

The reported CPIS bilateral equity investments for several countries are zero. These corner solution outcomes may be due to an investor's optimization in a world with investment barriers that results in an optimal outcome of zero foreign equity holdings. The dependent variable $W_{ij,t}^{act}$, is positive and continuous for all other observations. Therefore, a corner solution model is estimated, using Tobit model censored at zero, where the partial effects of $W_{j,t}^{thoer}$, $C_{j,t}$ and $C_{ij,t}$ on $E(W_{ij,t}^{act}, W_{j,t}^{thoer}, C_{j,t}, C_{ij,t})$ are taken into account. Tables 6.5 and 6.6 illustrate the Tobit results for the year 2001. Table 6.5 presents the main regression results taking into account the distance variable, while Table 6.6 checks the robustness by taking into account the phone cost variable instead of the distance variable. The Table 6.5 Tobit results matches the ordinary least squares results of Table 6.3 and the Tobit results of Table 6.6 matches the ordinary least squares results of Table 6.4. This implies that results are stable towards the choice of estimation methods.

Table 6.5: Main Tobit Results

	(1)	(2)	(3)
$W_{j,t}^{theor}$	0.185*** (5.147)	0.185*** (5.103)	0.185*** (5.147)
Dis	-0.432* (-1.928)	-0.536** (-2.035)	-0.430* (-1.909)
$Credit_{j,t}$	0.649* (1.825)	0.508 (1.552)	0.652* (1.819)
$Rstrict_{j,t}$	0.081 (0.115)	-0.565 (-1.368)	0.035 (0.049)
$GDPgrow_{j,t}$	0.054* (1.652)	0.062** (1.969)	0.056* (1.729)
$Legal$	0.384 (0.875)	0.531 (1.368)	0.384 (0.875)
$R_{j,t}$		-0.008 (-0.034)	0.079 (0.305)
$Cor_{ij,t}$	2.240 (1.448)		2.248 (1.451)
Log likelihood	-308.997	-310.435	-308.993
Observation	444	444	444

Table 6.6: Robustness Tobit Results

	(1)	(2)	(3)	(4)
$W_{j,t}^{theor}$	0.177*** (4.997)	0.177*** (5.004)	0.179*** (4.983)	0.180*** (4.988)
$Pcost$	-0.210 (-0.385)	-0.384 (-0.647)	-0.860 (-1.619)	-0.700 (-1.275)
$Credit_{j,t}$	-0.197 (-0.623)	-0.263 (-0.878)	0.054 (0.303)	0.173 (1.168)
$Rstrict_{j,t}$	-0.687* (-1.827)	-0.496 (-1.493)	-0.854** (-2.219)	-0.940** (-2.345)
$GDPgrow_{j,t}$	0.027 (0.863)	0.032 (0.932)	0.061* (1.816)	0.052 (1.622)
Lan		0.655 (1.121)	0.748 (1.288)	
$Legal$	0.410 (1.009)			0.465 (1.191)
$R_{j,t}$			0.255 (0.828)	0.041 (0.169)
$Cor_{ij,t}$	1.722 (1.447)	1.660 (1.381)		
Log likelihood	-310.116	-309.604	-310.597	-311.227
Observation	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. Z statistics is reported in parenthesis.

6.6.2 Impact of legal indicators on Portfolio Share Home Bias Model

Table 6.7 illustrates the impact of La Porta et al (1998) variables on the actual and benchmark portfolio equity holdings. The La Porta et al (1998) indicators viz. efficiency of legal system, rule of law and rating of accounting standards have significant and positive impact on the foreign portfolio equity holdings. In column (1), a 100 - percent increase in the destination countries efficiency of judicial system leads to an increase of the source countries share of foreign equity investment by about 6.4 - percent. In column (2), a 100 - percent increase in the destination countries law and order leads to an increase of source countries' share of foreign equity investment by about 9.2 - percent. In column (3), a 100 - percent increase in the destination countries accounting standards leads to an increase of the source countries share of foreign equity investment by about 1.3 - percent. In column (4), the variable *Average* is the average of the La Porta et al (1998) variables viz. efficiency of judicial system, rule of law and accounting standards. *Average* appears to be positive but insignificant. Overall, the results imply that investors prefer to hold their portfolio equities in countries that have an efficient judicial system, high tradition of law and order and high accounting standards. $W_{j,t}^{thoer}$ is throughout positive and significant. The low value of the $W_{j,t}^{thoer}$ coefficient implies low degree of the implications of traditional ICAPM.

Table 6.7: Regression results using La Porta et. al (1998) indicators

	(1)	(2)	(3)	(4)
W_{jtheor}	0.183 (5.133)***	0.182 (5.076)***	0.185 (5.201)***	0.185 (5.182)***
EFF	0.064 (2.979)***			
ROL		0.092 (4.485)***		
ACC			0.013 (2.179)**	
$Average$				0.017 (1.448)
Constant	-0.229 (-1.623)	-0.431 (-3.646)*	-0.626 (-1.559)	-0.074 (-0.300)
Adj R ²	0.607	0.609	0.608	0.606
Observation	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.8 illustrates the impact of Kaufmann et al (2003) indicators on actual and benchmark portfolio equity holdings. The indicators are positive and significant. The Regulatory Quality variable (RQ) is the most important of the Kaufmann et al (2003) indicators, judging from the size of the coefficient. A 1 - percent increase in RQ variable would lead to increase portfolio equity stocks by 0.41 - percent. Regulatory Quality consists of indicators related to the regulations of exports, imports, foreign investment, price controls, tariffs etc. Therefore more open the economies; the more likely are they recipient of foreigners' portfolio equity investment. Regulatory quality is followed by voice and accountability, government effectiveness, rule of law, control of corruption and political stability (in decreasing order of significance). The exercise just described illustrates the individual effects of various institutional variables. However, if various institutional dimensions determine simultaneously the location of portfolio equity investment, then by including them individually might

lead to an omitted variable bias. Therefore, regressions are also run by clustering these institutional variables into Political Stability and Freedom or Government Efficiency.

Table 6.8: Regression results using Kaufmann et. al (2003) indicators

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
W_{jtheor}	0.184*** (5.210)	0.188*** (5.365)	0.183*** (5.176)	0.184*** (5.219)	0.183*** (5.167)	0.184*** (5.201)	0.184*** (5.187)
$VACC$	0.362*** (5.387)						
PS		0.168*** (3.875)					
GE			0.346*** (5.577)				
RQ				0.413*** (5.474)			
RL					0.285*** (4.940)		
CC						0.230*** (5.354)	
PSF							-0.024 (-0.249)
$GEFF$							0.334*** (3.463)
Constant	-0.099* (-1.759)	0.140** (2.479)	-0.176** (-3.178)	-0.238*** (-3.115)	-0.067 (-1.441)	-0.015 (-0.332)	-0.120** (-2.415)
Adj R ²	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Observation	444	444	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Therefore, regressions are also run by clustering these institutional variables into Political Stability and Freedom or Government Efficiency. Column (7) of Table 6.8 indicates that the Political Stability and Freedom variable is negative and insignificant, while the, Government Efficiency variable is positive and significant. A 1 - percent improvement in Government Efficiency would increase foreigners' portfolio equity investment by 0.33 - percent. Political Stability and Freedom is

negative and insignificant. Though this variable has no direct effect on portfolio equity investment; it may however have an important indirect effect. Overall the results indicate that the quality of destination countries' institutions have positive effects on source countries' portfolio equity investments.

6.6.3 Result - Information Cost Home Bias Model

Table 6.9 presents regression results for international home bias for 12 source countries against 37 destination countries. The dependent variable is $BIAS_{ij,t}$, the degree of country i 's investors' home bias against country j . In column (1), the independent variable $INV_{j,t}$ is negative and significant. This is in line with theory and implies that as the countries holdings of foreign equity increases, the degree of home bias against the foreign countries decreases. Column (2) includes both, the capital control and $INV_{j,t}$ variables. The capital control variable is positive and highly significant, implying that the greater countries controls on the foreign equity investment, the greater the degree of home bias against the foreign countries. The $INV_{j,t}$ variable is still negative but it loses significance. The adjusted R^2 value increases from 0.01 to 0.07. In column (3), the *Trade* variable is introduced. *Trade* is negative and significant, implying that greater the destination countries trade in goods and services with the source countries, the lesser will the degree of home bias in portfolio equity investment. Countries that trade with each other tend to learn more about the destination countries culture, legal and financial environment, and current accounting practices etc. This facilitates portfolio equity investment in the destination countries. Again, the control variable is positive and significant, and the $INV_{j,t}$

Table 6.9: International Home Bias Regression Results I

	(1)	(2)	(3)	(4)	(5)	(6)
$INV_{j,t}$	-0.019*** (-2.634)	-0.006 (-1.110)	-0.001 (-0.231)	-0.003 (-0.548)	-0.01** (-2.45)	-0.02 (-1.59)
$Rstrict_{j,t}$		0.426*** (6.804)	0.461*** (6.694)	0.519*** (4.839)		
$Trade$			-0.012** (-2.148)	-0.012** (-2.170)		
$Riskreward_{j,t}$				-0.169 (-1.068)		
$Tran$					-0.00 (-0.94)	-0.00 (-0.74)
TC						0.03 (1.04)
Constant	0.677*** (17.595)	0.534*** (11.857)	0.557*** (13.033)	0.633*** (8.592)	0.84*** (5.14)	0.79*** (4.92)
Adj R ²	0.01	0.07	0.08	0.09	0.02	0.01
Observation	444	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

variable is negative and insignificant. In column (4), the $Riskreward_{j,t}$ variable is introduced. $Riskreward_{j,t}$ is negative and significant. This implies that investors prefer to invest in foreign markets that give positive returns on their portfolio equity investments. The greater the portfolio equity investment in foreign markets, the lesser will be the $BIAS_{ij,t}$. Again, the $INV_{j,t}$ variable is negative, capital control variable is positive and significant, and the $Trade$ variable is negative and significant. In column (5), there are two dependent variables; INV_j and $Tran$. INV_j is negative and significant implying that greater the host countries investment in source countries, the lesser will be source countries equity home bias against these host countries. $Tran$ is negative and insignificant. This is at odds with finance theory which suggests that greater the transaction costs associated with portfolio equity investment, the lesser will be foreign portfolio equity investment, leading to greater degree of home bias.

Column (5) adds variable TC , the interaction term of $(1-Tran)$ and INV_j . INV_j is negative, however, it is insignificant. $Tran$ is negative and insignificant which is at odds with finance literature. TC is positive, however it is insignificant. This implies that host countries having high transaction costs are less underweight in source countries portfolios. Overall, results in column (5) do not support significant effect of transaction costs on source countries equity investment home bias against host countries.

Table 6.10 presents the regression results by including the independent variables viz. $INV_{j,t}$, $Rstrict_{j,t}$, $Trade$, $W_{j,t}^{thoer}$, $Riskreward_{j,t}$ and $Tran$. In column (1), the INV_j variable is negative but insignificant. The greater the destination countries' equity investment in the source countries, the lesser will be the source countries' home bias against the destination countries. The capital control variable is positive and significant implying that greater the destination countries' restrictions on the source countries foreign equity investments, the greater will be the source countries' degree of home bias against the destination countries. $Trade$ is negative and significant; implying that investors prefer investing in countries with which they are familiar through trade in goods and services. However, the $Trade$ coefficient is small implying a low impact on $BIAS_{ij,t}$. $W_{j,t}^{thoer}$ is positive and significant but the value of coefficient is small. A greater value of $W_{j,t}^{thoer}$ corresponds to a lower weight in the source country relative to world portfolios and thus, a higher degree of home bias.

In column (2) the $Riskreward_{j,t}$ variable is included, which is negative and insignificant. The negative sign implies that source country investors underweight the

destination countries that have higher return to risk ratios. In column (3), the transaction cost variable, $Tran$ is positive and insignificant. The positive sign implies that source country investors are biased against high transaction costs countries. Consequently, the source country investors would underweight the high transaction cost destination countries, in their equity portfolios leading to greater bias. The variables $INV_{j,t}$, $Rstrict_{j,t}$, $Trade$ and $W_{j,t}^{thoer}$ have the same sign and significance as in column (2). In column (4), the $Riskreward_{j,t}$ variable is added. $Riskreward_{j,t}$ is negative and insignificant, implying low degree of diversification motives of foreign investors. The variables $INV_{j,t}$, $Rstrict_{j,t}$, $Trade$, $W_{j,t}^{thoer}$ and $Tran$ have the same sign and significance as in column (3). Column (5) indicates that upon excluding the independent variables $W_{j,t}^{thoer}$ and $Tran$; $Riskreward_{j,t}$ gains significance. $INV_{j,t}$, $Rstrict_{j,t}$ and $Trade$ have the same sign and significance as in column (4).

Table 6.10: International Home Bias Regression Results II

	(1)	(2)	(3)	(4)	(5)
$INV_{j,t}$	-0.000 (-0.035)	-0.001 (-0.332)	0.000 (0.047)	-0.001 (-0.245)	-0.002 (-0.430)
$Rstrict_{j,t}$	0.490*** (6.776)	0.535*** (4.991)	0.457*** (5.220)	0.486*** (4.579)	0.600*** (5.770)
$Trade$	-0.011** (-2.039)	-0.011** (-2.058)	-0.011** (-2.057)	-0.011** (-2.082)	-0.012** (-2.088)
$W_{j,t}^{thoer}$	0.003*** (3.158)	0.003*** (2.687)	0.003*** (3.170)	0.003*** (2.726)	
$Riskreward_{j,t}$		-0.144 (-0.896)		-0.167 (-1.012)	-0.349* (-1.869)
$Tran$			0.089 (0.767)	0.153 (1.272)	
Constant	0.526*** (10.614)	0.534*** (11.857)	0.511*** (9.116)	0.580*** (7.021)	0.433*** (4.528)
Adj R ²	0.09	0.09	0.08	0.09	0.09
Observation	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.11: Change in International Home Bias from 2001 to 2003

	(1)
<i>Bias</i> 2001	0.39*** (4.82)
<i>INV</i> 2001	-0.00 (-0.38)
W^{theor} 2001	0.00* (1.85)
ΔINV 2001	-0.02 (-1.51)
ΔW^{theor} 2001	0.07* (1.84)
Constant	-0.34*** (-4.80)
Adj R ²	0.48
Observation	444

Note: *, ** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.11 explains changes in home bias from 2001 to 2003. The change in $BIAS_{ij,t}$ is regressed on the initial level of $BIAS_{ij,t}$, and the initial levels of and changes in INV_j and W^{theor} . $BIAS_{ij,t}$ is positive and significant, implying that change in home bias from 2001 to 2003 increases as the source countries' home bias against destination countries equity investments increases in 2001. INV_j is negative, however it is insignificant. This implies that countries that were underweighted by source countries equity investors in 2001 tended to see increases in the equity investments in 2003. The variable W^{theor} is positive and significant, implying that change in home bias from 2001 to 2003 increases as the size of destination countries market capitalization increases in the world market capitalisation for the year 2001. Again, change in W^{theor} from 2001 to 2003 is positive and significant. This implies that change in home bias from 2001 to 2003 increases as the change in size of destination countries market capitalization increases in the world market capitalisation from the

year 2001 to 2003. Change in INV_j is negative and insignificant. Overall, results in Table 6.11 indicate that initial level of $BIAS_{ij,t}$, initial level and changes in W^{theor} have significant impact on changes in home bias of international equity investors from 2001 to 2003.

Table 6.12 presents regression results for which Australia is considered the source country and the other 37, destination countries. In column (1), the variable $INV_{j,t}$ is negative and significant implying that the greater the destination countries equity investment in Australia, the lesser will be Australia's home bias against the destination countries. In column (2), capital control variable, $Rstrict_{j,t}$ is added. $Rstrict_{j,t}$ is positive but insignificant implying that the greater the destination countries restrictions on their cross-border equity investments in Australia, the greater will be Australia's degree of home bias against the destination countries. The variable $INV_{j,t}$ is negative but it loses significance. In column (3) the *Trade* variable is added, which appears to be negative but insignificant implying that destination countries investors would prefer investing in Australia, if these investors are better able to attain accounting and regulatory information on Australia markets through trade. The variables $INV_{j,t}$ and $Rstrict_{j,t}$ variables have the same sign and significance level as in column (2). The results in column (3), indicate that $INV_{j,t}$, $Riskreward_{j,t}$ and *Trade* variables, taken together do not have significant effect on the Australia's home bias. In column (4), there are two dependent variables viz. INV_j and *Tran*. INV_j is negative and significant implying that greater the host countries investment in Australia, the lesser will be Australia's equity home bias against these

countries. $Tran$ is positive, however it is insignificant. This implies that greater the host countries transaction costs, the greater would be Australian investors' equity home bias against these countries. Column (5) adds the variable TC , the interaction term of $(1-Tran)$ and INV_j . INV_j is negative and significant implying that greater the host countries investment in Australia, the lesser will be Australia's home bias against these countries. $Tran$ is positive and significant implying that greater the host countries transaction costs, the greater would be the Australian investors' equity home bias against these host countries. TC is positive and significant, implying that countries having high transaction costs are less underweight in Australian portfolios. Overall, results in column (5) indicate that investing in Australian stock market reduces home bias through reduced transaction costs.

Table 6.12: Australia's Home Bias Regression Results

	(1)	(2)	(3)	(4)	(5)
$INV_{j,t}$	-0.018** (-2.775)	-0.169 (-1.068)	-0.154 (-0.974)	-0.01* (-1.85)	-0.07*** (-4.04)
$Rstrict_{j,t}$		0.047 (0.599)	0.103 (0.941)		
$Trade$			-0.015 (-1.218)		
$Tran$				0.00 (1.36)	0.00* (1.74)
TC					0.10*** (2.99)
Constant	0.85*** (36.72)	0.86*** (23.80)	0.86*** (22.45)	0.77*** (11.00)	0.75*** (9.71)
Adj R ²	0.01	0.08	0.05	0.03	0.02
Observation	37	37	37	37	37

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.13 explains changes in home bias from 2001 to 2003. The change in $BIAS_{ij,t}$ is regressed on the initial level of $BIAS_{ij,t}$, and the initial levels of and changes in INV_j and W^{theor} . The variable $BIAS_{ij,t}$ is negative, however it is insignificant. INV_j is negative and significant. This implies that countries that were underweighted by Australian equity investors in 2001 tended to see increases in the equity investments in 2003. For instance, countries' (Brazil, Hong Kong, France, Germany, Greece, Ireland, Japan, Netherlands, New Zealand, Norway, Singapore, Sweden, Switzerland, Thailand, United Kingdom and United States) share of portfolio equity investments in Australia as compared to their respective domestic stock market capitalisation increased from 2001 to 2003. W^{theor} is positive; however it is insignificant. Changes in INV_j and W^{theor} have no significant effect on the changes in home bias from 2001 to 2003.

Table 6.13: Change in Australia's Home Bias from 2001 to 2003

	(1)
<i>Bias</i> 2001	-0.24 (-0.80)
<i>INV</i> 2001	-0.06** (-2.73)
W^{theor} 2001	0.00 (0.13)
Δ <i>INV</i> 2001	0.00 (0.20)
ΔW^{theor} 2001	0.01 (0.51)
Constant	0.26 (0.93)
Adj R ²	0.39
Observation	37

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

6.6.4 Impact of legal indicators on Information Cost Home Bias Model

Table 6.14: International Home Bias using La Porta et. al (1998) indicators

	(1)	(2)	(3)	(4)	(5)	(6)
$INV_{j,t}$		-0.017** (-2.479)		-0.017** (-2.504)		-0.009 (-1.615)
ROL	-0.057*** (-4.389)	-0.051*** (-3.662)				
EFF			-0.046*** (-4.389)	-0.040*** (-3.675)		
ACC					-0.008*** (-2.705)	-0.007** (-2.477)
Constant	1.099*** (9.818)	1.085*** (9.482)	1.027*** (13.263)	1.016*** (12.522)	1.242*** (6.576)	1.228*** (6.414)
Adj R ²	0.01	0.02	0.01	0.02	0.01	0.02
Observation	444	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.14 illustrates the impact of La Porta et al (1998) variables on $BIAS_{ij,t}$ in the international context. The variable $INV_{j,t}$ is negative and significant, throughout. This implies that the greater the destination countries' equity investment in source countries, the lesser will be source countries' home bias against these destination countries. The legal indicators viz. rule of law, efficiency of judicial system and rating of accounting standards are all significant and negative. Column (1) indicates that a 100 - percent increase in destination countries law and order results in the decrease in source countries home bias by 5.7 - percent. Column (3) indicates that a 100 - percent increase in destination countries efficiency of judicial system leads to a decrease in source countries home bias by 4.6 - percent. Finally, column (5) indicates that a 100 percent increase in destination countries accounting standards leads to a decrease in source countries home bias by 0.8 - percent. These results imply that the source countries have low degree of home bias against the destination countries that have an

efficient judicial system; high tradition of law and order and high accounting standards.

Table 6.15 illustrates the impact of La Porta et al (1998) variables on $BIAS_{ij,t}$ in the Australian context. The variable $INV_{j,t}$ is negative and significant throughout, implying that greater the destination countries' equity investment in Australia, the lesser will be Australia's home bias against these destination countries. Individually, the legal indicator rule of law is negative but insignificant, and the efficiency of judicial system indicator is both negative and significant. Column (3) indicates that a 100 - percent increase in the destination countries' efficiency of judicial system leads to 2.2 - percent decrease in Australia's equity home bias against those destination countries. Overall the results imply that Australia's degree of home bias will decrease against those destination countries that have efficient judicial system and high tradition of law and order.

Table 6.15: Australia's Home Bias La Porta et al (1998) indicators

	(1)	(2)	(3)	(4)
$INV_{j,t}$		-0.013* (-1.816)		-0.012* (-1.843)
ROL	-0.016 (-1.226)	-0.014 (-0.990)		
EFF			-0.022* (-1.840)	-0.019 (-1.522)
Constant	0.984*** (9.074)	0.970*** (8.726)	1.036*** (10.898)	1.021*** (10.256)
Adj R ²	0.02	0.00	0.05	0.03
Observation	37	37	37	37

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.16: International Home Bias using Kaufmann et. al (2003) indicators - I

	(1)	(2)	(2)	(3)	(4)	(5)	(6)
<i>VACC</i>	-0.268*** (-5.540)						
<i>PS</i>		-0.236*** (-4.621)					
<i>GE</i>			-0.212*** (-6.360)				
<i>RQ</i>				-0.331*** (-5.479)			
<i>RL</i>					-0.230*** (-5.270)		
<i>CC</i>						-0.170*** (-5.962)	
<i>PSF</i>							-0.219*** (-3.111)
<i>GEFF</i>							-0.089** (-2.417)
Constant	0.938*** (30.608)	0.850*** (32.588)	0.936*** (31.945)	1.074*** (22.728)	0.942*** (33.143)	0.877*** (34.128)	0.981*** (30.585)
Adj R ²	0.04	0.03	0.03	0.05	0.04	0.03	0.04
Observation	444	444	444	444	444	444	444

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.16 presents regression results showing the impact of Kaufmann et al (2003) indicators on home bias in the international context. In Table 6.16, Kaufmann et al (2003) indicators are negative and significant throughout, implying that better governance in the destination countries would lead to greater equity investment in source countries. This would result in a lower degree of source countries equity home bias against destination countries. On an individual basis, the regulatory quality (*RQ*) variable has the greatest impact on home bias. A 100 - percent increase in destination countries regulatory quality environment leads to a decrease in source countries equity home bias against destination countries by about 33 - percent. Column (6) presents the results once the Kaufmann et al (2003) indicators are grouped together. A

100 - percent increase in political stability and freedom (*PSF*) variable, leads to a decrease in source countries equity home bias against destination countries by about 22 - percent and a 100 - percent increase in government effectiveness (*GEFF*) variable, leads to a decrease in source countries equity home bias against destination countries by about 22 - percent.

Table 6.17: International Home Bias Kaufmann et. al (2003) Indicators - II

	(1)	(2)	(2)	(3)	(4)	(5)	(6)
<i>INV_{j,t}</i>	-0.014** (-2.309)	-0.015** (-2.387)	-0.015** (-2.382)	-0.014** (-2.295)	-0.014** (-2.314)	-0.015** (-2.362)	-0.013** (-2.23)
<i>VACC</i>	-0.240*** (-5.033)						
<i>PS</i>		-0.212*** (-4.332)					
<i>GE</i>			-0.192*** (-5.752)				
<i>RQ</i>				-0.304*** (-5.128)			
<i>RL</i>					-0.207*** (-4.839)		
<i>CC</i>						-0.152*** (-5.296)	
<i>PSF</i>							-0.197*** (-2.92)
<i>GEFF</i>							-0.083** (-2.26)
Constant	0.937*** (30.514)	0.859*** (34.566)	0.938*** (32.132)	1.068*** (22.756)	0.941*** (33.410)	0.882*** (34.564)	0.977*** (30.72)
Adj R ²	0.04	0.04	0.04	0.05	0.05	0.04	0.05
Observation	444	444	444	444	444	444	444

Note: **, * and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.17 adds the *INV_j* variable to Kaufmann et al (2003) indicators. The *INV_j* variable is negative and significant throughout, implying that the greater the destination countries' equity investment in source countries, the lesser will be source countries' home bias against these destination countries. Kaufmann et al. (2003)

variables are negative and significant throughout, with the results similar to those in Table 6.16.

Table 6.18: Australia's Home Bias Kaufmann et. al (2003) indicators - I

	(1)	(2)	(3)	(4)	(5)
<i>GE</i>	-0.090** (-2.114)				
<i>RQ</i>		-0.122* (-1.987)			
<i>RL</i>			-0.069* (-1.798)		
<i>CC</i>				-0.061** (-2.144)	
<i>PSF</i>					0.083* (2.042)
<i>GEFF</i>					-0.137*** (-4.983)
Constant	0.983*** (17.465)	1.016*** (13.134)	0.943*** (19.204)	0.937*** (26.911)	0.956*** (16.285)
Adj R ²	0.18	0.17	0.08	0.13	0.15
Observation	37	37	37	37	37

Note: *, ** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

Table 6.18 presents regression results showing the impact of Kaufmann et al (2003) indicators on home bias in the Australian context. On an individual basis, regulatory quality (*RQ*) variable has the greatest impact on home bias. A 100 - percent increase in destination countries regulatory quality environment leads to a decrease in Australia's equity home bias against destination countries by about 12 - percent. Column (6) presents the results once the Kaufmann et al (2003) indicators are grouped together. A 100 - percent increase in government effectiveness (*GEFF*) variable, leads to a decrease in Australia's equity home bias against destination countries' by about 14 - percent. On the other hand, a 100 - percent increase in political stability and freedom (*PSF*) variable, leads to an increase in Australia's

equity home bias against destination countries' by about 8.3 - percent, which is not in accordance with theory.

Table 6.19 adds the $INV_{j,t}$ variable to the set of Kaufmann et al (2003) indicators. The variable $INV_{j,t}$ is negative and significant throughout, implying that greater the destination countries' equity investment in source countries, the lesser will be source countries' home bias against these destination countries. The Kaufmann et al. (2003) set of variables are negative and significant throughout, with the results similar to those in Table 6.16.

Table 6.19: Australia's Home Bias Kaufmann et. al (2003) indicators - II

	(1)	(2)	(3)	(4)	(5)
$INV_{j,t}$	-0.009 (-1.381)	-0.010 (-1.441)	-0.011 (-1.645)	-0.009 (-1.200)	-0.011 (-1.417)
GE	-0.084* (-1.804)				
RQ		-0.113 (-1.690)			
RL			-0.060 (-1.459)		
CC				-0.055* (-1.740)	
PSF					0.088* (2.020)
$GEFF$					-0.132* (-4.390)
Constant	0.979*** (16.644)	1.010*** (12.383)	0.937*** (18.712)	0.934*** (25.710)	0.949*** (15.201)
Adj R ²	0.15	0.14	0.05	0.10	0.13
Observation	37	37	37	37	37

Note: *,** and *** indicate significance at the 1%, 5% and 10% levels, respectively. White corrected t-statistics in parenthesis.

6.7 Conclusion

Research in this chapter employs the CPIS data to investigate the determinants of the home bias puzzle in the international context for 12 source countries and 37 host countries. In addition, the research investigates the home bias puzzle for the source country Australia and other 37 destination countries. Research in this chapter employs two models – Portfolio Share Model and Information Cost Model to test home bias puzzle. Portfolio Share Model relates the actual equity portfolio shares to those predicted by the ICAPM under the assumption of perfect capital markets taking into account the impact of direct and indirect capital market frictions. The direct barrier viz. capital controls has negative but insignificant impact on the portfolio equity investment. The results of this analysis indicate some interesting facts about international equity holdings, including home bias for most country pairs.

The regression results indicate that information asymmetries, proxied by geographical proximity and the existence of a common legal origin or, common language have an especially large impact on equity portfolios. The distance variable is highly significant and moves inversely with foreign investors equity holdings. The common legal origin and common language variables are positive. The impact of source countries financial market development and GDP growth rate is positive and moves together with foreign investors equity holdings.

The diversification motives of investors and their relations to capital market frictions are also investigated. The results indicate a weak diversification motive for the portfolio equity investors of source countries. This result is similar to Aviat and Coeurdacier (2004), who also employ CPIS data for 2001.

This chapter also investigates the impact of La Porta et al (1998) legal variables and Kaufman et al (2003) governance indicators on portfolio equity investments. Investors prefer holding equities in countries that have an efficient judicial system, high tradition of law and order and high accounting standards. The results indicate that individually all the Kaufmann et al (2003) indicators are significant and move together with foreign investors equity holdings. On clustering into groups, the set of Kaufmann et al (2003) indicators reveal that the government efficiency indicator is highly significant and moves together with foreign investors' equity holdings, however the political stability and freedom indicator is insignificant and moves inversely with foreign investors equity holdings. Overall, the quality of destination countries institutions has a positive effect on the source countries portfolio equity investment.

Robustness tests including Tobit tests suggest that the main regression results are stable. Overall, the results of Portfolio Share Model reveal a strong impact of indirect capital market frictions on international equity holdings and thereby, explain the home bias puzzle in portfolio equity investment.

Information Cost Model employed in this chapter relates the source countries' equity investment bias against destination countries to the share of destination countries' stock market that is invested in the host countries, the share of destination countries' stock market in the world market capitalisation, the capital control restrictions in the destination countries, the trade of goods and services between source and destination countries, the source countries risk adjusted returns and the transaction costs associated with the portfolio equity investment. Results for both the international and

the Australian context indicate the evidence of a decrease in the home bias as the share of destination countries stock market that is invested in the host country increases. Capital controls are found to have a positive impact on degree of home bias meaning that greater the capital controls, the lesser will be foreign equity investments and accordingly, the greater will be the degree of home bias. Trade links are found to have a negative and significant impact on home bias; implying that trade alleviates certain information asymmetries in terms of familiarity with the financial and legal environment of the countries, cultural barriers etc.

In the Australian context, trade links are found to have a negative impact on home bias and transaction costs are found to have a positive impact on home bias. This implies that Australian investors prefer holding equities in those countries with which Australia has trading relationships and countries that have low transaction costs associated with equity investments. Consequently, Australian investors weight these countries in their portfolios, thus leading to low degree of home bias.

This chapter also investigates the impact of La Porta et al (1998) legal variables and Kaufman et al (2003) governance indicators on home bias. The results indicate that in the international context, source countries have low degree of home bias against the destination countries that have an efficient judicial system, high tradition of law and order and high accounting standards. In the Australian context, the variables viz. rule of law and efficiency of judicial system indicate that Australia has low degree of home bias against those destination countries that have an efficient judicial system and high tradition of law and order. Australian investors weight countries in their portfolios that have efficient judicial system and high tradition of law and order.

In the international context, it is observed that all the Kaufmann et al (2003) governance indicators have a negative impact on source countries home bias. However, in the Australian context, it is observed that not all Kaufmann et al (2003) indicators have the same importance for the portfolio equity investment. The indicators related to government effectiveness, regulatory quality, rule of law and control of corruption have a negative impact on Australia's home bias against portfolio equity investment in the destination countries. Investors weight countries in their portfolios which have efficient governing systems, high tradition of law and order, transparent corporate governance, effective policies related to trade and development. Consequently, the degree of home bias in investors' equity portfolios will decrease.

Overall the results indicate that both regulations and information costs have impact on cross border equity holdings. Even among countries for which regulatory barriers to foreign equity holdings are small, cultural barriers seem to constitute quite significant barrier to equity holdings. There is little evidence that the importance of distance and thus information barriers has been declining significantly over time.

Overall this chapter identifies that the barriers to the free mobility of equity can arise from two main sources. First, policy measures in the form of capital controls can cause barriers to free equity flows. Second, even if policy induced barriers to equity flows have been lifted, there remain substantial economic or market inherent barriers. These barriers tend to remain relevant and to affect the way in which financial systems operate and integrate even if economic policy has reduced regulatory barriers to entry. The asymmetries in information between domestic and foreign investors,

which can arise from differences in preferences or from cultural factors, are of primary importance. The market inherent barriers due to fixed costs of market entry including transaction costs are also important. In addition, the legal barriers arising from the economies' regulatory environment have impact on the portfolio equity investment.

CHAPTER 7.

CONCLUSIONS

The primary objective of research in this thesis was to examine the cross border equity investment patterns by employing the high quality International Monetary Fund's (IMF's) Coordinated Portfolio Investment Survey (CPIS) dataset. Research in this thesis answered the following questions: What were the salient features of increase in international financial integration over the period from 1990 to 2003? Which bilateral factors were responsible for explaining the overall size of countries cross border equity holdings? Were cultural, informational factors and financial frictions important in explaining the asymmetries in portfolio allocations? What was the impact of direct and indirect barriers of equity investment on geographical and home bias? To answer these questions and to investigate the effects of cross border equity holdings on barriers of investment, thesis developed several empirical models.

Chapter 2 empirically tested model that linked levels and composition of foreign assets and liabilities to potential drivers of integration viz. global trade in goods and services, output per capita, domestic financial development, tax and capital controls. The results showed that the growth in goods trade and stock market capitalisation were the key determinants of the growth in the scale of international balance sheets. Taxes and capital controls did not significantly explain the movements in dependent variables. At the individual Australian level, the variables such as trade openness, financial depth, GNI per capita, tax rate and stock market capitalization were reasonably successful in explaining the degree of international financial integration. The analysis of the properties of rates of return on foreign assets and liabilities

suggested that international cross border equity holdings provided diversification opportunities against fluctuations in domestic market returns. Positive and significant trade openness implied that those factors that stimulated trade in goods also stimulated trade in assets and in addition, trades in goods and in assets were complementary activities. Overall results indicated that among industrial countries, greater trade openness and more developed financial markets lead to larger stocks of external assets and external liabilities i.e. more external diversification.

Chapter 3 developed an empirical model that links bilateral equity holdings to bilateral trade in goods and services. This chapter also empirically tested models that linked aggregate assets and liabilities to various source and host country characteristics viz. size, income per capita, domestic stock market capitalisation, trade and capital controls. Result indicated that the bilateral equity investment was strongly correlated with the underlying patterns of trade in goods and services. The information asymmetries and cultural-institutional proximity, such as a common language and a common legal origin were also important for bilateral equity investment. Results indicated that the bilateral equity investments took place between countries with similar characteristics, including coordinated business cycles and correlated stock market returns, against the predictions of standard diversification arguments. Results also indicated low diversification motives for Australian investors. Capital controls had negative and significant impact on the countries aggregate foreign portfolio equity asset positions. Income per capita had positive and significant impact on countries aggregate cross-border portfolio equity asset positions. 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. Capital controls and income per capita did not significantly impact countries aggregate foreign portfolio equity liabilities positions. The size of domestic stock market was the key correlate of aggregate foreign portfolio equity liabilities.

Chapter 4 developed an empirical model that linked destination countries' portfolio share in Australia with share of Australia's trade with each country, financial market share of each country in world financial market and countries' share in world GNI. This chapter also developed an empirical model which took into consideration a number of informational and legal variables which influenced deviation in countries' investment shares from the benchmark of shares in global market capitalization. Major findings indicated a broad correspondence between the stock market capitalisations of destination countries and the allocation of Australian investment but with some deviations from that baseline, where the deviations were correlated with Australian trade patterns. Australian investors' were willing to hold equity portfolios in countries where the judicial system was recognised as efficient and appeared to uphold enforcement of the rule of law and countries which have well developed accounting standards.

Chapter 5 developed a model that considered both information and transaction costs to explain the international investment pattern of cross-border portfolio equity holdings and the geographical bias. The results indicated that by explicitly introducing the information and transaction technology variables into the regression, a significant part of the heterogeneity of cross border holdings could be explained. The empirical results showed that asymmetric information was related to geographical bias.

International capital markets were not frictionless but rather segmented by informational asymmetries or familiarity effects. Distance remained significantly negative even after taking into account other information asymmetries viz. phone cost and number of phone lines in source and host countries. However, once the trade variable was introduced, distance lost its significance and became positive. The positive sign of distance variable implied that there was a possibility that international equity flows might be driven by international trade flows so that the distance variable picked up the effect of trade linkages rather than information. This also supported the theories that trade in assets was positively linked to trade in goods or theories in which diversification benefits were highly correlated with trade in goods that do not capture all the informational dimensions of asset trade. Distance affected bilateral asset holdings mainly through its impact on trade in goods. Research in this chapter documented that investors' exhibited a preference for nearby countries, same language and same culture countries. Research in this chapter also indicated low diversification motives for both the international as well as Australian investors. Investors preferred holding equities in countries' that had high degree of accounting standards, efficient judiciary system and high degree of law and order. Regulatory quality, government effectiveness, control of corruption and rule of law had significant impact on the Australian investors' foreign portfolio equity holdings. Civil liberties, civil rights and media independence had no significant effect on Australian investors' foreign portfolio equity holdings; however, these variables had an indirect effect.

Chapter 6 employed Portfolio Share Model and Information Cost Model to test home bias puzzle. The Portfolio Share Model related the actual equity portfolio shares to

those predicted by the ICAPM under the assumption of perfect capital markets taking into account the impact of direct and indirect capital market frictions. The direct barrier viz. capital control had negative impact on the portfolio equity investment. Research in this chapter indicated that especially the information asymmetries, proxied by geographical proximity and the existence of a common legal origin or, common language had large impact on equity portfolios. The impact of source countries financial market development and GDP growth rate had positive impact on equity portfolios. Results indicated a weak diversification motive for the portfolio equity investors of source countries. Investors preferred holding equities in countries that had an efficient judicial system, high tradition of law and order and high accounting standards. Overall, the quality of destination countries institutions had a positive effect on the source countries portfolio equity investment.

The Information Cost Model related the source countries equity investment bias against destination countries to the share of destination countries stock market that was invested in the host country, the share of destination countries stock market in the world market capitalisation, the capital control restrictions in the destination countries, the trade of goods and services between source and destination countries, the source countries risk adjusted returns and the transaction costs associated with the portfolio equity investment. In both the international and the Australian context, results indicated the evidence of a decrease in the home bias as the share of destination countries stock market that is invested in the host country increased. Capital controls were found to have a positive impact on the home bias. Trade links were found to have a negative impact on home bias; implying that trade alleviated certain information asymmetries in terms of familiarity with the financial and legal

environment of the countries; cultural barriers etc. In the international context, source countries had low degree of home bias against the destination countries that had an efficient judicial system; high tradition of law and order and high accounting standards. In the Australian context, the legal indicators viz. rule of law and efficiency of judicial system were found to be significant and negative; implying that Australian investors had low degree of home bias against those destination countries that had an efficient judicial system and high tradition of law and order. In the international context, it was observed that all the Kaufman et al (2003) governance indicators had negative impact on source countries' home bias. However, in the Australian context, it was observed that not all Kaufman et al (2003) indicators had the same importance for the portfolio equity investment.

7.1 Policy Implications

The magnitude and persistence of barriers to the integration of financial markets have implications for fiscal and monetary policies. In imperfectly integrated markets, macroeconomic policies retain degrees of freedom, and regional factors are important in shaping policy decisions. The structure of financial markets differs across countries. These differences in financial structures affect transmission channels of monetary policy.

The structure of the financial system matters for the transmission of monetary impulses and the linkages of domestic financial markets with the rest of the world are important. Countries may benefit from financial integration and financial sector reforms to different degrees, which may explain the political difficulties of progressing with financial sector reforms.

The integration of financial markets can be considered a relatively gradual process. While some forms of capital are relatively mobile internationally, the bulk of capital tends to be invested locally. This has two implications for policy makers. On the one hand, markets for securitized financial assets punish unsustainable economic policies relatively quickly. On the other hand, policymakers retain quite some leverage, in particular with regard to taxing those forms of capital that cannot easily move across borders.

Financial integration may be associated with local financial development for various reasons. First, financial integration is likely to increase the efficiency of the financial intermediaries and markets of less financially developed countries by stimulating the demand for funds and for financial services. There will be increased competition with more sophisticated and cheaper foreign intermediaries, associated with financial integration. The competition from these intermediaries may reduce the cost of financial services to the firms and households of countries with less developed financial systems, and thus expand the quantity of the local financial markets. In some cases, the additional supply of financial services may be provided by foreign intermediaries who may enter the local market by acquiring local banks or merging with them. The increase in competition may lead to better credit conditions and hence stimulate investment and economic growth. Second, financial integration may require improvements in national regulation, i.e. accounting standards, securities law, bank supervision, corporate governance to bring it in line with best-practice regulation in the integrating area. This convergence in regulatory standards will result in an improvement in the regulatory standards of less developed financial markets. This

improvement may help promote their development, by reducing adverse selection and agency costs as well as the distortions induced by inadequate regulation.

In the process of financial integration the size of national financial systems should increase (relative to domestic GDP) in the countries starting with less developed financial markets. One policy implication is that financial market stability can be increased by further promoting the integration of markets and by removing indirect barriers to entry rather than devising new regulatory frameworks. In small open economy like Australia, tax policy plays a vital role in attracting foreign investments as compared to international level. This may have implication towards formulation of suitable tax policy for attracting foreign investments.

Investors who choose to hold a large number of stocks, concentrating the portfolio in certain stocks because of distance, language, or culture effects may make quite a large difference to the risk profile of their investment holdings. The information based theory of the influence of distance, language, and culture would lead to more active trading of these familiar firms and would generate superior performance in these firms.

Results with respect to the influence of language may have implications for firm policy. Australian based companies will be able to expand their investor base if they are able to publish their annual reports in English and other languages, based on the cultural mix. Investors may acquire useful information about familiar firms from reading company statements in a language they understand, from general or acquired knowledge about local firms, or from the cultural groups they socialize within.

This thesis shows that distance, language and cultural preferences alter the flow of investment capital between countries. This may have implications in altering the home bias, if companies' listing in the unified stock market can overcome language barriers in their communications to investors, particularly for investors in nearby countries and in countries that share the same culture as the firm.

7.2 Further Research

This thesis states that growth in goods trade and stock market capitalisation are the key determinants of the increase in the scale of international balance sheets. An important avenue for research is in sorting out the lines of causality among these variables.

This thesis investigates the cross border equity investment patterns in the international and Australian context. One important issue for future research is to investigate the role of offshore centres in cross border equity investments and devise methods to allocate equity investment in offshore centres to their ultimate destination. Another issue for research consists in developing the economic implications of the asymmetries in the geographical portfolio allocations that have been highlighted in this paper. Establishing lines of causality between financial and other linkages is also an important avenue for research.

An important area of research is to conduct a comparative analysis across different asset classes, including portfolio debt allocations; bank loans and deposits; and FDI positions. This would provide insight into various components of the geography of international investment positions and gain further insight into the external capital

structure of nations. Another area of research is to examine whether 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.

In order to investigate the home bias puzzle, research in this thesis relates the actual equity portfolio shares to those predicted by the international capital asset pricing model under the assumption of perfect capital markets taking into account the impact of direct and indirect capital market frictions. Further research is needed to base the empirical evidence on a more sophisticated theoretical model that demonstrates the impact of capital market frictions on international equity holdings in an international capital asset pricing model framework taking into account diversification considerations of investors.

This thesis also highlights that the differential between the actual share and the international capital asset pricing model's predicted share of domestic holding of equity has been falling over time, with the improvement in information technology. As the development of information technology is taking place only gradually, an important avenue for research would be to compare the differential over a longer time horizon. Some of the issues that are worth exploring in the context of home bias include how foreigners have performed relative to the general market, what determines foreigners' purchases and sales of shares, and how flows are related to returns. Research can also be undertaken by employing the CPIS data on bilateral equity holdings to investigate the role played by transactions costs in equity home bias phenomenon, over a period of time.

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APPENDIX

A 2 Appendix Chapter 2.

A 2.1 Trade Openness

Trade Openness is the ratio of the sum of exports and imports to GDP. This is in accordance to Lane and Milesi-Ferretti (2003). There is a positive relationship between trade openness and international investment positions. First, goods trade is directly associated with corresponding financial transactions, i.e. trade credit and export insurance. Firms may wish to hedge the riskiness of these flows in their investment and treasury strategies. Second, trade costs create an international wedge between marginal rates of substitution and hence limit the gains to asset trade (Obstfeld and Rogoff, 2001). Third, the cross border holdings of assets and liabilities that are the results of FDI, may in turn generate increased trade in goods and services. Fourth, trade openness may increase the domestic residents' cross border financial transactions (Honohan and Lane, 2000). Finally, trade openness may raise volatility and hence the desire for income smoothing. Rodrik (1998) states that more open economies face more volatile environments and hence desire larger government sectors as a social insurance mechanism. Income smoothing by international asset cross-holdings may prove to be potentially more powerful since it involves cross-country transfers rather than just domestic transfers.

A 2.2 Income per Capita

Income per capita matters for international asset trade. First, income per capita may influence the propensity to engage in international asset trade. Higher income per capita is associated with lower risk aversion and international investments are

perceived as riskier than domestic alternatives, it may also raise international asset trade. Second, if fixed costs (for instance, learning costs) are involved to participate in foreign asset markets, then international cross-holdings may rise with income levels (Mulligan and Sala-i-Martin, 1996; Martin and Rey, 2000, 2004).

A 2.3 Financial Development

A well developed domestic financial sector may facilitate international asset trade in several ways. First, countries with well developed domestic financial markets are more likely to engage in international asset trade. In well developed domestic financial markets, firms and households that are accustomed to domestic trade in assets may also be more familiar to the benefits of holding international investments in smoothing income. Second, a well developed financial infrastructure may attract foreign investors. Third, financial development encourages equity structures, thus diminishing the problems arising due to asymmetric information. Fourth, well functioning financial markets may stimulate marketed liabilities viz. debt, portfolio equity and FDI in the form of mergers and acquisitions over nonmarketed liabilities i.e. greenfield FDI. De Gregorio (1998) stresses the complementarities between financial development and financial integration. Research in this chapter considers two broad measures of financial development namely, financial depth and stock market capitalisation.

Financial depth is the ratio of currency plus demand and interest bearing liabilities of banks and non-bank financial intermediaries to GDP (ratio of M2 to GDP). This is the broadest available indicator of financial intermediation but one short coming of

this measure is that it includes the liabilities of central bank, which is unlikely to convey funds to private borrowers. This ratio is in line with King and Levine (1993).

Stock market capitalisation is the ratio of domestic stock market capitalisation to GDP i.e. the ratio of the value of listed domestic shares to GDP. This is an indicator of the size of the stock market. Relatively high stock market capitalisation may be coupled with low levels of activity which may increase the risk premium firms have to pay, because investors want to be compensated for the lack of liquidity of the assets they hold.

A 2.4 Tax

Tax policy may influence the level of international cross holdings. Firm's assets may be shifted to countries with low corporate income tax rates. This will also attract international financial intermediaries engaged in offshore financial transactions. At a household level, high tax rates on investment income will stimulate the growth of offshore saving vehicles, if overseas investments can be more easily hidden from domestic tax authorities (Grilli, 1990).

A 2.5 Capital Control

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. The level of international asset cross-holdings may increase if capital control policies are liberalized.

A 3 Appendix Chapter 3.

A 3.1 Statistical Discrepancies in the World Current Account

As discussed in Chapter 2, the globalization of international financial flows increased sharply between 1980 and 2000. During this era, a host of new instruments and new ways of investment emerged and the number of market participants grew rapidly. Accordingly, the gathering of statistical data became difficult and as a result there were great gaps in covering instruments, especially portfolio investments in many countries.

In theory, the sum of current account balances should be zero for the world as a whole. However, statistical discrepancies in current account balances arise due to inconsistencies in the ways individual countries compile their data and sometimes, measurement errors in the data. The large magnitude of these statistical discrepancies in the global current account has been a cause of concern to the International Monetary Fund (IMF). In the early 1980s, the IMF organised a working party to investigate the principal sources of statistical discrepancies and to recommend ways to improve statistical practices.

Table A 3.1: Discrepancies in the world current account (billion dollars)

	1990	1991	1992	1993	1994	1995
Current account balance	-127.8	-120.0	-114.1	-80.4	-78.8	-82.4
Trade balance	16.1	29.7	44.3	73.3	96.9	114.6
Services balance	-44.9	-45.7	-35.5	-26.9	-17.8	-30.2
Of which transportation	-46.7	-48.6	-53.4	-55.6	-59.7	-72.6
Income balance	-66.6	-69.8	-81.3	-82.1	-102.5	-123.3
Of which investment income ¹	-110.0	-109.1	-109.5	-117.0	-137.4	-166.2
Current transfers balance	-32.4	-34.1	-41.7	-44.7	-55.4	-43.5

Source: IMF, Balance of Payments Statistics Yearbook, 1996.¹ Excludes reinvested earnings on direct investment

According to the IMF working party report, the statistical discrepancy in the world current account exceeded \$100 billion (about 2 percent of total current account credits and debits) in the year 1982. Table A 3.1 presents the discrepancies in the world current account for the period from 1990 to 1995. The world current account discrepancy reached \$100 billion in the early 1990s before declining to about \$80 billion annually during 1993 to 1995. The world current account discrepancy was about 0.5 percent of the sum of world current account credits and debits in 1995.

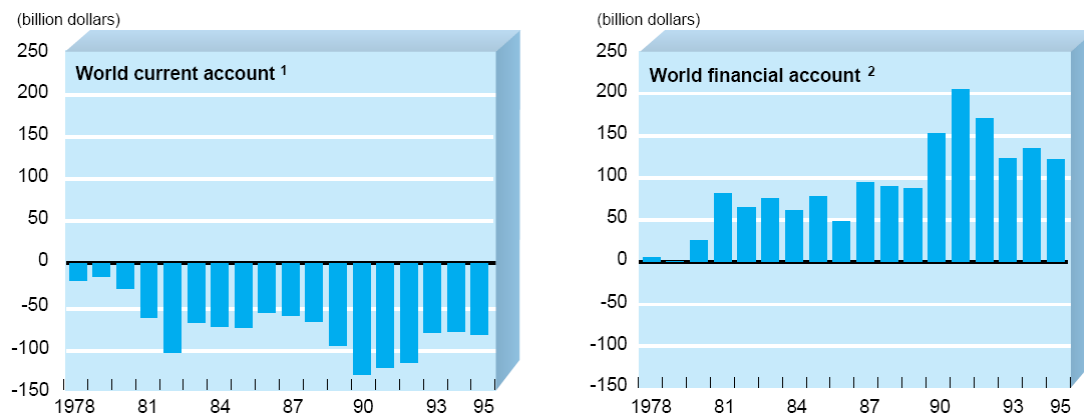
A 3.2 Investment Income

In September 1987, the International Monetary Fund's (IMF's) Working Party on the Statistical Discrepancy in World Current Account Balances (Final Report, September 1987) reported the statistical discrepancies in World Current Account Balances. The working party investigated and suggested improvements in the statistical procedures being used. It also recommended compilation procedures that would make nations balance of payment statistics more consistent to one another. The current account study concluded that one of the main reasons for the growth of the discrepancies in global investment income data in the early 1980s was that the debtor countries recognised the cross border assets coupled with higher interest rates after 1979; however, the creditor countries did not recognise the same.

For 1977-83, the reported data on capital flows showed a cumulative net flow of nearly \$300 billion (apart from reinvested earnings), indicating that host countries were able to measure the flows than the countries where the creditors resided. Figure A 3.1 illustrates that in 1995, the liabilities exceeded assets by \$122 billion, which is

largely related to the recording of portfolio and other investment transactions excluding direct investment.

Figure A 3.1: Discrepancies in world current account and world financial flows, 1978-95



Source: Compiled from selected IMF publications

¹ Excludes capital transfers from 1988; ² Adjusted to exclude reinvested earnings, includes IMF staff estimates for earlier years

The IMF’s Executive Board authorized a second working party in December 1989 to do a follow up study of global balance of payments statistics. This study evaluated the statistical recording practices relating to the measurement of international capital flows. In 1992 the IMF established the Committee on Balance of Payment Statistics to administer the implementation of two IMF’s working parties reports regarding the principal sources of discrepancy in the balance of payments statistics; to advise on methodological and compilation issues related to balance of payments and international investment position statistics; and to encourage greater synchronization of data collection among countries. The IMF’s working parties recommended that national compilers systematically compare national data on nonbank capital flows and associated stocks of foreign assets and liabilities with the Bank for International Settlements (BIS) banking statistics and where appropriate, use these statistics in compiling balance of payments estimates. Accordingly, the IMF’s Statistics

Department and its Committee on Balance of Payments are working with the BIS to refine the international banking statistics to improve their use in balance of payments compilation.

In 1992, the IMF published the Report on the Measurement of International Capital Flows (the Godeaux Report). The report evaluated the statistical practices related to the measurement of international capital flows. It addressed the principal sources of statistical discrepancies in the component categories of capital account in the global balance of payments. Table A 3.2 illustrates that changes in the flow of portfolio investments were relatively small in 1986-1989, but in stocks and bonds the changes were significant.

Table A 3.2: Global Discrepancies and adjustments by major components of the balance of payments (1986-89) financial flows (billion US\$)

Balance of Payments components	Original Data	Adjustments	Adjusted Data
Direct Investments	-16.5	11.8	-4.0
Reinvested Earnings	-22.2	18.2	-4.7
Other Direct Investments	5.7	7.4	0.7
Portfolio Investments	5.8	5.4	13.2
Equity Securities	-12.4	5.4	-7.0
Debt Securities	18.3	1.9	20.2
Other Investments	66.4	-58.4	7.8
Reserves minus liabilities corresponding foreign reserves	-15.3	16.2	0.9
Total (net)	40.4	-23.4	17.0

Source: Godeaux Report (1992)

The report highlighted the importance of cross border portfolio investment, indicating the liberalization of financial markets, financial innovation and the changing behaviour of investors. This has led to measurement difficulties reflecting imbalances in worldwide level between recorded financial assets and liabilities. The main reasons for the deviations in the data on financial flows were the following: first, inability of

some countries to fix direct investment liabilities in the form of reinvested income; second, issuing of international debt securities was classified as long term loans or repayment of loans, not as portfolio investments; third, lack of data from the offshore financial centres, particularly on portfolio investments; fourth, different interpretation of repurchase transactions by parties involved, for instance, some countries treated these as short term loans against security, others as sale/purchase of securities; fifth, difference in changes of the central bank reserves and liabilities of the partner country; sixth, inadequate reporting of the assets and liabilities of international organizations; seventh, higher flows have been recorded for liabilities than for assets.

The Godeaux report tried to eliminate these deviations to some extent. The global difference in the variation of financial assets and liabilities fell from 40 billion dollars to 17 billion dollars. The Godeaux report concluded that the remaining deviation may be taken as portfolio investments' error amounting to 25.3% of identified liabilities. This also corresponded to the volume of investments made from offshore financial centres and the undervaluation of other portfolio investment claims. The latter was due to the complicated structure of portfolio managers' claims (part of the long investment chain could be abroad and thus liabilities could turn out to be overvalued). Bilateral comparisons were inadequate as different methodologies were used in geographical distribution (creditor-debtor principle versus transaction based method at which the origin of the actual investor remains undetermined when intermediaries were used). The report estimated that, at the end of 1998, measured global assets in cross border bonds amounted to \$1209 billion, about 75 percent of measured cross border liabilities of \$1618 billion (after adjusting for liabilities constituting foreign authorities reserves), an imbalance of \$409 billion.

The Godeaux Report recommended that steps be taken by countries to ensure improved coverage and better implementation of international standards for balance of payment financial account statistics; that statistical activities be equipped with appropriate resources and legal powers; that stock be collected on regular basis and that an effort be made to undertake a coordinated benchmark survey of international portfolio assets to permit the calculation of portfolio investment liabilities. Based on the Godeaux report, the financial indicators of the balance of payments and investment position have been defined according to the new standard of the IMF published in the Balance of Payments Manual (5th edition, 1993; BPM5).

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. The reasonable estimate thus obtained, would reduce to some extent the imbalance at the global level.

In recording portfolio investment liabilities on a bilateral basis, the country of initial sale was recorded, but subsequent transactions with residents of other countries were not frequently recorded by compilers in the country of residence of the issuer. The transaction was frequently recorded with the country of residence of the broker rather than with the country of residence of the beneficial owner, which may be different

from that of the broker. To overcome these problems, the IMF organised the first internationally coordinated portfolio investment survey, using a common set of definitions and a common reference date.

A 3.3 The 1997 CPIS

The CPIS was undertaken based on the recommendations in the Report on the Measurement of International Capital Flows (the Godeaux Report). The participation in the survey was voluntary and both advanced and emerging economies were invited to participate. Twenty nine countries participated in the survey viz. Argentina, Australia, Austria, Belgium, Bermuda, Canada, Chile, Denmark, Finland, France, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Thailand, the United Kingdom, the United States, and Venezuela. These countries accounted for approximately 80 percent of the estimated international holdings of equities and long term debt securities.

Before conducting the survey, the IMF held four meetings to establish the standards for measurements, reporting and coverage. Accordingly, the *Survey Guide* was prepared under the supervision of Ms. Lucie Laliberte of Statistics Canada. It was agreed that equity and long term debt security assets (excluding direct investment) would be treated as “mandatory” and the short term debt security, financial derivative assets¹⁷ and equity, long- and short term debt securities and financial derivatives liabilities would be treated as “non-mandatory”. Fifteen countries provided data on

¹⁷ At the time of survey, financial derivatives were included in portfolio investment in the Balance of Payments Financial Account and the International Investment Position. Since then, a new functional category has been created for them.

short-term debt security assets, eight provided data on equity and long and short term debt security liabilities, and two provided data on financial derivatives.

It was decided that basic conditions for a coordinated approach (e.g. on timing and valuation, and treatment of reverse repos transactions) would be adopted. However, no survey approach was prescribed. It was felt that the national circumstances should determine the most appropriate approach. The countries were free to adopt an aggregate approach, a security by security approach, to approach end investors only, custodians only, or a combination of both. The securities database created by the *Ufficio Italiano dei Cambi* was made available to those countries intending to adopt security-by-security approach. Most countries conducted the survey under the existing legislation that gave the compiler authority to require respondents to comply. In some countries the legal basis for requesting the information was insufficient, in which cases it was conducted on a voluntary basis.

The results were published by the IMF in December 1999 (IMF, Results of the 1997 Coordinated Portfolio Investment Survey, Washington 2000). Table A 3.3 illustrates the portfolio investment assets of countries participating in the 1997 CPIS. At the end of 1997, the total holdings of non-resident equity and long term debt securities of countries participating in the CPIS exercise amounted to nearly US 5.2 trillion (Table 1, Column (c)). The United States, United Kingdom, and Japan accounted for 68 percent of portfolio holdings. The shares of Netherlands, Italy, and France each were within a range of 4-6 percent of the total and those of Sweden, Ireland, Canada, Bermuda and Belgium each were within a 1-3 percent of the total. The foreign short

term securities contributed to a total of US 100 billion, about 3.7 percent of total portfolio assets for countries that collected both mandatory and non mandatory data.

In order to derive a total global estimate of the value of equity and long term debt security assets, information from other sources was added.

Table A 3.3: Portfolio Investment Assets of countries participating in the CPIS (Millions of US Dollars)

Countries	Equity securities	Long term debt securities	Total	Country Share(%)	Short term debt securities	Financial derivatives	Total
	(a)	(b)	(c)		(d)	(e)	(c+d+e)
Argentina	10090	18050	28140	0.54	1551		29691
Australia	32870	7449	40319	0.77	1217		41537
Austria	11520	39421	50922	0.97			50922
Belgium	64830	86668	151499	2.89	10786		162285
Bermuda	46861	82934	129795	2.48			129795
Canada	105920	17491	123411	2.35	4859		128270
Chile	390	137	527	0.01			527
Denmark	21751	21346	43096	0.82			43096
Finland	3122	7849	10971	0.21	591		11562
France	99604	205938	305542	5.83			305542
Iceland	386	82	468	0.01			468
Indonesia	26	701	726	0.01	398		1124
Ireland	36506	59144	95650	1.83			95650
Israel	1057	2117	3174	0.06		6	3180
Italy	75233	172239	247473	4.72	10391		257863
Japan	158771	712161	870932	16.62	31324	4406	906662
Korea	976	8101	9077	0.17	4428		13505
Malaysia	1385	348	1733	0.03	55		1788
Netherlands	127314	115425	242739	4.63			242739
New Zealand	5002	1448	6450	0.12			6450
Norway	9282	25395	34676	0.66			34676
Portugal	4765	14145	18911	0.36	366		19277
Singapore	16199	4527	20726	0.40	2061		22788
Spain	22308	24771	47079	0.90			47079
Sweden	52367	16451	68819	1.31	2739		71557
Thailand	232	43	275	0.01			275
United Kingdom	461553	483354	944908	18.03	27080		971987
United States	1197446	542898	1740344	33.21			1740344
Venezuela	36	2384	2420	0.05	555		2975
Total CPIS	2567785	2673016	5240801	100	98401	4411	5343613
Supplementary Data*	32033	716950	748983				748983
Grand Total	2599818	3389966	5989784		98401	4411	6092596

Note: (*) Foreign long-term securities (equity and debt) held as reserve assets by the monetary authorities of countries participating in the SEFER survey, plus BIS data relating to holdings of non-resident debt securities of banks resident of Germany, Hong Kong SAR, Luxembourg, and Switzerland, plus equity and long-term debt securities held by selected international organizations mainly in respect of pension funds operations for their staff.

These other sources comprised of: (1) Survey of the Geographical Distribution of Securities Held as Foreign Exchange Reserves (SEFER), which sought information from countries on the geographical breakdown of their holdings of equities and long term debt securities held as part of their reserve assets as at December 31, 1997; (2) International organizations viz. IMF, United Nations and World Bank, which sought information about their own assets holdings in respect of pension funds of their staff and operational accounts; (3) data from Banking International Settlement (BIS) database on international securities issues. Table A 3.3 illustrates that the holdings of non resident long term securities were almost US\$750 million from these supplementary sources. The overall portfolio holdings of the countries participating in the CPIS, together with the supplementary information from other countries and institutions were estimated to almost US\$6.1 trillion.

At the end of 1997, by summing countries' IIPs and cumulated balance of payments (BOP) data, the outstanding global portfolio investment liabilities in both equity and long term debt securities were approximately \$8.9 trillion, while identified global holdings of portfolio investment assets were almost \$6.56 trillion leading to a difference of \$2.34 trillion.

By incorporating the supplementary data of SEFER, BIS and International organizations, the global holdings of portfolio assets were found to increase by \$750 billion and those of outstanding global portfolio investment liabilities increased by \$440 billion. Overall the measured gap fell by about \$300 billion.

Table A 3.4: Global Portfolio Investment Assets and Liabilities (as of the end of December 1997) (Trillions of US dollars)

	Assets (X)	Liabilities (Y)	(X)-(Y)
(A) Estimate based on available IIP or cumulated BOP data	6.91	8.90	-1.99
(B) Revisions to basic estimate due to combined CPIS, IMF SEFER, international organizations, and information from BIS	+0.75	+0.44	+0.31
Final estimate (A)+(B)	7.66	9.34	-1.68

Note: (A) shows global holdings of portfolio investment assets and liabilities compiled by summing across countries' international investment position (IIP) data and, in the absence of such sources for particular countries, by summing balance of payment flows, or a combination of the most recent IIP data plus accumulated flow data to the end of 1997. (B) shows the changes to the data in row (A) that result from using data from the 1997 CPIS, the international banking statistics system of the Bank for International Settlements (BIS), the results of the IMF Survey of the Geographical Distribution of Securities Held as Foreign Exchange Reserves (SEFER) that was conducted in conjunction with the 1997 CPIS, and data provided by major international organisations on this portfolio investment holdings.

A 3.4 Coordinated Portfolio Investment Survey Task Force

The Task Force, chaired by Mr Gunnar Blomberg of the Riksbank, Sweden, presented its reports to the IMF Committee at its meetings in Santiago, Chile, in October 1999 and in Washington, D.C., in October 2000. At the 1999 meeting, the Task Force reported that 1997 CPIS resulted in several benefits. First, it demonstrated that an organized effort could be successfully coordinated across a large number of countries with respect to scope, coverage, timing, definitions, and concepts used in the compilation of data on portfolio investment. Second, it provided an effective and efficient means for establishing and spreading world-wide good methodological standards. Third, it eased access to budgetary support as a result of higher visibility given to coordinated cross country approach. Fourth, it enabled a greater understanding of country practices with respect to survey design and alternative approaches to data collection and exchange of experience in this regard. Fifth, it increased the confidence of countries in portfolio investment data. Sixth, it facilitated data exchange. Seventh, it encouraged awareness of the IMF's Balance of Payments Manual, fifth edition (Washington, 1993; BPM5), and promoted implementation of

the methodology and standards presented therein. Finally, it facilitated the attribution of portfolio investment assets by country, although there were some difficulties relating to issuers resident in small economies with international financial centres.

However, the size of global discrepancy between the measured outstanding portfolio investment assets and liabilities was about \$1.7 trillion (Table A 3.2). This indicated that there were significant gaps in coverage, the possibility of overestimation of global portfolio investment liabilities, and other measurement problems. The main gaps in the 1997 CPIS were due to non participation of some important investing countries for which alternative data sources proved inadequate; the non participation of a number of countries with offshore centres (OFCs; in the Survey Guide, the term used is small economy with an international financial center, or SEIFiCs) for which there were no alternative sources¹⁸ and difficulties faced by many participating countries in capturing cross-border portfolio investment by households that do not use the services of resident custodians. The likely largest holders of portfolio equity assets among non-participants were the British Virgin Islands, China, Kuwait, Saudi Arabia, Taiwan Province of China, and the United Arab Emirates.

The Task Force felt that the 1997 CPIS was an encouraging first step to meet to some extent the global imbalances in financial flows and stocks and it substantially improved the level of statistical work within the international investment position and balance of payments field and it. Even though the 1997 CPIS increased the coverage of portfolio assets for many countries, the need to address the global imbalances

¹⁸ From a statistical point of view, SEIFiCs can be characterised as jurisdictions that have financial institutions engaged primarily in business with non-residents and having financial systems (i) with external assets and liabilities out of proportion to domestic financial intermediation designed to finance domestic economies and (ii) where enterprises owned or controlled by non-residents play a significant role in providing financial services to non residents.

continued even more so than at the time of Godeaux Report. These global imbalances were the result of rapid internationalization of the securities markets, fast growing international portfolio investment positions during the 1990s, and the problems within the statistical field to keep up with those developments. Since the mid 1990s, the volatility of international financial flows, and the increased vulnerability of some countries to exchange rate crises, increased the need for reliable information concerning outstanding positions of portfolio investment. There were a series of financial crises – the Mexican peso crisis of December 1994, the Asian crisis of 1997, the Russian crisis of August 1998, the collapse of the Brazilian real in January 1999, the Turkish lira crisis of February 2001 and the Argentine peso crisis of December 2001-January 2002. These crises inherently reflected the instability of international financial markets and the risks associated with the cross border financial transactions in association with relatively fragile financial systems and weak regulatory and supervision structures. The lessons of international financial crises of 1997 and 1998 increased the importance of the 1997 CPIS. The need for reliable information by governments, financial market players and analysts strongly confirmed the usefulness of continuing the CPIS. The improved asset positions data might be used in supporting work on the measurement of external debt, providing creditor side information on portfolio liabilities, to supplement the BIS' banking creditor data. The data could also be used to enhance attention to macro-prudential considerations and measures for organizations involved in financial stability issues. The geographical details were important for macro-prudential supervision policies.

The Task Force recommended to the IMF Committee that the CPIS be repeated with the reference date of the end of December 2001, and that it be undertaken on a regular

basis thereafter. The IMF Committee agreed to the recommendation to conduct 2001 CPIS and to conduct the survey on an annual basis thereafter.

A 3.5 Country Experiences of 1997 CPIS

A 3.5.1 Collection Method

The choices of collection methods were influenced by various factors including the availability of data, ease of collection, respondent burden, availability of resources, existing surveys for collecting data for the international investment position, a country's national circumstances and its institutional arrangements.

Table A 3.5 presents the choices made by the 29 countries that participated in the 1997 CPIS. The aggregate / end-investor-only approach was chosen by four countries; only one country, Australia used an aggregate / end-investor and investment managers approach; twelve countries chose the aggregate / combination of end-investor and custodian approach; the security-by-security / end-investor approach was the choice of one country only; and security-by-security / combination of end-investor and custodian was used by six countries. The combined approach i.e. mixing the aggregate approach with the security-by-security approach was used by four countries. Aggregate / custodian-only and security-by-security / custodian only approaches were not used by any country. One country did not use any of these approaches because it used administrative records.

Table A 3.5: Type of Survey used in 1997 CPIS

Countries	Aggregate End Investors	Approach Custodians	Security by Security End Investors	Approach Custodians
Argentina	¹			
Australia	X ²			
Austria			X	X
Belgium	X	X		
Bermuda	X	X		
Canada	X ³		X	X
Chile		X	X	
Denmark	X	X		
Finland	X	X		
France	X ³			X
Iceland	X	X		
Indonesia	X	X		
Ireland	X			
Israel	X			X
Italy			X	X
Japan	X	X		
Korea	X	X		
Malaysia			X	X
Netherlands	X	X		
New Zealand	X	X		
Norway	X			
Portugal			X	X
Singapore	X	X		
Spain			X	X
Sweden	X	X		
Thailand	X			
United Kingdom	X			
United States			X	X
Venezuela			X	

Note: X = Approach used; - = approach not used. **Source:** IMF, Results of the 1997 Coordinated Portfolio Investment Survey (Washington, 2000); ¹Mixed, depending on the available information; ² also used investment managers; ³ Banks.

The various survey types are described below:

(a) End Investor Survey

This survey approaches directly the owner of securities issued by non-residents. This approach should provide a good coverage when investment in securities issued by non residents is concentrated in institutional investors, such as banks, security dealers, mutual funds, insurance funds and pension funds. The quality of the data provided

should also be good because end investors are probably best informed about the size, composition and value of their portfolio.

In case, if collecting portfolio investment data through end investor survey is a new approach for the national compiler, then the compiler will need to prepare a comprehensive register of potential survey respondents and engage in extensive discussions with the institutions most likely to hold securities issued by non-residents. National compilers must also avoid either double counting or over recordings of securities holdings. Compilers should maintain a regular contact and follow up visits to potential respondents.

An end investor approach gives a better means of determining the holdings by sector. An end investor approach is likely to provide good coverage of large institutional investors; however, securities covered by households are not captured because it is difficult and expensive to conduct a survey of households.

Some end investors mark their holdings to market daily; others do it weekly, monthly, quarterly or annually. Some investors may hold both a trading account and an investment account. The investment accounts are sometimes not marked to market because they are held for reserves or capital requirements. Respondents should be asked to specify where they maintain valuation on a different basis from that required for the survey (i.e. market price on the reference date). The securities should be revalued to market price whenever possible, in cases, where valuation is provided on a different basis from market price.

(b) Custodian Survey

It focuses primarily on those financial institutions that hold securities issued by non residents on behalf of end investors. This survey should provide good coverage when residents mainly hold their securities issued by non residents by domestic custodians. Since the number of survey respondents will be fewer than the number of end investors, the difficulties inherent in identifying and maintaining the appropriate reporting population are much reduced compared with such difficulties for an end investor survey.

The national compiler must be aware of the relationships between end investors and custodians and among custodians, to compile good quality data from a survey of custodians. Custodians may encounter difficulties in distinguishing between holdings of residents and non residents, providing details of the geographical breakdown of resident holdings of securities issued by non residents and valuing some securities at market value. It is difficult for them to extract the data required by the national compiler. It is therefore, essential that those countries undertaking a custodian survey conduct pre survey consultations with domestic custodians. Compilers should also maintain a regular contact and follow up visits to potential respondents.

(c) Combined Custodian / End Investor Survey

Countries that use combined custodian / end investor surveys have adopted the approach of collecting data primarily from custodians (and from end investors only when the end investors do not use domestic custodians or have own custody). There is a danger of double counting; domestic investors might erroneously report securities deposited with domestic as well as with non-resident custodians. In some countries,

national compilers require the custodian to indicate the name of the end investor on the behalf of which the securities issued by non-residents have been assigned. The end-investor may also be asked to report a breakdown of holdings of securities issued by non-residents that are held with domestic custodians, held with non-resident custodians and held in their own custody. However, the custodians may be reluctant to provide such information.

The various data collection approaches are:

(i) Security- by- Security basis data collection

The security-by-security basis of collecting data provides more information and allows greater possibility for data verification. This approach provides the building blocks required to construct the geographically allocated position data and allows for verification of certain variables such as price and country of issuer, currency attribution, industry/sector of the issuer, yields on securities etc. It could also help identify direct investment securities. The decision whether to collect data security-by-security basis will depend on the costs involved and whether respondents are prepared to provide the information on that basis. This survey is cheaper and easier for the respondents but costly for the compilers.

(ii) Aggregate basis

An aggregated survey relies on the survey respondent to perform the aggregation, allocation and valuation of securities. There is less involvement of the national compilers. An end investor survey should produce a good quality data reported on an aggregate security basis, provided that the national compiler ensures that survey

respondents are fully aware of the survey requirements, regarding market valuation and country attribution of issuer.

The evidence from countries collecting data from custodians is that it is advisable to collect data at individual security level. The individual security level data collection ensures that double counting is kept to minimum, securities are correctly valued and quality is maintained.

The countries experiences of collection methods employed in the 1997 CPIS survey are as below:

(A) United Kingdom

Based on the preliminary investigations, the Office for National Statistics (ONS) concluded that the existing end-investor surveys used to compile portfolio investment assets in the IIP statement could also be used for the CPIS. Accordingly, United Kingdom selected the aggregate end investor approach, after adding questions related to seeking information on the country of residence of the issuer. This approach was beneficial for several reasons. First, end investors were already familiar with the enquiry forms and the subject matter. Second, the ONS's enquiry team was already familiar with the subject matter, had established relations with the end-investors, and was in a good position to encourage and guide the respondents through the requirements of the survey. Third, the legal basis of the CPIS data collection could be linked to the existing survey, thus avoiding the need of introducing new legal provision. Fourth, it was economical for both the end-investor and the ONS to use the existing survey design. Fifth, linking the data to the balance sheet returns provided an inbuilt consistency check. Finally, potential problems of double counting were

minimized because end investors would only be reporting their own holdings of portfolio assets.

(B) United States

Based on United States' 1994 survey, a similar survey to the CPIS; U.S. Treasury concluded that resident custodians were responsible for the bulk of residents' holdings of cross border portfolio investment assets. Reporting by custodians was preferred because there were comparatively small number of custodians and reporting by custodians made it possible to include the household sector and small businesses. In addition, the security by security approach was used for custodians because based on their experience; the initial data received from custodians were frequently inaccurate as regards the country of residence of the issuer and the price of securities. The errors would most readily be detected and resolved only by collecting the security level data. Further, the security level data collection would lead to more detailed information for analysis.

U.S. compilers purchased commercial security databases that covered all the commonly used coding systems and provided pricing information on all securities that had traded within the previous year on any of the world's 87 largest non-U.S. security exchanges. These databases provided key information that was not always supplied by survey respondents and helped to resolve conflicting information and confirmed the information reported.

(C) Australia

The domestic sectors surveyed in CPIS Australia by directly addressing end investors were banks; insurance; pension funds; mutual funds, unit trusts etc; general government and nonfinancial corporations. CPIS Australia approached these sectors for reporting equity securities, long term debt instruments and short term debt instruments.

Table A 3.6: Number of end-investors approached and the number of end-investors reporting CPIS data for Australia

	Entities Approached	Entities Reporting
Total	959	959
Banks	50	50
Insurance	54	54
Pension Funds	29	29
Mutual Funds, Unit Trusts, etc.	75	75
General Government	1	1
Nonfinancial Corporations	750	750

Source: Coordinated Portfolio Investment Metadata Individual Economy Information

Table 3.6 illustrates the number of end investors approached for the CPIS data and those who reported the same in Australian context. In the case of insurance; pension funds and mutual funds, unit trusts etc, all entities having international investment activities were approached. In the case of non financial corporations, all large entities (300) were completely enumerated and small ones (350) were sampled. A quarterly census of fund managers placing funds overseas on behalf of resident households was undertaken.

The Australian Bureau of Statistics (ABS) maintains a separate register of enterprise groups with international involvement. The enterprise groups that report are the

Australian head offices on behalf of all branches, subsidiaries, and consolidated associates, rather than each legal entity that might have an element of overseas investment or debt. The sources of information for enterprises for this specialised investment register are as follows:

- (i) Existing registers of businesses maintained by the statistical agency or other government agencies, which can be approached with brief debt coverage surveys;
- (ii) Existing business data collections already run by the statistical agency or other government data collection agencies.
- (iii) Government administrative sources viz. taxation records, files, or lists; information held by foreign investment approval or monitoring boards; information held by registered banks, other deposit accepting institutions, securities brokers, investment managers, investment advisers, authorized pension or mutual funds; statutory company reports and company registration details etc.
- (iv) Media Reports: Newspapers and periodicals are useful sources of information on potential reporting entities. The reports of transactions that are reported in the media are used to update the register and to confirm data reported in the Survey of International Investment (SII).
- (v) Publicly Available Databases: These sources include the stock exchange register; commercial equity registries' information services; international credit rating agencies' publications (for instance, Moody's, Standard and Poor's); and market research reports such as reviews by accounting or brokerage firms. The ABS uses several Australian Stock Exchange products,

such as monthly updates of shares issues listed on the exchange and their prices and indices.

- (vi) Industry Associations: The industry associations and their reports and releases can be a useful source of information.

A 3.5.2 Distinguishing between Direct and Portfolio Investment in Securities

CPIS collects data on residents' investment in securities issued by non-residents for use in the compilation of portfolio investment data. CPIS excludes the securities considered to be issued by an enterprise that is in a direct relationship with the holder.

The definition of direct investment is in Chapter XVIII of *BPM5* and in the OECD *Benchmark Definition of Foreign Direct Investment* (third edition; Paris: OECD, 1996). The equity that establishes the direct investment relationship and any other holdings of equity or debt¹⁹ that are issued by the direct investment enterprise or the direct investor or its affiliates and owned by them should be excluded from the CPIS. The exception is transactions between affiliated financial intermediaries. The securities that are permanent in nature i.e. debt (loan capital reflecting a permanent interest) and equity (share capital), are classified as portfolio investment.²⁰ In practice, the general collection method may determine the method by which the direct and portfolio investment are excluded.

¹⁹ Securities already held when the threshold of 10 percent is reached or other securities acquired subsequent to the reaching of that threshold.

²⁰ See *BPM5*, paragraphs 365 and 372.

(A) Australia's Experience of 1997 CPIS related to Separating Direct from Portfolio Investment

Australia performs the Survey of International Investment (SII). This is an ongoing, integrated collection system that collects, inter alia, portfolio and direct investment and integrates flows and balances. The respondents record separately their liabilities to and claims on first, non-resident direct investors, second, direct investment groups abroad, and third, other non resident investors, in the SII survey forms. The data collected for other non resident investors only, are relevant to CPIS. The definition of direct investment is in line with the BPM5, and an explanatory diagram is drawn from the IMF's *Balance of Payments Textbook* (Washington, 1996). For each instrument, respondents are required to record separately particulars for non resident direct investors, direct investment groups abroad, and other non-resident investors on the same page of the survey forms. This helps to prevent mis-reporting among these categories.

A 3.5.3 Market Price Valuation

The CPIS uses the concept of market price valuation. There is no problem so far as the market price valuation of the regularly traded equities and debt securities is concerned. The end-investors may not value all their holdings of securities at market prices and resident custodians may not keep records of the market prices of the securities they are holding. End investors may follow alternative valuation principles such as par value, acquisition cost, amortized value or keep separate books for different portfolios of securities. The following paragraph describes experiences of Australia and the United Kingdom in reporting the CPIS data on a market price basis.

(A) Australia

For measuring the value of equity securities, respondents to the SII were asked to adopt the following principles: (i) for listed enterprises, the market value of the equity positions should be reported using a recent transaction share price; if recent transaction prices were not available, the mid point of the quoted buy and sell prices of the shares on their main stock exchange on the reference date specified provided a useful approximation. (ii) for unlisted enterprises, if a market value of the shares was not available, the respondent was asked to estimate the market value by one of the following methods, in descending order of preference: a recent transaction price, a director's valuation, or net asset value. For debt securities, survey respondents were asked to report traded price on the date specified. If that value was not available, they were asked to report using, one of the following methods (in order of preference): yield to maturity, discounted present value, face value less written down value of discount, issue price plus amortization of discount (less amortization of premium), or another mark to market basis. The bases upon which debt securities were actually valued are not known.

(B) United Kingdom

The market prices information was readily available on large frequently traded issues, which comprised of the majority of debt and equity issues. In the event of missing prices, the information available from both commercial sources and other reporters were used. The estimated prices were used for debt securities, as a last resort when all the sources described above were exhausted. Equities represented only a very small percentage of the total; and estimated prices were used for their valuation of market prices.

A 3.5.4 Treatment of Accrued Interest

The 1997 CPIS employed market prices of debt securities to include interest accrued but not yet paid (dirty price). The valuation of long term securities held in investment accounts (for prudential or reserve capital requirements) was done on par or acquisition price and not on market price. Ireland's experience related to treatment of accrued interest is described below:

(A) Ireland

The respondents were asked to provide positions on a clean price market value basis, market priced transactions and valuation changes. Further, details of outstanding interest (positions) and movements in interest (flows) were required. The clean price positions were combined with outstanding interest to obtain the dirty price market values of the stocks, for the CPIS.

A 3.5.5 Treatment of Nominee Accounts

Generally, one party holds the securities as a nominee on behalf of another party, usually for reasons of administrative convenience or confidentiality. When non-resident nominee accounts and custodians are used, it is not always possible to identify the beneficial owner. For instance, if a resident of country A holds securities issued by a resident of country B and uses a nominee account in country C, and securities are kept in custody in country C, the custodian in country C may not be aware that the ultimate owner is in country A. In such cases, the custodian should obtain the residence of the beneficial owner from the nominee. The approach used by United Kingdom in treatment of nominee accounts is described below:

(A) United Kingdom

The ONS conducts periodic sample surveys of all companies listed on the U.K. stock exchange to determine the ownership of their share issues, based on the share registers maintained by companies. Holders were classified according to their institutional sector. Nominees (unit trusts, pension funds, offshore entities, other overseas investors) held about one third of all ordinary traded shares. It was possible to identify the owner in most cases because this information was known to the reporting enterprise (knowledge of the beneficial owner is required by company law). A residual of undesignated nominee accounts was attributed to beneficial owners, based on the proportions that obtained for nominee holdings for which beneficial owners were identified.

A 3.5.6 Treatment of Collective Investment Schemes

The units in collective investment schemes (mutual funds, investment trusts, unit trusts) are classified as equity, regardless of the type of fund or assets that the fund acquires. For instance, if a resident in country A owns units in a collective investment scheme domiciled in country B that holds only bonds issued by the government of country C, the resident of country A should report that he or she holds an equity claim on country B, not a holding in government bonds from country C. The approach adopted by United States in treatment of collective investment schemes is described below:

(A) United States:

If U.S. residents owned shares in a foreign mutual fund, these were counted as equity holdings in the country in which the mutual fund was legally domiciled. This was

regardless of the security-type the mutual fund purchases or the physical residence of mutual fund managers. U.S. based mutual funds reported in detail the securities they owned that were issued by unrelated non residents.

A 3.5.7 Direct Holdings Abroad

One of the major challenges for the 1997 CPIS was the identification of residents' direct holdings abroad either by utilizing the services of custodians abroad or holding securities in self-custody. Australia's experience in the determination of direct holdings abroad is described below:

(A) Australia

SII covers the direct holdings abroad by all Australian enterprises. However, SII does not directly cover the direct holdings abroad by Australian households. The investment abroad by the households can be through the following routes: (i) direct personal holdings of securities issued by non-residents, (ii) enterprises and legal entities set up by individuals and families to manage their financial affairs (for example, tax), or (iii) superannuation (pension funds) and other collectively managed investment vehicles. The majority of investment abroad by households is managed by enterprises, legal entities, superannuation funds and investment agencies; therefore the holdings by households of securities issued by non-residents were assumed to be adequately covered in Australian statistics.

A 3.5.8 Quality Control

The data received from the compilers were verified to check whether the respondents had provided information on the basis required for the survey. The quality control checks adopted by Australia are discussed below:

(i) Survey Forms

The survey forms (Figure A 3.2) were structured so that there was a full reconciliation for each item between the opening and closing levels of investment and for transactions during the period.

(ii) Other reported data

In the case of non financial corporations sector, independent sources viz. published stock or bond price indices or exchange rate movements over the period were used to judge whether the reported data are accurate.

Figure A 3.2: Reconciliation of Reporting of IIP and Balance of Payments Data in Australia

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Position	+	-	+	+	+	=
at market	Purchases	Sales	Market	Exchange	Other	Position
value at	during	during	price	rate	changes	at market
start of	period	period	changes	variations		value at
period						end of
						period

Source: Coordinated Portfolio Investment Survey Guide, Second Edition, IMF 2002

(iii) Analytical checks

The individual analysts within the ABS were responsible for confirming the reported data. They produced editorial notes that identified and explained all large movements

at the aggregate level by reference to the entities contributing significantly to those movements. All large amounts (approximately \$A 100 million or more) reported in the transactions, exchange rate variations, and “other factors” boxes were validated with respondents.

(iv) Other edit checks

Survey outputs were also verified through (a) comparison with results obtained from the ABS’s Survey of Financial Information, which collected data on institutional units’ balance sheets, transactions and “other changes”, not just transactions and balances with non-residents, (b) an examination of the comparability of balance of payments and financial account balancing items, (c) data confrontation with annual reports and Australian Stock Exchange reports and (d) checking details provided against press clippings and unit profiling checks.

A 3.5.9 Steps Taken to Address Low Coverage or Low Response Rates

In some cases, there might be a need to gross up results, because the survey may not have covered all units or because of low response rate. The latter problem might arise in situations where a survey was not obligatory. The experience of United Kingdom in the 1997 CPIS survey is described below:

(A) United Kingdom

The Bank of England conducted an aggregate end investor survey for banks and the ONS conducted a separate survey for all other institutions. CPIS survey was conducted on a statutory basis for non bank institutions. However, in the case of CPIS survey, it was not possible to force any respondent to respond. In the event of non-

response, the respondents were reminded by telephone and written reminder. In the case of banks, existing survey forms were used rather than a specific CPIS survey form. Further, non-response was not a problem in the case of banks. In the ONS survey, non-respondents were assumed to have a pattern of holdings that was the same for those that did respond and therefore were included in the grossing up. The method of grossing was ratio estimation, using the same auxiliary value as used for the other surveys to financial institutions. In the case of ONS, grossing up was done separately for insurance companies, pension funds, trusts, securities dealers, and non-financial companies.

A 3.5.10 Sectoral Information

The sectoral information is an encouraged item in the CPIS. The sectoral information is useful for counterpart liability analysis because holders of portfolio investments may behave in different ways, especially during periods of financial crisis. In the case of end investor survey, the sectoral information is self defining but for a custodian survey it may be very difficult and expensive for the custodian to identify his or her customers' sectors. The experience of United States in having custodians identify the sector for which they hold the securities, is described below:

(A) United States

The sectoral information was collected with respect to the sectors of the domestic investor and the sector of the issuer. For the holder, custodians were asked to report record-by-record which of the following sectors they were reporting for: (a) own portfolio, (b) custody for mutual fund, (c) custody for pension fund, (d) custody for

insurance company, (e) custody for other. However, this exercise of determining the sector for many investments proved to be difficult.

A 3.6 The 2001 CPIS

In 1997, the first CPIS was undertaken based on the recommendations in the Report on the Measurement of International Capital Flows (the Godeaux Report). A description of the 1997 CPIS and related country experiences is contained in the Appendix. CPIS data measures the countries bilateral equity holdings as against BIS dataset which does not differentiate between equities, bonds and cross-border bank lending and OECD dataset that measures only foreign direct investment of OECD countries. The following paragraphs describe the IMF's 2001 CPIS survey.

The IMF's Managing Director invited 86 countries/jurisdictions to participate in the 2001 CPIS. Of these, a total of 74 countries/jurisdictions indicated that they would participate in the 2001 CPIS. They comprised the 29 countries/jurisdictions that participated in the 1997 CPIS and 45 newly participating countries/jurisdictions. The newly participating countries/jurisdictions were Germany, Luxembourg, Switzerland, Hong Kong SAR, Singapore, Aruba, The Bahamas, Bahrain, Barbados, British Virgin Islands, Cayman Islands, Cyprus, Gibraltar, Guernsey, Isle of Man, Jersey, Lebanon, Macao SAR, Malta, Mauritius, Netherlands, Antilles, Panama, Vanuatu, Bulgaria, Estonia, Greece, Hungary, Kazakhstan, Poland, Romania, Russia, Slovakia, Turkey, Ukraine, Bangladesh, Pakistan, The Philippines, Brazil, Colombia, Costa Rica, Mexico, Uruguay, South Africa, Egypt and United Arab Emirates.

As per the Task Force recommendations, the IMF Committee decided that the 2001 CPIS would include the equity securities, long term debt securities and short term debt securities by country of residence of issuer on a mandatory basis. In addition, the IMF Committee also decided to include portfolio investment liabilities-equity securities, long-term debt securities and short term debt securities; institutional sector of the holder; currency breakdown of all securities for assets on encouraged categories.

The Task Force recommended including short term debt securities as mandated item because it recognized that a complete coverage of debt securities would be useful in developing external debt statistics, including partner country exchange of data, and for use in vulnerability analysis. It would also improve comparisons of total of debt securities in cases where respondents have difficulties in correctly separating short term from long term securities. In addition, including short term securities would for most countries, add only limited costs to undertaking the survey.

The Task Force recommended including portfolio investment liabilities as an encouraged item because this item would be useful to determine the nature and size of the discrepancies by comparing with the partner countries' holdings. However, the Task Force recognised that many countries would be unable to report a geographical breakdown of their portfolio investment liabilities because of difficulties in their identifying the country of residence of the non-resident holder.

The currency breakdown of all securities for assets would provide important additional information for the analysis of a country's balance of payment flows and

reconciliation with its IIP. The Task Force considered that to include a full currency breakdown within the CPIS framework would add materially to the collection costs and would make the resulting matrix of data too big to manage or understand.

The IMF Committee recommended that an effort be made to encourage new participants among major investing countries and SEIFiCs. A broader participation by countries on a regional basis should be encouraged to ensure a wider application of best practice. The IMF Committee recommended the Survey of the Geographical Distribution of Securities Held as Foreign Exchange Reserves (SEFER) and Survey of Geographical Distribution of Securities Held by International Organizations (SSIO) to be conducted in parallel with the 2001 CPIS. In order to maintain the confidentiality of individual returns, special procedures were used by the IMF to collect data from these two surveys. Data from these two surveys were published only in aggregated form so that no country's or organization's data were identifiable.

CPIS results show that no developing country is among the top twenty recipients of portfolio investment in 2001. The top twenty recipients of portfolio investment in 2001, all developed countries' account for more than 91 percent of total portfolio liabilities. The remaining 218 countries account for the other nine percent. The top ten countries hold about 74 percent of total portfolio liabilities.

In the late 1980s and early 1990s, the World Bank and IMF encouraged developing countries to open up their economies to attract portfolio capital inflows. In the late 1980s, one of the essential components of the IMF's Structural Adjustment programme was the widespread liberalization of the financial sector of developing countries and the removal of restrictions on foreign investors' entry into the domestic

economies of these countries. A number of developing countries initiated sweeping liberalization in their domestic economic system to attract foreign portfolio investment. The portfolio investors responded positively to these developments and significant amounts of foreign portfolio investment came into these countries. However, the situation changed drastically as a result of the financial crisis that occurred in developing countries during the late 1990s.

According to CPIS 2001, cross border holdings of portfolio investment of the 67 economies participating in the survey was US\$12.9 trillion. The total cross border holdings comprised of US\$5.2 trillion in equity securities and US\$7.7 trillion in debt securities. The results show that compared to 1997, there was a significant shift towards short term debt securities in 2001. The share of short term debt in total portfolio investment increased from 1.6 percent in 1997 to 8.3 percent in 2001. CPIS results indicate that the total stock of portfolio liabilities has more than doubled from US\$ 6.1 trillion in 1997 to US\$ 12.8 trillion in 2001. Table A 3.7 indicates that the share of developing countries' in total portfolio liabilities has gone down quite significantly because in more than 50 developing countries there has been a net outflow of portfolio investment during the period 1997-2001. Since the late 1980s, financial systems of most developing countries have moved from a bank based to more stock market based systems. The reverse flow of portfolio investment may have caused serious repercussions on the economy of these countries.

Table A 3.7: Share in Total Portfolio Liabilities (%)

Year	1997	2001
Developed Countries	91.13	94.95
Developing Countries	8.87	5.05
Total	100.00	100.00

Source: CPIS database

The results of the CPIS survey show that the focus of portfolio investors has moved away from most of the developing countries. Portfolio investment has grown more than 100 percent between 1997 and 2001 and most of the new investments are going to the developed countries. The results indicate that developing countries and emerging markets are no longer attractive investment destinations.

Table A 3.8 indicates that at the end December 2001, total holdings of portfolio investment liabilities stood at US\$ 14.9 trillion, about US\$ 2 trillion larger than holdings of portfolio investment assets. The main reasons for these deviations were the following: first, inability of some countries to fix direct investment liabilities in the form of reinvested income; second, issuing of international debt securities was classified as long term loans or repayment of loans, not as portfolio investments; third, lack of data on portfolio investment from offshore financial centres; fourth, different interpretation of repurchase transactions by parties involved; fifth, higher flows have been recorded for liabilities than for assets; seventh, inadequate reporting of the assets and liabilities of international organizations.

Table A 3.8: Global Imbalances in Portfolio Investment, 2001 (US \$ billion)

<i>Residents' net acquisition of securities issued by non residents</i>	
Comprising portfolio investment assets	11,555
Comprising securities held as reserves	1,282
Total net acquisition of securities	12,837
Equities	5,159
Debt securities	7,678
<i>Non-residents' net acquisition of securities issued by residents</i>	
Comprising portfolio investment liabilities	14,867
Equities	5,917
Debt securities	8,950
Global imbalance (liabilities>assets)	2,030
Equities	758
Debt securities	1272

Source: A Guide to the CPIS Database (IMF, 2003)

A 3.7 Conclusion

The coverage of countries' international investment position (IIP) statistics for portfolio investment has significantly improved as a result of CPIS survey. The users have access to individual economy data for both portfolio investment assets and liabilities in a database that allows them to analyse the data on both the economy and global level. The CPIS data is useful in studies of regional concentration, financial integration, spillover effects between countries (contagion), and globalization. CPIS provides a useful complement to the Bank for International Settlement (BIS), International Banking Statistics and the Joint BIS-IMF-OECD-World Bank statistics on external debt. The ongoing CPIS surveys will provide compilers with an annual database that should facilitate their efforts to improve the estimation of portfolio investment transactions and associated income flows.

CPIS data is one of the most significant components of this thesis. The thesis employs CPIS data for studying the portfolio equity investment patterns; the phenomenon of geographical and home bias, in the international and Australian context. The high

quality CPIS data is being employed first time in the Australian context to study the portfolio equity investment patterns and analyse the geographical bias and home bias puzzles.

A 5 Appendix Chapter 5.

A 5.1 Country Size

Cross border holdings are positively correlated with each country's *GDP*. Country size may matter in several aspects. First, the establishment of domestic financial markets may involve fixed set up costs. Therefore, a small country may depend on the already existing deep financial and capital markets of larger economies. For instance, Grilli (1990) states that Belgian firms and households performed all of their financial transactions in London markets. Irish banks likewise relied on London for wholesale funds until a domestic market was established in 1972. Second, Calvo and Mendoza (2000) state that larger countries may be more attractive to international investors owing to the existence of fixed costs in acquiring information about investment conditions in a given country. Third, smaller countries may be more specialized, with greater vulnerability to external shocks and hence with more volatile national output levels.

A 5.2 Distance

Geographical distance is a barrier to interaction among economic agents and cultural exchange. Countries which are relatively close geographically can also be expected to share cultural similarities, which in turn tend to lower information costs. Coval and Moskowitz (1999, 2001) show that the weight of a US stock in US mutual funds is negatively related to the distance between the location of the fund and the location of

the headquarters of the firm. The mutual fund managers do better with their holdings of stocks of firms located more closely to where the mutual fund is located. Aviat and Coeurdacier (2004) state that distance affects bilateral asset holdings mainly through its impact on trade in goods. Once the impact of trade in goods on equity holdings is taken into consideration, distance loses its significance as an explaining factor for equity holdings. This variable is expected to have a negative impact of foreign equity holdings.

A 5.3 Language

For Finland, Grinblatt and Keloharju (2001) show that language matters in investor's portfolio allocation. Finnish investors whose native language is Swedish are more likely to own stocks of companies in Finland that have annual reports in Swedish and whose CEOs speak Swedish than those investors whose native language is Finnish. For Korea, Choe et al (2001) find that foreign investors buy at higher prices than resident investors and sell at lower prices. Shukla and Van Inwegen (1995) show that UK money managers underperform American money managers when picking US stocks. Hau (2001) finds that proprietary trades on the German stock market do better when they are geographically closer to Frankfurt. This variable is expected to have a positive impact of foreign equity holdings.

A 5.4 Legal Origin

Information advantages may arise due to similarity of institutions and legal structures. Legal rights of investors differ very much across countries, primarily due to legal origin. This applies to commercial laws for the financing of firms, for investment and also for law enforcement (La Porta et al, 1997; 1998). Laws from different countries

are typically not written from scratch but rather transplanted from a few legal families or traditions. In general, commercial laws stem from two broad traditions viz. common law and civil law. As previously discussed countries can be classified as per German, French, Scandinavian civil law families, the English common law and the Socialist law family to account for reduced information asymmetries between countries belonging to the same legal origin. The similarity of institutions can also be proxied by the fact that two countries share a common colonial background. This variable is expected to have a positive impact of foreign equity holdings.

A 5.5 Phone Cost

Phone cost is a function of information cost and is positively correlated with distance, i.e. the cost of travelling is higher, cultural differences are likely to be stronger and business links weaker for longer distances. The model uses the dimension of phone cost along with distance to capture the information cost. This variable is expected to have a negative impact of foreign equity holdings.

A 5.6 Phonenumber

The number of phone lines refers to the transaction technology in the source and host countries. The greater the number, the better the information gathering of the broad population and the cross country networks associated with migration, cultural ties, past colonial relationships etc. This variable is expected to have a positive impact of foreign equity holdings. Buch (2003) use this variable as a proxy for the technological advancement of the host economy. Buch also use number of television sets as a proxy for the technological advancement of the host economy. Portes and Rey (2005)

measure information costs through the volume of telephone calls between two countries.

A 5.7 Trade

Investors are better able to attain accounting and regulatory information on foreign markets through trade. Consequently, investors may be inclined to hold stocks of foreign companies with whose products they are most familiar. This variable is expected to have a positive impact on foreign equity holdings.

A 5.8 Financial Development

Financial development can increase the degree of competition in financial markets and thereby curtail monopoly rents. More developed financial systems can reduce the cost of financial intermediation because they can better deal with the problems of asymmetric information that are omnipresent in and across financial markets. Financial markets and financial intermediaries play an important role for domestic as well as international investments by mobilizing savings, allocating credit, and facilitating the hedging, pooling and pricing of risks. Market prices are assumed to be more informative in larger and more liquid markets because these markets encourage arbitrage through liquidity and the existence of more and better substitutes to use as hedges for trading against mispriced securities and reduced transaction costs (Beck et al, 2000, 2001; Wurgler, 2000). A common proxy for financial development as measured by the size and depth of the domestic capital market is the ratio of M2 to GDP (Edison and Warnock, 2004; Portes and Rey, 2004).

A 5.9 Diversification

There is return chasing behaviour as the equity holding in country j is positively correlated with the return $r_{j,t}$ in country j . Brennan and Cao (1997) state that when domestic investors have a cumulative information advantage in the domestic market, the trade of foreign investors in market j is positively related to the return of country j . This occurs because foreign investors revise the means of their predictive distributions according to the realized public signals by more than the better informed domestic investors do. If signal errors in the two markets are independent, the purchase of foreign securities depends only on the return on the foreign market index, and not on the return on the domestic index. This variable is expected to have a positive sign because it takes into account the return chasing behaviour of foreign investors in country j .

The variable $rcorr_{ij,t}$ is the correlation between monthly equity returns in the country i and j . The monthly equity return is computed from the MSCI stock indices. The correlation variable should be negative, i.e. the greater the co-movements between financial assets of two countries, the lower the benefit of diversification. The correlation of different countries assets tend to be negatively correlated with distance i.e. the further apart two countries are, the less correlated their business cycles are.

A 5.10 Legal Variables

A brief description of these legal indices is provided below:

(i) La Porta et al (1998) variables:

The efficiency of judicial system (*EFF*) variable is developed by the country risk rating agency Business International Corporation. This variable assesses the efficiency and integrity of the legal environment as it affects business, particularly foreign firms. It may be taken to represent investors assessments of conditions in the country in question. This variable scales from 0 to 10, with lower scores for lower efficiency levels and is averaged between 1980-1983.

Rule of law (*RL*) developed by the country risk rating agency International Country Risk (ICR) assesses the law and order tradition in the country. This variable scales from 0 to 10, with lower scores for less tradition for law and order and is average of the months of April and October of the monthly index between 1982 and 1995.

Rating of accounting standards (*ACC*) is the index created by the International Accounting and Auditing Trends; by examining and rating companies' 1990 annual reports on their omission or inclusion of ninety items. These items fall into seven categories viz. general information, income statements, balance sheets, funds flow statement, accounting standards, stock data and special items. A minimum of three companies in each country were studied that represented a cross-section of various industry groups where industrial companies numbered seventy percent and financial companies represented the remaining thirty percent.

(ii) Kaufmann et al (2003) variables:

Kaufmann et al (2003) indicators describe various aspects of the governance structures of a broad cross-section of countries. The indicators have been constructed

on the basis of information gathered through a wide variety of cross-country surveys as well as polls of experts. The authors' model is based primarily on data for 1997 and 1998, which enables them to achieve levels of coverage, for each of their indicators, of approximately 160 countries. They estimate the indices by employing 31 different qualitative indicators from 13 different sources, which are used to construct six indicators each representing a different dimension of governance viz. voice and accountability, political instability, government effectiveness, regulatory burden, rule of law and graft. The variables are standardized to have a mean of zero and a standard deviation of one. The larger the values, the better they indicate their institutional quality.

Voice and accountability (*VACC*) is based on concepts that measure the extent to which the state engages in repression of its citizens and the extent to which the state relies on tactics commonly considered illegitimate in the international community in carrying out internal security tasks. The concepts related to civil liberties viz. freedom of speech, assembly and demonstration, equal opportunity, political rights viz. free and fair elections, free vote, freedom of political participation, participation of military in politics etc. are measured. *VACC* focuses on various indicators related to political process, civil rights, and institutions that facilitate citizen control of government actions, such as media independence.

Political stability and lack of violence (*PS*) combines indicators that measure the risk of a destabilization or removal from power of the government in a violent or unconstitutional way. The concepts measured include military coup risk, major

insurgency, political assassination civil war, social unrest, frequency of political killings, civil unrest, terrorism etc.

Government Effectiveness (*GE*) and Regulatory Quality (*RQ*) comprise indicators that focus on the ability of the government to formulate and implement policies. Government Effectiveness (*GE*) comprises indicators that measure the quality of bureaucracy, the competence of civil servants, the quality of public service provision and the credibility of the government's commitment to its policies. Regulatory Quality (*RQ*) consists of indicators related to the regulations of exports, imports, business ownerships, equities ownerships, banking, foreign investment, price controls, tariffs, unfair competitive practices etc.

The Rule of Law (*RL*) and Control of Corruption (*CC*) considers the respect, on the part of both citizens and the government, for the institutions that resolve their conflicts and govern their interactions. Rule of Law (*RL*) includes variables that measure the perceptions on the effectiveness and predictability of the judiciary and enforceability of contracts. It measures concepts related to enforceability of government and private contracts, fairness of judicial process, speediness of judicial process, violent and organised crimes, trust in legal system, patent and copyright protection etc. Control of Corruption (*CC*) comprises of different indicators of corruption. It focuses on the measure of corruption within the political system, the rate of severity of corruption within the state, the intrusiveness of the country's bureaucracy, corruption among public officials etc.

The above described variables are highly correlated with each other and might also be subjected to measurement errors. Therefore, research in this chapter uses the average of Voice and Accountability and Political Stability and Lack of Violence as the Political Stability and Freedom variable; and the average of Rule of Law, Control of Corruption, Government Effectiveness and Regulatory Quality as the Government Efficiency variable.

A 6 Appendix Chapter 6.

A 6.1 Market Capitalisation:

Stock market capitalisation is the total number of issued shares of domestic companies multiplied by their respective prices at a given time. Market capitalisation figures only include shares of domestic companies, common and preferred shares. They exclude investment funds, rights, warrants, convertible instruments, options, futures, listed foreign shares, and companies whose only business goal is to include shares of other listed companies.

A 6.2 Capital Control:

The measure of capital control is based on the Miniane (2004). Grilli and Milesi-Ferretti (1995) develop capital control measures that rely on the 0/1 IMF dummies. The pre-1996 editions of IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) provide dummies for all member countries in six separate categories: bilateral payments arrangements with members and non-members, restrictions on payments for current account transactions, restrictions on payments for capital account transactions, import surcharges, advance import deposits, and surrender to repatriation requirements for export proceeds.

Eichengreen (2001) states that the dummy for capital account transactions accounts only for restrictions on residents, not on non-residents. IMF changed its reporting procedures starting with 1996 edition of AREAER, in order to remedy the lack of suitable capital control measures. In the 1996 AREAER edition, there are 13 sub categories related to capital account transactions viz. capital market securities, money market instruments, collective investment securities, derivatives and other instruments, commercial credits, financial credits, guarantees, sureties, and financial backup facilities, direct investment, liquidation of direct investment, real estate transactions, personal capital movements, provisions specific to commercial banks and other credit institutions, and provisions specific to institutional investors. Johnson and Tamirisa (1998) and Tamirisa (1999, 2003) build indices for 45 countries by averaging over all possible 0/1 dummies in the 1996 AREAER edition, that cover only post 1996 period. Tamirisa (2003) data is restricted to OECD countries. Edison and Warnock (2004) compute the ratio of total market capitalisation of equities that are available for purchase by foreign investors over total market capitalisation. Lane and Milesi-Ferretti (2003) construct the capital control measures as the ratio of a country's portfolio and direct investment assets and liabilities over GDP. Miniane (2004) has utilized the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and extended the IMF's post 1996 disaggregated capital account indices back to 1983 for a sample of 34 countries. The disaggregated indices are better than the pre-1996 single dummy in tracking both global trends toward capital account liberalization and country specific liberalization during that period. Miniane (2004) adds fourteenth sub category viz. multiple exchange rate arrangements, which are not part of the capital account subdivision of the AREAER.

Some other distinguishing features as compared to the 1996 AREAER are as follows: First, Miniane's indices take into account restrictions on inflows and outflows, without discriminating between the two. Second, some countries have restrictions on foreign equity participation in some sectors. The 1996 AREAER computes them as double restrictions, in both capital market securities and in foreign direct investment. Miniane computes this measure as single restriction on FDI, in order to avoid double counting. Third, many countries have restrictions on foreign investment in sectors related to defence and public order. Miniane does not consider these as capital controls, however indicates these sensitive cases with a note. Finally, AREAER fails to provide consistent information on whether countries enforce their restrictions. Miniane attributes a value of 1 whenever a control exists, regardless of whether it is enforced. In case, whenever AREAER indicates explicitly that a given restriction has never used or enforced, Miniane considers it as nonexistent with a note in the relevant cell. This index is expected to have negative impact on portfolio shares for the country of destination.

A 6.3 Investment

The variable INV_j is the share of the country j 's market capitalisation that is invested in country i . This variable is expected to have negative impact on $BIAS_{ij,t}$. This implies that the greater the equity investment of country j in country i , the lesser will be the deviation from the benchmark CAPM. This variable is computed using data on bilateral equity holdings from the CPIS, and data on stock market capitalisation data from the FIBV.

A 6.4 Diversification

The variable $Riskreward_{j,t}$ is the ratio of mean monthly return to standard deviation. Investors might tend to underweight those countries whose stock markets have performed poorly, based on their information of stock returns. This variable is expected to have negative impact on $BIAS_{ij,t}$.

A 6.5 Transaction Cost

The variable $Tran$ is a measure of transaction costs, derived from Elkins-McSherry Co. Elkins-McSherry Co. receives trade data on all global trades by institutional traders and computes measures of trading costs. These institutions accounted for 28 billion shares in 632,547 trades, using 700 global managers and 1000 brokers. The data consists of average trading costs as a percentage of trade value for active managers in a universe of 42 countries. The data are quarterly, from the last quarter of 1995 through the third quarter of 1998. In 1998, the institutional traders in the data represented 135 firms, of which 105 were pension funds, 27 were investment managers, and 4 were brokers.

The trading cost data comprises of three cost components viz. commissions, fees and market impact costs. Research in this chapter takes into account the total cost comprising of all three cost components. There is enormous variation in one-way trading costs across countries, ranging from as high of 198 basis points in Korea to a low of 30 basis points in France. Willoughby (1998) reports that Paris Bourse is one of the lowest-cost exchanges, while South Korea is one of the most expensive markets. Investors would underweight high transaction cost countries' in their portfolios. Therefore, this variable is expected to have positive impact on $BIAS_{ij,t}$.