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Linkages between U.S Cross-border Portfolio Equity Flows and Equity Markets

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Dedication

To ‘A’

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Abstract

There is an ongoing debate over the role that equity markets play in determining and influencing international equity flows. The first chapter of this dissertation describes the large portfolio equity flows into China and India, in order to understand the buying behavior of US investors. The rapid growth of the Chinese and Indian economies, coupled with the recent development and liberalization of their financial markets has attracted significant portfolio investment from U.S. investors. It is commonly assumed that domestic investors have an informational advantage over foreign investors; however, some recent empirical literature has questioned this assumption. Essay one dissects the nature of the relationship between foreign equity flows, equity returns, and related variables. The results of my empirical investigation provides evidence that U.S. institutional investors are making investment decisions based on long-run determinants of value rather than responding to price signals or 'chasing returns'. I anticipate that the strong relationship between equity flows and fundamentals will strengthen as information asymmetries decline and US investors continue to develop more sophisticated methods of assessing underlying value in China and India.

The second essay of this dissertation explores a new panel data set based on US gross cross-border equity flows to 20 industrialized nations combined with measures of market valuation for the period of 1977-2005. Empirical evidence of imperfect integration across world equity markets indicates that valuation matters. Consistent with relative value trading as a determinant of equity flow patterns, I find that equity flows decrease sharply with host-country market valuations—in particular the component of valuation that is forecasted to revert the following year. I also find that equity flows increase sharply with US equity market valuations. These results suggest the existence of a valuation channel for cross-border equity flows. The findings of this chapter show that US investors are informed about both domestic markets and foreign markets. Peripheral findings of this essay confirm the findings of other researches, but with a longer sample period. Consistent with existing literature, I find a negative influence of interest rates spreads, and information asymmetries on cross-border trade in equities.

Keywords: Equity Flows; Cross-border Portfolio Investment; International Markets; SVAR
JEL classification: F21; G15; G14; 016; G11

Introduction

The purpose of this dissertation is to explore the role that equity markets play in determining and influencing equity flows. Equity flows are one component of capital flows. Capital flows are generally broken into foreign direct investment flows, bond flows, and equity flows. Equity flows represent cross-border portfolio flows of investors living abroad. These flows comprise inflows, the flows originating in 'home' country and flowing into a foreign market, outflows, the flows originating in the 'foreign' country and flowing to the home market, and net flows (inflows-outflows). The motivations and relationship between equity flows and financial markets has been a subject of academic research for about 20 years. There are few established results on the determinants of equity flows between nations or the exact nature of the relationship between equity flows and financial markets (Portes and Rey, 2005 and Stulz, 1999). Empirical work has been stymied by data problems, imperfect mobility of capital, and behavior of international investors which is contrary to established theory. Empirical agreement has also been difficult to reach because different researchers focus on different time-periods and different sets of countries.

Equity flow literature and capital flow literature more broadly, has evolved along two major lines. The first line, sometimes referred to as the 'traditional' approach, explores the determinants of equity flows. The traditional approach has usually focused on large cross-sectional regressions, in an attempt to determine the long-run motivating factors of equity flows. The second line of research has evolved around understanding the dynamic relationship between equity flows and market returns. This research is often referred to as the 'portfolio' approach. The primary methodologies in the 'portfolio' approach are dynamic autoregressive models.

The first essay of this dissertation tackles the issue of the dynamic relationship between equity flows and equity market returns in two of the most rapidly growing

economies on the planet: China and India. China and India have emerged as the leaders in the Asian region due to their rapid growth and market size. China's economic growth in the past 20 years has been close to 8% per year, while India's annual GDP growth between 1999 and 2004 averaged approximately 6% per annum. Consequently, equity markets in both China and India have significantly developed following liberalization in the early 1990s. The rapid growth of these economies, coupled with the development of their financial markets, has attracted significant portfolio investment from US investors. For example, US institutional equity portfolio flows have increased from 0.63 billion to 7.14 billion in China and from 0.5 to 11 billion in India between 1994 and 2005.

Previous literature has avoided China due to the lack of transparency, government intervention, and awkward nature of the equity markets. India presents a counter-example to China, as its market is generally considered much more efficient. Both countries' equity markets were liberalized in 1992. This research is the first to consider the nature of the relationship between equity returns and flows using only post-liberalization data in these two economies. The first objective of chapter one is to garner an understanding of the time-series nature of the relationship between equity flows and equity returns in China and India. Issues that chapter one addresses include the response of equity markets to equity flows and the response of flows to changes in stock market performance. The tremendous increase in the volume and variability of gross equity flows to China and India, motivates the study of this component of capital flows.

The second objective of chapter one is to use the nature of the relationship between equity markets, flows and fundamentals, to address the issue of information asymmetry between foreign and domestic investors. Much of existing literature assumes that foreign investors are informationally deficient. This paper steps back from the a-priori assumption

that foreign investors are uninformed and decomposes the behavior of US institutional investors to address this issue empirically.

China and India are countries that export many products and services to the United States. The countries' financial systems are not as sophisticated as the financial system in the United States (GDF, 2005). These two facts make it entirely possible that economists in the US are better at analyzing many companies in China and India, than are Chinese and Indian economists. US economists may be better at gauging demand for exports, price trends, US economic conditions, and other global factors. In this case, there is no a-priori reason why one should believe that being located near a company's manufacturing facility is any more important than being located near the company's customers (Seasholes, 2004).

My results indicate that a one standard deviation shock to returns leads to a cumulative increase in unexpected monthly portfolio flows of 139 million US dollars in China and 153 million US dollars (USD) in India, over a 10-month forecasting period. More importantly, I find that in both countries shocks to fundamental determinants of value explain the majority of the variance in the purchase behavior of US institutions. I find that a one standard deviation shock to dividend yields leads to a 260 million USD increase in unexpected flows in China and a 394 USD increase in unexpected inflows in India. I anticipate that the strong relationship between equity flows and fundamentals should strengthen in the future as information asymmetries decline and US investors continue to develop more sophisticated methods of assessing underlying value in these markets.

The findings of the first chapter of this dissertation support the notion that US institutional investors are not informationally deficient, since they respond more to shocks in fundamentals than to shocks in prices. Furthermore, this research finds evidence that the variance of the Chinese equity market is statistically unaffected by shocks to equity flows and shocks to dividends. In India, on the other hand, US investors' portfolio allocation decisions

appear to have a significant effect on the evolution of market returns. Weak evidence of US institutional investors leading the Indian equity market is also uncovered.

The second chapter of this dissertation uses the traditional approach to modeling capital flows to address the issue of market valuation as an empirical determinant of equity flows for 21 developed nations. Previous literature has considered a variety of factors that motivate equity flows, but market valuation has been ignored in the majority of the literature. In chapter two, I conduct a comprehensive investigation of the role that relative market valuation plays in motivating the large cross-border trade in equities. The influence of equity market valuation on cross-border equity flows has not been considered as an empirical determinant or equity flows, because a common assumption of most financial models are that markets are integrated and efficient. However, in reality, relative value trading is common. The US Offshore Funds Directory (1999) lists several dozen hedge funds that use 'pair trading' as one of their principle equity investment strategies.

This observation indicates that relative market valuations may be important. The possibility that valuation of equity markets is a determinant of equity flows is important, because it implies that if the equity of an individual country becomes relatively undervalued, large US investors will reallocate their investments to the country whose equity is temporarily undervalued in hopes to make excess returns as the financial markets corrects this mispricing. Additionally, the finding that relative valuation is a determinant of equity flows will help to explain many of the mixed findings in previous literature.

The need to consider the role of equity market prices or valuation ratios on cross-border equity investment can be further evidenced by empirical findings of 'Siamese twin' stocks, which illustrates that the same stock can trade at different prices in different markets. Froot and Dabora (1999) find that Royal Dutch and Shell transport have often not been priced

in line with their relative claims on cash flows. Essay two considers the role of equity market valuation and cross border equity flows between the US and 20 industrial countries.

The specific question this paper addresses is whether source and host country valuations are an empirical determinant of cross-border equity flows. The data for this study is hand collected from a variety of sources and spans the period of 1977-2005. The length and cross-sectional size of my data set makes it one of the largest panels of data that analyzes the empirical determinants of equity flows. Consistent with relative value trading as a determinant of equity flow patterns, I find that equity flows decrease sharply with host-country market valuations—in particular the component of valuation that is forecasted to revert the following year.

I also find that equity flows increase sharply with US equity market valuations, supporting the notion of a relative wealth effect. These findings suggest the existence of a valuation channel for cross-border equity flows. When valuation is decomposed into a mispricing component, (i.e. the component of valuation predicted to revert) and a more permanent or fundamental component, I find that US equity flows are strongly negatively related to the mispricing component and weakly positively related the permanent component. This finding suggests that US investors are informed about both domestic and foreign equity markets and allocate their funds rationally, based on fundamentals. Peripheral findings of essay two confirm the findings of other researches, but with a longer sample period. Consistent with existing literature, I find a negative influence of interest rates spreads, and information asymmetries on cross-border trade in equities.

In both chapters of this dissertation, I find support for the view that large US equity investors are not informationally deficient. In China and India, the variance of US investor behavior is strongly influenced by shocks to fundamentals, and not transitory price shocks. In industrial nations the finding that equity flows are negatively related to the component of

valuation that proxies mispricing, while strongly positively related to the component of valuation that proxies fundamental valuation, indicates that large US investors are acting on information and not following only price signals. I believe that the strong relationship between fundamental determinants of equity prices and cross-border trade in equities will increase in coming years. As information, asymmetries continue to decline and equity investors continue to 'learn' about markets abroad.

The rest of this dissertation is structured as follows: Chapter 1 contains essay one, Chapter 2 contains essay two and Chapter 3 concludes my dissertation.

Chapter 1

Linkages between US Institutional Equity Flows and Equity Market Returns: Evidence from China and India

1. Introduction and Motivation

Asia presents one of the most vibrant economic environments in the world and the dynamic nature of the region has drawn considerable attention from academics as well as the business community. China and India have emerged as the leaders in the Asian region due to their rapid growth, market size, and market potential. China's economic growth in the past 20 years has been close to 8% per year, while India's annual GDP growth between 1999 and 2004 averaged approximately 6%. Consequently, equity markets in both China and India have significantly developed following liberalization in the early 1990s. The rapid growth of these economies, coupled with the development of their financial markets has attracted significant portfolio investment from US investors. For example, US institutional equity portfolio flows have increased from 0.63 billion to 7.14 billion in China and from 0.5 to 11 billion in India between 1994 and 2005[1].

This chapter examines the dynamic nature of the relationship between US portfolio equity flows and equity returns in China and India. Equity flows represent cross-border portfolio flows of investors living abroad. These flows are comprised of inflows, the flows originating in 'home' country and flowing into a foreign market, outflows, the flows originating in the 'foreign' country and flowing to the home market, and net flows (inflow-outflow). While it is generally held that portfolio flows benefit the economies of the recipient countries, policy makers have been more 'uneasy' about such investments (Stulz, 1999). Portfolio flows have often been referred to as 'hot money' and are volatile compared to other forms of capital flows (Kim and Ying, 2001). Portfolio flows have been blamed for

[1] Figures calculated using US treasury department data (TIC).

exacerbating small economic problems in a country by making large concentrated withdrawals at the first sign of economic weakness[2]. Portfolio flows have also been held responsible for spreading financial instability and causing contagion in international financial markets.

International equity flows have emerged as an important policy issue in China and India as well (Tian, 2002). The danger of a 'Thailand-style' abrupt and sudden withdrawal of equity flows and the destabilizing effects on equity markets are of concern. While these concerns are justified, comparatively less attention has been paid to analyzing the actual flow data and understanding the key relationships between these flows and equity markets. A proper understanding of the influence of equity flows on equity market returns and vice versa is essential for a meaningful debate about their effect. Since these flows are now large and variable, effort to understand their relationship with financial markets is called for. In academic literature, there is a lingering debate on the role of foreign investors in emerging markets, both in terms of the informational role of their trades and in terms of the effect that portfolio flows have on local market returns[3]. The objectives of this essay are first to uncover how equity market returns influence cross-border equity flows of US institutional investors and in turn, how these portfolio flows affect equity returns. To this end, I first look at the key features of equity flows and then study the relationship between equity flows and stock markets with the key objective of determining causality or more generally forecastability. Several papers have looked at the relationship between flows and returns and interpreted their findings in terms of 'trend-chasing', 'base-broadening', 'price pressure', or 'momentum investing', without asking why it is foreign investors are prone to such behavior.

[2] Evidence is provided by the actions of portfolio investors in Malaysia during the Asian Financial Crisis of 1997. Refer to Maroney, Naka, and Wansi (2004) for detailed discussion on the 1997 Asian Financial Crisis.
[3] See Dvorak, 2003, Portes and Rey, 2005, Rey and Hau, 2004, Brennan and Cao, 1997, Tesar and Werner, 1995, Froot and Ramadori, 2005.

The second objective of this research is to use the nature of the relationship between portfolio equity flows, equity markets, and related variables to uncover if US portfolio investors act as informed investors. There is no accepted method to tackle this issue. With proprietary data Brennan, Cao, Stong and Xu (2005), looked at the relationships between the perceptions of foreign investors and returns, where perception were measured from Merrill Lynches Monthly Fund Manger Survey. Without access to this data, I take a unique approach and look at the response of US equity flows to unexpected shocks in both market prices and fundamental determinants of equity prices, to address an emerging debate in the literature over the equality of information between foreign and domestic investors.

The majority of academic research argues that local (i.e. Chinese or Indian) investors in emerging markets naturally have an information advantage over foreigners (i.e. US), while a new line of research suggests foreign investors may perform better than domestic investors in their selection and timing of emerging market investments[4].

To address the issues above and to understand the relationship between equity flows, market returns, and other variables I dissect my empirical findings. First, I examine the correlations between stock market returns and portfolio flows, second I decompose flows into expected and unexpected components to analyze how returns are influenced by different flow components, and third I explore the dynamic relationships among flows, returns, and related variables that include dividend yield and industrial production. The primary empirical methods employed are VAR, VARX, and SVAR.

The attractive feature of VAR and SVAR analysis is that since the relationship between flows and returns is not well established and neither variable is known to be exogenous, VAR allows for each variable in the system to be treated symmetrically. For example, in a bivariate case, VAR allows the time path of returns to be affected by current

[4] See Brennan and Cao (1997), Seasholes (2004), Brennan, Cao, Strong and Xu (2005), Dvorak (2003)

and past realizations of the return sequence and allows the time path of the return sequence to be affected by current and past realizations of the flow sequence. The time path of the flow sequence is also affected by current and past realizations of both the return and flow sequences. Another attractive feature of VAR is that the structure of the system incorporates feedback because the variables in the system are allowed to affect each other (Enders, 2004).

The findings of this chapter show that flows are 'pulled' into China and to a lesser extent India by returns greater than US market returns. These results imply that US investors funnel investment funds to foreign markets in an attempt to take advantage of higher returns. This finding is consistent with the return chasing behavior, suggested by Bohn and Tesar (1996) and documented in several other countries. There is stronger evidence of return chasing in China than in India. This finding suggests that agents are relying more on past return realizations to forecast future returns in China, than in India. These finding are consistent with the logic that information asymmetries are larger in China for US investors than in India. My results are both statistically and economically significant. I document that one standard deviation shock to returns leads to a cumulative increase in unexpected monthly portfolio inflows over the next 10 months of 139 million USD into China and 154 million USD into India.

The second major finding of this essay is that the variance of the Indian equity index is influenced by US investment activity and dividend yields, whereas the Chinese equity index is statistically unaffected by US investor behavior and fundamental determinates of value. This supports the ideas espoused in the financial press and academic literature that the Chinese government still plays a major role in determining equity prices[5]. This result reveals that the participants in the Chinese equity market do not view increases in US equity purchases as signaling information, as evidenced by the fact that the time path of the market

[5] See Tian (2002) and Allen et al (2005)

is statistically unaffected by US purchasing behavior. On the other hand, in the Indian market participants considers changes in the purchasing behavior of large US investors as signaling information. The finding that the variance of the Indian equity market is influenced by the investment decisions of US portfolio investors indicates that US institutional investors are playing a major role in the Indian market.

This essay also documents that when returns are decomposed, flows tend to be better explained by fundamental shocks as opposed to price shocks. This result is also economically significant, I show that a one standard deviation shock to dividend yields leads to a cumulative increase in inflows in China of 260 million USD and 394 million USD in India, over a ten-month forecasting period following the shock. These results indicate that US investors are reacting to fundamentals in both the Chinese and Indian markets, which suggests that US institutional investors are not informationally deficient.

The rest of this chapter will be structured as follows: Section 2 surveys the literature, Section 3 presents some background of capital flows to China and India, Section 4 provides a brief primer on the Chinese and Indian equity markets, Section 5 presents the major questions and approaches of this essay, Section 6 details my empirical methodology, Section 7 describes the data, Section 8 presents the results, and Section 9 concludes.

2. Literature Review

2.1 General Review

Financial economists have generally thought about portfolio flows in the context of a portfolio optimization problem. In order to get closed form results, theoretical work has been forced to make several very restrictive assumptions. This makes the performance of such models difficult to judge, and has led to a variety of stories about the relationship between equity flows and market returns. For example, Griffen, Nardari, and Stulz, (2004) recently

attempted to model equity flows and derived demand curves for foreign equities, which are shown in equations (1) and (2):

$$N_D^D = \frac{\mu_D}{\sigma_D^2}\frac{W^D}{P_D} \tag{1}$$

$$N_F^D = \frac{\mu_F}{\sigma_F^2}\frac{W^D}{P_F} \tag{2}$$

where N_D^D and N_F^D are number of shares demanded by domestic investors in domestic markets and number shares demanded in foreign investors respectively, μ_D and μ_F are mean returns for domestic and foreign markets, σ_D^2 and σ_F^2 are variance of domestic and foreign markets respectively, W^D is domestic aggregate wealth of domestic investors and P_D and P_F is price of shares in domestic and foreign markets.

While these demand curves provide a benchmark for thinking about the main drivers of portfolio flows, they were derived under some very restrictive assumptions. For example, it is assumed that the world has only two countries and each country has only one stock (or market portfolio). Additionally, it is assumed that the returns of the two stocks are uncorrelated. Trading is assumed to be continuous and that all investors in a country are identical log utility functions; the log utility assumption implies that the portfolio demands of investors are myopic, so that they do not depend on the state of the world. While a portfolio optimization model, like the one of Griffen et al (2004) provides a framework for thinking about equity flows, as one sees from the example above, the reality of equity flows is likely much more complicated.

The research on the motivation for capital flows has long been a subject of research in financial economics. This research began with studies of the degree of capital mobility among countries. Early models of capital flows found it convenient to assume perfect mobility of capital. However in 1980, the Feldstein-Horioka puzzle was identified--the

finding of low capital mobility in OECD countries (Obsterfeld and Rogoff, 2001). Today the existence of the Feldstein-Horioka puzzle is particularly puzzling, since there are several indications that industrial countries' international capital markets are well integrated (Stulz, 1999). In practice, this puzzle, along with other complications, implies that it has proven difficult to model capital flows in a world in which capital is not perfectly mobile or information is not distributed uniformly (Bekaert, Harvey and Lumsdaine, 2002). This has led researchers to rely on single equation and vector autoregressive models to determine the nature of the relationship between equity flows and returns (Hoti, 2005).

Another strand of research has tackled the issue of equity flows starting with the idea that there are diversification gains from investing in countries with low correlation with one's home market. Studies published in the 1960's and 1970's showed that investors are rewarded for holding a globally diversified set of assets rather than skewing their portfolios toward domestic investments (Solnik, 1974). Since that time, barriers to international investment, such as government controls on cross-border capital flows, difficulties in obtaining information about foreign markets, and differences in financial institutions have gradually declined[6].

One of the most influential papers in this area of research is by Tesar and Werner (1995) who find that US investors do not invest in Canada enough to take advantage of the full diversification benefits. There appeared to be a simple explanation for this phenomenon---transaction costs. However, turnover rates by American investors abroad are higher than in domestic equities. Since Tesar and Werner's papers in 1994 and 1995, the academic literature on equity flows has developed along many lines. This portion of the chapter will detail the development of this literature along the hypotheses most frequently cited in literature.

[6] Antidotal evidence exists in Thailand where the banking sector is being 'over-taken' by foreign banks, following the collapse of the banking system in 1997.

2.2 Common Hypotheses

I begin this section by briefly summarizing the literature before tackling the major theories in detail. Existing evidence indicates a strong relationship between inflows of foreign capital and market returns. Griffin, Nardari, and Stulz (2004) have recently confirmed this result in their studies on emerging Asian equity markets, though China and India were not included. What is unsettled is the interpretation of this relationship and implications for the role of foreign investors in emerging markets. There are several competing hypotheses to explain this relationship. One hypothesis is that the participation of foreign investors in the market brings about a demand shift and hence a permanent price change. This broadening of investor base increases risk sharing opportunities and hence lowers the required rate of return. Theoretical arguments for this mechanism are provided by Merton (1987), and empirical work on the effect of liberalization on emerging markets is reported by Bekaert and Harvey (2000) and Henry (2000). Another hypothesis is the temporary price pressure effect due to market illiquidity in absorbing the extra demand and the resulting price change tends to be reversed in subsequent trading periods, empirical work in mutual fund literature by Warther (1995) and in equity flows by Clark and Berko (1997) fail to find support for this notion. In addition, the role of foreign investors in emerging market is also much debated, as they are alternately described as trend chasers (Cho, Kho, and Stulz, 1999, Bohn and Tesar, 1996), informed traders (Seasholes, 2004, Grinblatt and Keloharju, 2000), or investors with information disadvantage (Brennan and Cao 1997, Brennan, Cao, Stong, and Xu, 2005).

2.3 Return Chasing

The most commonly found characteristic of the nature of the relationship between of equity flows and returns is 'return chasing' or the fact that US purchases are positively correlated with both current and lagged stock returns. The seminal paper that developed the

return chasing hypothesis in the context of equity flows was by Bohn and Tesar (1996). The return chasing hypothesis implies that investors chase high returns into emerging equity markets. This implies that flows should be correlated with lagged returns and therefore flows should be able to be predicted from lagged returns. Hence, as investors see that foreign markets are outperforming domestic markets they funnel funds to the foreign market in an attempt to take advantage of these excess returns. This behavior leads to a positive relationship between lagged returns and equity flows.

The theory of return chasing is most clearly understood in the context of Bohn and Tesar's (1996) paper. They consider the problem facing an investor who can purchase market indexes of domestic and foreign equities, in the context of the International Capital Asset Pricing model (ICAPM). They relate net purchases to portfolio shares using standard economic definitions. Bohn and Tesar (1996) let NP_{kt} represent the period-t net purchases of stocks in country k, and let W_t represent the value of the investor portfolio. By definition then, net purchases of asset k are related to shares in the portfolio (x_{kt}) and total wealth by the following relation:

$$NP_{kt} = x_{kt}W_t - (1 - g_{kt})(x_{kt-1}W_{t-1})$$

(3) where g_{kt} is the capital gain on a security of country k. Bohn and Tesar go on to assume that wealth at time t is a function of return on the total portfolio over the period and approximate net purchases as:

$$NP_{kt} = (x_{kt} - x_{kt-1})W_{t-1} + (d_t^p + g_t^p - g_{kt})x_{kt-1}W_{t-1} \quad (4)$$

where d_t^p and g_t^p are dividends and capital gains on the investors complete portfolio. The above equation suggests that there are two factors that influence an investor's decision to purchase foreign equities. The first is if the desired weights in the securities of market k changes over the period and the second channel is the portfolio-rebalancing effect. Since

dividends and capital gains are earned on the entire portfolio increase the wealth of investors, these gains then need to be distributed across securities. Additionally, if the capital gains on security or market k were high the investor may want to sell some to bring portfolio weights back into balance. Bohn and Tesar use the approximation above and the first order condition of Cox, Ross, and Ingersoll (1985) and assume that US investors choose portfolios of equities facing the tradeoff between mean and variance and that all variation occurs in the first moment, they derive the following equation[7]:

$$NP_{kt} = (d_t^p + g_t^p - g_{kt})x_{kt-1}W_{t-1} + e_k \sum_t^{-1} (\overline{\mu}_t - \overline{\mu}_{t-1})\alpha W_{t-1} \quad (5)$$

where α is the coefficient of relative risk aversion, $\overline{\mu}_t$ is the vector of expected excess returns on all securities, e_k is a 0-1 vector that selects element k and $\sum_t^{-1}$ is the covariance matrix.

The second term of the Bohn and Tesar (1996) equation (equation 4 of this paper) captures the extent that investors adjust the weights in their portfolios to 'chase' higher average returns. Bohn and Tesar define return chasing as follows, given a fixed level of risk aversion and a constant variance-covariance matrix of returns, an investor adjusts his portfolio weights only if his expectations of excess returns are changed over time. Empirically this has been translated into a positive relationship between past returns and equity flows (Portes and Rey, 2005, Froot et al, 2001). Froot, O'Connel and Seasholes (2001) found that the majority of co-movement of flows and returns at quarterly or monthly intervals is actually due to returns predicting future flows, which would be supportive of the return chasing behavior of international investors. They also found some ability for international inflows to forecast returns.

A number of papers have also documented similar phenomena, which has also been termed positive feedback trading. Choe, Kho and Stulz (1999) detect strong positive

[7] For more details, see Bohn and Tesar (1996).

feedback activity in Korea before the Asian financial crisis, but not during the crisis. They found that foreign sales do not lead to negative abnormal returns, which implies that there is no evidence that foreigners are destabilizing. Dahlquist and Robertsson (2004) document a similar feedback trading behavior in the Swedish market showing that such behavior may not be just a characteristic of emerging markets. However, the return chasing hypothesis is not without challenge, for example Portes and Rey (2005) in a large panel study fail to find evidence of return chasing and Brennan and Cao (1997), Brennan, Cao, Strong and Xu (2005) tend to favor the information asymmetry as an explanation for the observed relationship between equity flows and market returns.

If one ties together the ideas of informational differences and the positive feedback-trading hypothesis, one would expect to find that as informational differences decline that positive feedback trading or return chasing would also decrease. The reason for this conjecture is as follows: since a rudimentary method for forecasting future expected returns is based on past returns, as information asymmetries decline, foreign investors will develop more sophisticated methods for determining expected returns and therefore we would expect to observe a decline in return chasing. While this hypothesis has not been directly tested (to my knowledge) in Froot et al (2001) they found that, return chasing was more common in emerging markets than in developed markets. This leads to the conclusion that as information asymmetries decline, there is a reduction in positive feedback trading.

2.4 Portfolio Rebalancing

A second proposed theory on the relationship between equity flows and returns common in the literature is the portfolio rebalancing effect, which implies, investors will sell equities from countries that are the best performers in their portfolio since they have become overweighed in these securities. The portfolio rebalancing effect predicts that high U.S

returns are accompanied by flows toward foreign countries. Alternatively, from a Chinese perspective, a high return in the Chinese equity market would imply flows toward foreign (non-Chinese) markets. Recently, Rey and Hau (2006) modeled this relationship in with an intuitive relationship called the uncovered equity parity condition. According to the logic of their model, after a period of good returns international investors are exposed to more risk so they repatriate some funds, this causes foreign currency to depreciate. Rey and Hau (2006) derive a negative correlation between foreign equity excess returns and the corresponding exchange rates. The recent theoretical model by Rey and Hau (2006) suggests the portfolio-rebalancing motive for capital flows.

To derive the main findings of their paper Rey and Hau make several assumptions: first they assume that both the home and foreign stock market provide exogenous stochastic dividend flows in local currency. Investors can invest in the market as well as a riskless domestic bond with a constant return. The second major assumption is that home and foreign investors are risk adverse and maximize a mean-variance objective function. Home investors pick a portfolio of home and foreign equities and vice versa. The third assumption is that the foreign exchange market clears for a less than fully price elastic supply curve. The fourth major assumption is that home and foreign dividends expressed in local currencies follow a particular process, have identical variance, and mean reversion. The risk aversion of the investors and the market incompleteness with respect to foreign exchange trading imply that asset prices will generally differ from fundamental value.

While the main finding of Rey and Hau's (2006) paper does not directly derive an inverse relationship between returns and equity flows, this relationship is implied by their model. Rey and Hau (2006) introduce the risk-rebalancing channel of capital flows; this channel is modeled to work as follows: any excess performance by foreign equity market will lead to an increase in relative exchange rate exposure of the home investor and will therefore

alter the tradeoff between diversification benefits and exchange rate risk. One would therefore expect the home investor to decrease her investment in foreign equities and foreign investor to increase her investment in foreign equities. This is what Rey and Hau call the 'risk rebalancing' channel for portfolio flows. One of the key contributions of this paper is that it explicitly provides motivation for the portfolio-rebalancing channel for net equity flows based on exchange rate risk rebalancing. Formalizing the logic of the risk-rebalancing channel, Rey and Hau (2006) develop the following two relationships assuming incomplete FOREX trading:

$$Corr\left[-dE_t, (dR_t^{f*} - dR_t^d)/\overline{P}\right] = -1 \quad (6)$$

where d and f are domestic and foreign respectively, dE is exchange rate return, where a positive value represents dollar appreciation, $(dR_t^{f*} - dR_t^d)/\overline{P}$ is excess return of foreign equities over domestic equity divided by steady state prices[8]. This relation simply states that there should be a perfectly negative relationship between foreign currency appreciation and foreign excess return.

For their empirical work, Rey and Hau only maintain the negative sign of the above relationship. This correlation has been called the equity parity condition.

As with the interest rate parity condition where foreign exchange rates move one-to-one with interest rate differences, in the equity parity condition exchange rates move one-to-one with equity price differentials. This is because the forces of demand and supply prevent arbitrage and in theory, drive market price to meet this condition. The second relationship they developed is as follows:

$$Corr\left[-dE_t, (dK_t^f - dK_t^{d*})\right] = 1 \quad (7)$$

[8] In their empirical work, this variable is calculated as log of foreign stock market index return (in local currency) relative to US market index returns (in dollars).

This simply states that there should be a perfectly positive relationship between foreign currency appreciation and net equity flows into the foreign country.

While not derived in their paper the implications of the above two correlations implies that:

$$Corr\left[(dR_t^{f*} - dR_t^d)/\overline{P}, (dK_t^f - dK_t^{d*})\right] = -1 \quad (8)$$

Under the assumptions of Rey and Hau (2006) there should be a negative correlation between excess foreign returns and equity flows into a foreign country to reflect the trade-off between foreign exchange risk and the benefits of diversification. The reason for the negative relationship between foreign exchange rate risk and diversification benefits in Rey and Hau's models comes from the fact that as equity holders increase their holdings of foreign equities they are subject to more foreign exchange rate exposure if they are not completely hedged. In Rey and Hau's model, this increase in foreign exchange rates risk reduces the benefits of diversification. If investors have optimally chosen their portfolio weights at time one and the foreign market outperforms the domestic market then the investor is subject to more foreign exchange risk and will repatriate some funds back to her home country.

Empirically this translates into a negative relationship between excess returns and equity flows. This model is particularly interesting, but cannot be directly applied in this essay because of the nature of the financial markets in China and India. Since the exchange rate in China is fixed (expect for the occasional change in the peg), if the Chinese equity market experienced excess returns (i.e. returns greater than the US) investors would not be subject to increases foreign exchange rate risk and hence would have little incentive to repatriate funds back to the US. In the case of India, the assumption of a riskless Indian bond seems to not be supported in reality, though the model does have more realism in the case of India. These issues make testing Rey and Hau's model using Chinese and Indian data plagued with problems and hence I use this model only as a starting point in my analysis.

2.5 Base Broadening and Price Pressure

Another interesting strand of literature developed as an application of a theoretical model by Merton (1987) appears to explain many of the observed characteristics of the relationship between equity flows and stock market returns. Merton (1987) provides an intuitive and tractable model for illustrating how broadening the investor base for a given market (or stock in Merton's original model) may raise equity prices through risk sharing. In Merton's model, investors are assumed to invest only an exogenously determined subset of the universe of equities. Merton characterizes the assumed barriers that prevent investors from holding fully diversified portfolios as informational, i.e. investors only invest in stocks about which they are 'informed'. However, he notes that his approach is consistent with explaining the impact of other barriers such as institutional restrictions including: limitations on short sales, taxes, various transactional costs, liquidity, or imperfect divisibility of securities.

Merton demonstrates in his framework that if investors were able to invest in all equities, the standard capital asset pricing model pricing relations would hold, that is, the expected return on a given market (or share in his original model) would be a function of its covariance with the global market, but not its variance. However, with segmentation restrictions, the expected return on a market, with a restricted investor base, will be higher than its unrestricted return by a risk premium that is a convex function of the markets conditional variance, the narrowness of the investor base and the investor's risk aversion. Markets (or stocks in Merton's 1987 paper) with narrow investor bases exhibit higher expected returns because for the holders of the shares in these markets the variance of returns on the stocks is more systematic than it appears from the perspective of the market as a whole. Merton's model predicts that the greater the number of 'informed' investors the lower

the required rate of return. This hypothesis is often referred to as the 'base broadening' hypothesis[9].

Berkaert, Harvey and Lumsdaine (2002) use this idea to show that equity flows should lower the cost of capital in many countries and facilitate the flow of capital to firms and countries that have the best investment opportunities irrespective of their location. In their empirical work, Berkaert et al (2002) use dividend yield to proxy the cost of capital and find a negative relationship between equity flows and dividend yields, implying that as investor base increases the cost of capital declines, which in turn increases equity prices.

The base broadening hypothesis has also been used to establish a relationship between equity flows and equity return in the segmentation literature (Henry, 2000). Stulz (1999) implicitly suggests that a dramatic change in investor base, surrounding liberalization in emerging market equities, has implications for their pricing. In particular, because of greater risk sharing and increased liquidity, expected returns should fall and cause prices to increase. The base broadening hypothesis has also been interpreted as a sort of 'radar' theory. As the equities of a particular country are exposed to a larger number of investors, the required return for this equities decline, which leads to an increase in price.

While the base broadening hypothesis is compelling, the efficient market hypothesis implies that relevant information available at the start of the period should already be reflected in the price of assets at the start of the period. Therefore, if foreign demand is expected to ultimately push prices to a higher equilibrium level, prices should rise ahead of actual inflows (Clark and Berko, 1997). Additionally, if investors are unsure of the magnitude of new foreign demand, the arrival of new information that causes investors to increase their estimates of total foreign inflows should push prices to a higher level. This implies that lagged inflows should be important.

[9] Merton's base broadening hypothesis is known in some circles as the Radar theory; Merton's comparative statics are discussed in the SVAR section of this chapter.

The converse of the base broadening theory was tested in the context of aggregate mutual fund flows by Warther (1995) and in the context of exchange rates by Hau, Massa and Peress (2005). Warther (1995) develops a theory in the context of aggregate mutual fund flows which is referred to as the price pressure hypothesis and suggests that a rise in prices associated with an inflow surge are due to temporary illiquidity; such a theory predicts that inflow induced price increases will be reversed. Shleifer (1986) presents evidence that increases in stock prices resulting from the announcement of inclusion of individual stocks in the Standard and Poor's 500 are at least partially reversed over the subsequent 30-60 trading days. However, Warther's (1995) approach is more appropriate for testing the relationship between aggregate equity flows and market wide prices.

One of the empirical implications that Warther developed is that if mutual fund flows exert price pressures, security returns should exhibit reversals as prices return to fundamental levels. However, Warther (1995) did not find any instances of reversals in his study. Berko and Clark (1997) investigate the price pressure hypothesis in the context of Mexico, but like Warther, find no evidence of price pressure.

2.6 Information Disadvantage of Foreign Investors

The vast majority of the literature agrees that foreign investors tend to build-up positions in foreign markets slowly, which implies that new purchases can be predicted from past purchases. Brennan and Cao (1997) postulate that one reason for the autocorrelation of equity flows is that foreign investors are less informed about local market than domestic investors. With this assumption, they propose a model that links the relationship between international portfolio flows and market returns to differences in information endowments between foreign and domestic investors. The crux of their argument is that if domestic

investors are better informed than foreign investors, they will hold more domestic shares on average.

The reason for this is that foreign investors discount share prices relative to domestic investors since domestic investors tend to sell if they have adverse information that is not incorporated in asset prices. This implies that foreign investors do not take full advantage of the complete benefits of diversification as they would if information was symmetric. The home bias resulting from information asymmetries implies that the cost of capital in the domestic country is higher than it would be in the absence of these asymmetries because domestic investors bear greater risk. Therefore, as flows leave the country because of bad news, equity prices decline because domestic investors have to hold more domestic shares, and hence bear more risk (Brennan and Cao, 1997). Inflows have the opposite effect; prices should increase to reflect the lower risk bore by domestic investors. This implies that in such a world flows should have an impact on the cost of capital. As information is revealed, investors change their holdings, which have a permanent effect on prices.

Brennan and Cao's (1997) empirical work finds positive correlation between flows and both contemporaneous and lagged returns that are supportive of their notion that foreign investor's are informationally disadvantage, the results were particularly strong in emerging markets. Kang and Stulz (1997) argue that the ideal setting to further test the hypothesis of information asymmetry would be to see if foreign investors favor large firms. However, Japan is the only country where the data on holdings of equities by foreign investors is easily available at the firm level. Kang and Stulz (1997) demonstrate that foreign investors have a considerable bias toward large firm stocks in Japan. The conclusion that this is evidence of uninformed foreign investors is slightly naïve, since the majority of foreign investors are institutions and institutions tend to favor large firms even in the domestically domestic

market. There is no reason to think they would not be consistent in their investment preferences abroad.

2.7 Intelligent Foreign Investors

As mentioned above, existing empirical work has consistently found that foreign investors tend to build up positions slowly which leads to autocorrelation in equity flows. These results have been taken to suggest cross-border heterogeneity in information endowments[10]. The reason autocorrelation has been taken to suggest informationally deficient foreign investors, is because autocorrelation in equity flows reflects a learning process. However, it has also been recently suggested that there is a strong possibility that foreign investors may be 'smart' to use the words of Seasholes[11]. The possibility of intelligent foreign investors was also mentioned in Brennan and Cao's 1997 paper, but was assumed away.

It is not unreasonable to assume that the average domestic investor is better informed than the average foreign investor, particularly in emerging markets. However, it is also not unreasonable to assume that many (likely institutional investors or large investors) may be able to gain informational advantages over locals. This assumption is particularly rational when the best foreign investors and local traders tend to have very similar backgrounds and skills. This concept was recently suggested by Seasholes (2004) in the case of Taiwan. Additionally, if one assumes that foreign institutional investors are informed, this could explain the observed autocorrelation in flows. For example, if a US institution were able to gain an informational advantage, they would want to 'hide' or conceal this informational advantage. The attempt to conceal this information would lead to rationing behavior in an attempt to minimize the price impact of their purchases. Thus, the observed autocorrelation

[10] See Brennan and Cao (1997), Griffen et al (2004), Brennan, Strong and Xu (2005), Kim and Ying (2001)
[11] See Dvorak (2003) and Seasholes (2004)

of equity inflows could be a result of rationing behavior by US institutional investors with superior information or could reflect learning, depending on one's assumption about information endowments[12].

Further motivation for the idea that US investors may not have inferior information endowments is provided by the nature of the economies of China and India. China and India are countries that export many products and services to the United States. Alfaro, Kalemali-Ozen and Volosovych (2005) mention that several factors tend to reduce information asymmetries between countries. The first factor they mention is a rapidly growing economy, as GDP increases informational asymmetries decline. The second factor, which Alfaro et al (2005) mentions that reduces differences in information, is increase in trade between nations or regions. The fact that China and India are expanding coupled with the increase in trade with the US, indicate that informational asymmetries have likely declined.

The decline in information asymmetries combined with China and India's suboptimal financial system make it entirely possible that economists in the US are better at analyzing some companies in China and India, than are Chinese and Indian economists. US economists may be better at gauging demand for exports, price trends, US economic conditions and other global factors. In this case, there is no a-priori reason why we should think that being located near a company's manufacturing facility is any more important than being located near the company's customers (Seasholes, 2004).

Even with the above considerations, the base assumption of most models that attempt to model the relationship between equity flows and equity market returns are that domestic investors are better informed than foreign investors. This causes the beliefs of foreign investors to be more sensitive to new information than the beliefs of domestic investors (Brennan and Cao, 1997). As a result, foreign investors buy from domestic investors when

[12] See Froot, O'Connell and Seasholds (2001) Froot and Ramadorai (2005), Grinblatt and Keloharju (2000) for some recent examples.

there is good news and prices rise and sell when there is bad news and asset prices fall, which can account for the observed trend-following behavior (or return chasing) of foreign investors (Bohn and Tesar 1996). Theoretical models of information asymmetry (where domestic investors are better informed than foreign investors) predict a positive contemporaneous relation between net flows and returns. (Brennan and Cao, 1997, Brennan, Cao, Stong and Wu, 2005).

The assumption of domestic investors having superior information has recently come under challenge. Seasholes (2004) finds evidence that foreign investors are better informed than domestic investors. He also finds that the amount that foreigners hold or trade in an underlying stock is a good proxy for ability to profit. Froot and Ramadori (2005) agree with Seasholds (2004) and find that foreign investors act informed. Hamao and Mei (2001) also argue that foreign investors are more sophisticated than domestic investors in Japan and tend to be long term contrarians; additionally Grinblatt and Keloharju (2000) suggest that foreign institutional investors are the most sophisticated investor class in Finland. One of the objectives of this essay is to use the relationship between equity flows and equity market returns to uncover the nature of the information endowments of US investors. Since these flows are now large and variables, further effort to understand their determinants and information levels of market participants is important.

3. Background on Capital Flows to China and India:

3.1 FDI and Equity Flows

Capital flows are generally broken down into foreign direct investment flows (FDI) and portfolio flows (bond flows and equity flows). International portfolio flows are, as opposed to foreign direct investment, liquid in nature and are motivated by international portfolio diversification benefits for individual and institutional investors. Institutional

investors like pension funds and mutual funds initiate the majority of cross-border equity flows and bond flows[13]. Table 1.1 shows that there is a positive correlation between FDI and portfolio investment, in both China and India. This indicates that many of the factors that make a country a desirable place to acquire fixed assets also make it a desirable place to invest portfolio monies.

Table 1.1: Correlation between US Institutional Equity Flows and Foreign Direct Investment Flows (FDI)

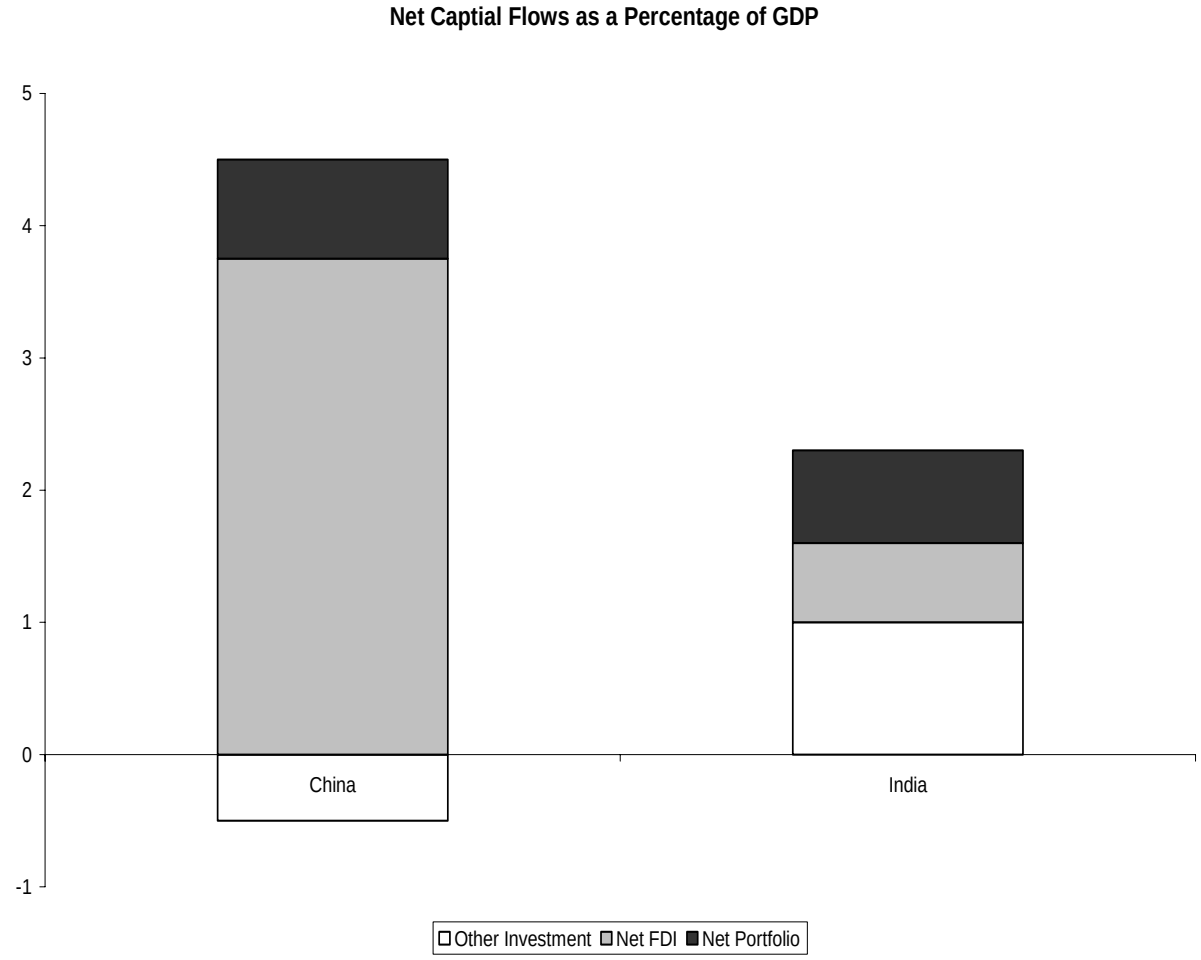
	FDI (CHINA)	***FDI (INDIA)***	***E(CHINA)***	***E(India)***
FDI (CHINA)	1			
FDI (INDIA)	0.87	1		
Equity(CHINA)	0.63	0.39	1	
Equity(India)	0.57	0.54	0.66	1

Based on data from 1994-2005 from the BEA database

China has become a magnet for foreign direct investment, overtaking the United States in 2003 as the number one destination of FDI (Prasad, 2005). FDI makes up the majority of US investment in China[14], while in India portfolio investments are equally important. This could be in part because the Indian equity market is relatively more efficient than the Chinese equity markets. Additionally, the development scheme of the Chinese government has been to promote FDI, rather than liquid portfolio investments. Figure 1.1 illustrates that net FDI flows to China from the rest of the world account for about 3.5% of GDP per year, in 2004, with net portfolio flows account for less than a percent of GDP. In India as figure one illustrates, net FDI flows and net portfolio flows represent approximately equal percentages of GDP.

[13] See TIC notes
[14] www.bea.gov

Figure 1.1: Net Capital Flows as a Percentage of GDP



Source: World Economic Outlook

3.2 Equity Flows

One of the primary theoretical reasons to invest in countries like China and India is the diversification benefits. One can see this theoretical motivation by considering the problem facing the portfolio investor. The problem is often thought of as deciding upon appropriate country weights in the portfolio, to maximize portfolio returns subject to a risk constraint, or in absence of a prespecified risk level, to reach the portfolio that has the highest Sharpe ratio. The Sharpe ratio (S) is the ratio of expected excess returns (excess over the risk free rate) to the standard deviation of the return (Obsterfeld and Rogoff 1996). The portfolio investor problem can be thought of as:

$$MAX_{X_i} S = \frac{E(r_p) - r_f}{\sigma_p} \quad (9)$$

where x_i refers to the portfolio weights for different countries and $E(r_p)$ and σ_p refers to the expected return and standard deviation of the return for the entire portfolio respectively. The variability of the portfolio returns depends not only on the variance of returns of the country but also on the correlation matrix of the country level returns with the world market. Emerging markets with their low covariance with world markets are attractive to foreign investors. China equity market return is only correlated with the US market at 14.97% and India is correlated with the US market at a slightly higher rate of 24.72%[15].

The low correlation between the Chinese and Indian equity markets reduce overall risk of the investor (Stulz, 1999). Over a longer period of time Erb, Harvey and Viskanta (1996) found that from 1985-1993 China had a correlation with the world market of 5% and India for the period 1979-1993 has a negative correlation with the world market of 5%. These findings imply that, at least theoretically, India and China are naturally attractive to international portfolio investors. Beginning in early 1992, the Chinese and Indian markets that were previously closed to foreign investors began to liberalize, making portfolio investments possible and equity investments poured into the region.

Besides diversification benefits of investing in these markets, China and India's rapid growth, market size, and increasing global competitiveness make these two economies the leaders in the Asian region (Griffith-Jones, 2004). China's economic growth in the past 20 years has been almost 8% per year, while India's growth improved in the mid-1990's to 6.7% and looks to be sustainable at that level. Between 1999 and 2004, average annual GDP growth in China and India has been around 8.3% and 6% respectively (World Development Report, 2005).

[15] Correlations were calculated using USD returns for the period January 1994 to May 2006.

Such growth rates, liberalization, and low correlations have attracted the attention of international investors and academics alike. Table 1.2 presents net portfolio equity flows to China and India. Equity flow accounting can be confusing, so a brief illustration is in order. In equity flow accounting inflows are reported as flows into a foreign country from the domestic country. Hence, an inflow would be a flow out of the US into to China or India. Accounting for out flows is the exact opposite; an outflow is a flow originating in a foreign country and flow to the domestic country. An outflow is represented by a flow from China back to the US. Net flows are simply inflows minus outflows, where a positive net flow indicates that more equity has exited the US than entered. Table 1.2, illustrates a very important trend in equity flows. As the table illustrates, China and India are becoming the major destinations for portfolio investment accounting for about 67% of total portfolio equity flows to developing countries in 2004 from all developed nations.

Table 1.2: Net Equity Flows to Developing Countries: China and India

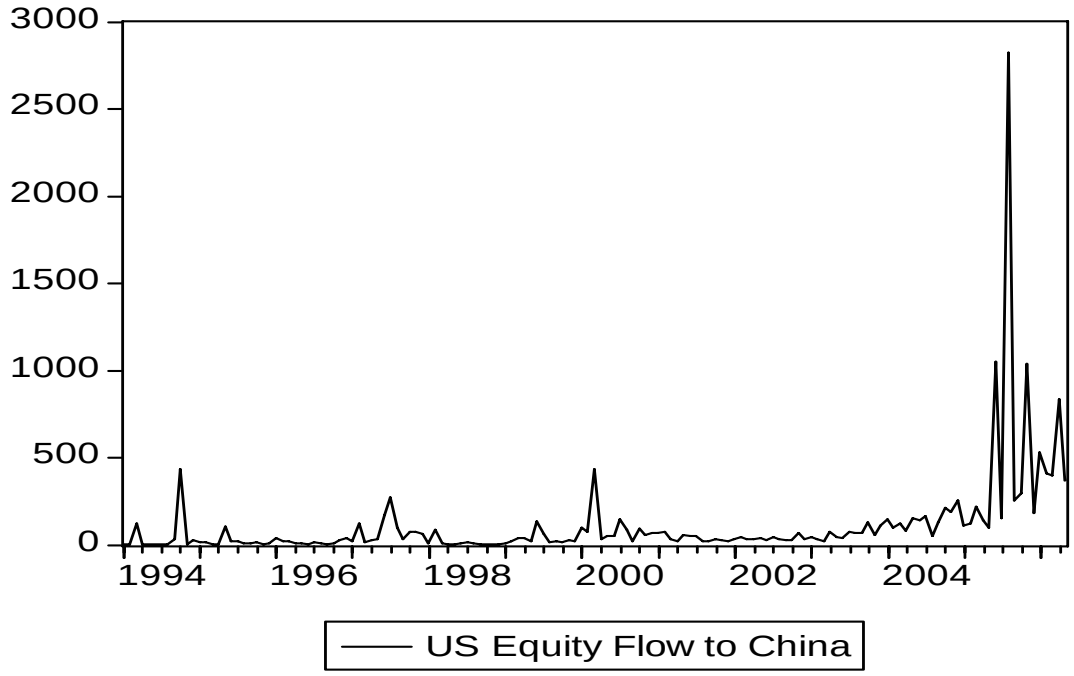
	1996	**1997**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Developing Countries	32.9	22.6	12.7	12.4	6.0	5.8	24.8	26.8
China	1.9	5.7	0.6	6.9	0.8	2.2	7.7	10.5
India	4.0	2.6	2.3	2.5	3.0	1.1	8.2	7.5
As a proportion of net equity flows to developing countries (%)								
China	5.8	25.2	4.7	55.6	13.3	37.9	31.0	39.2
India	12.2	11.5	18.1	20.2	50.0	19.0	33.0	28.0
China and India	18.0	36.7	22.8	75.8	63.3	56.9	64.0	67.2

Source: Global Development Finance 2005, all numbers in USD billions

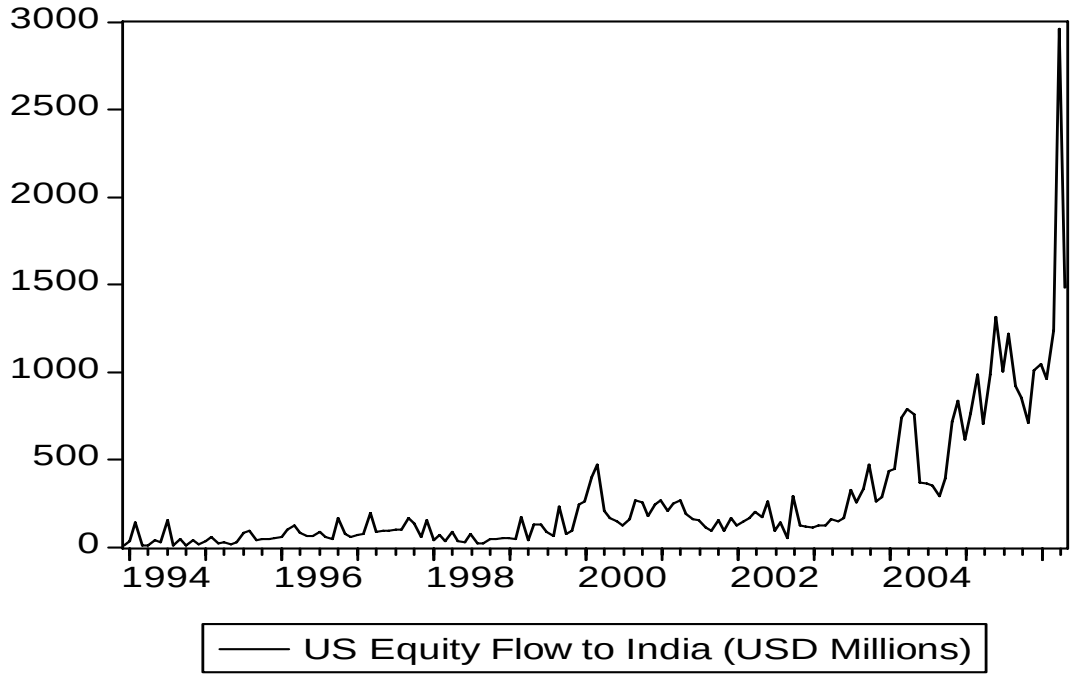
Graphs 1.1a and 1.2a present monthly portfolio equity inflows into China and India from the United States. The data is from the Treasury Department of the United States and provides further evidence of the importance of studying portfolio flows to China and India. As these pictures clearly illustrate, inflows to China and India from the United States has increased substantially in the last five years, and all indications are that equity flows to the region should continue. A couple interesting spikes occur in both countries. In China, the spike in equity inflows occurred in the month immediately following the appreciation of the

Chinese Yuan (RMB). In India, the spike in equity flows occurred around the time of increased public interest in Indian equities as evidenced by an investment of 100 million dollars by Goldman Sacs in the month the spike occurs and the corresponding visit by President George W. Bush (Lexis-Nexis).

Graph 1.1a: **Monthly Equity Flows from the USA to China**



Graph 1.2a: Monthly Equity Flows from the USA to India



The fact that China and India are attracting increasing amounts of portfolio investment shows that US institutional investors consider China and India attractive sources for portfolio investment and seems to be indicative of some sort of competitive advantage for these two economies. Interestingly, China and India had similar development strategies prior to India breaking out of their insulation from the world economy and the ushering in of market-oriented economic reforms and liberalization in 1992 (Henry, 2000).

China started reforming its closed, centrally planned, non-market economy in 1978. India always had a large private sector and functioning markets that were subject to rigid state controls until the reforms of the 1980s. The reforms became far broader after India experienced a severe macroeconomic crisis in 1991 (Griffith-Jones, 2004)

The political environments under which reforms were initiated and implemented in the two countries and their consequences were very different. India continues to be an open, multiparty democracy, while China has a communist leadership and only one party (Allen, Qian and Qian, 2002 and Padmanabha, 2005). The fact that both China and India are

experiencing rapid increases in equity flows, even though the forms of government are drastically different, makes this paper a study of contrasting government structures, which could shed important light on issues of the government's role in promoting development via equity flows.

Another important aspect of the Chinese and Indian markets, which make them attractive to portfolio investors, is large reserves that these two countries have build-up in the past five years. These high reserves serve the purpose of protecting against instability in financial markets and help to mitigate undesirable appreciation of the Rupee and Yuan, which could undermine their international competitiveness (Griffith-Jones, 2004). Table 1.3 presents just how rapidly these two countries have build-up foreign exchange reserves. Most of these reserves have been invested in US assets, and have helped to finance the US's large and still growing current account deficit. For example, about three-quarters of China's 610 billion of foreign reserves are invested in the US according to the Financial Times (2005).

Table 1.3: Foreign Exchange Reserves of China and India

	2000	**2001**	**2002**	**2003**	**2004**
China	165.6	212.2	286.4	403.3	610.0
India	37.3	45.3	67.0	97.6	125.5

Source: Global Development Finance 2005, all number in USD billions

Although China's trade surplus with the United States has been growing, its overall trade surplus is modest since it is running a growing trade deficit with Asia-Pacific countries that offsets in large part its trade surplus with the US. China has accumulated a substantial foreign exchange reserves, exceeding its annual imports. However, Prasad and Wei (2005) point out the recent increase in the pace of reserve accumulation in China is potentially related to "hot money' (i.e. bond and equity flows) rather than trade surplus or FDI flows. India has done the same, its reserves, around $98 billion at the end of 2003, exceed by a

substantial margin the imports of $60 billion. The issue of the appropriate level of reserves is unsettled (Griffith-Jones, 2004).

Any attempt to determine the appropriate level of reserves has to be based on an analysis of the appropriate exchange rate regime for either country, and the related issue of whether the benefits from integration with the global financial markets outweigh the costs. Rogoff (2003) discusses these issues in the context of India and China and concludes that for the most part China and India are getting to the point where the lost opportunity cost of building up reserves is beginning to outweigh the benefits of the reduction of the risk of exchange rate appreciation[16].

Rogoff's conclusion does not imply that US pressure on China to revalue the Yuan is justified or that India should also let its Rupee appreciate, but only that greater flexibility in exchange rates would be appropriate in both countries. The Indian exchange rate regime is one of managed float, and it does allow some flexibility. China, on the other hand, faces problems in the financial sector, particularly the overhang of nonperforming loans are serious, and an immediate revaluation might worsen the problem according to Rogoff. Finally, as Rogoff points out, by continuing to accumulate reserves in terms of US dollar assets, China, India and other Asian countries are financing US current account deficits.

There is little doubt that China's growing exports to countries outside of Asia has generated equally rapid growth in imports by China from other Asian and Pacific countries. According to Perez (2002), Japan's current economic recovery is being driven by a surge in

[16] *To directly quote Rogoff 2003: "Certainly I wouldn't say that India has gone too far at the moment in accumulating reserves, it has a very strong position but I think all the countries in Asia are reaching a point when they have to start asking the question how much is enough…we are talking about close to a trillion dollars, are basically low interest rate loans from the emerging markets to United States and Europe..... How much is enough and at what point should one risk letting the exchange rate appreciate…, I realize that there are some outside the IMF who call for greater flexibility in Asian currencies in order to strengthen demand from the rest of the world. I think that is an issue worth considering… From the Asian economies' own perspective, and this is true for India, it is true for China…, moving to a regime of greater flexibility would be something that is advisable, would not bring the cost many policy makers fear, and in fact would allow the economies to reduce the level of recession and that would have many positive growth effects."*

exports to China. Australia's healthy economy is being kept that way by Chinese investments in liquid natural gas products. China is now also South Korea's largest trading partner. Although India is the largest market in South Asia, it is yet to have a major impact on the trade of its neighbors in South Asia in spite of the creation of the South Asian Preferential Trade Area (SAPTA) in 1997. To a significant extent, this reflects the hostile relations between India and Pakistan (Perez, 2002).

The greater interconnection and potential interconnection within the region indicates a financial crisis in India and China will likely have far-reaching consequences for its trading partners. Contagion has been discussed in many academic papers. There is growing evidence that economic crises are transmitted across economies and equity markets (Naka, Maroney and Wansi, 2004). Understanding the motivation of investors and the responses of equity markets to large equity flows may help China and India avoid a future financial crisis or prevent the spread of instability to the rest of the region.

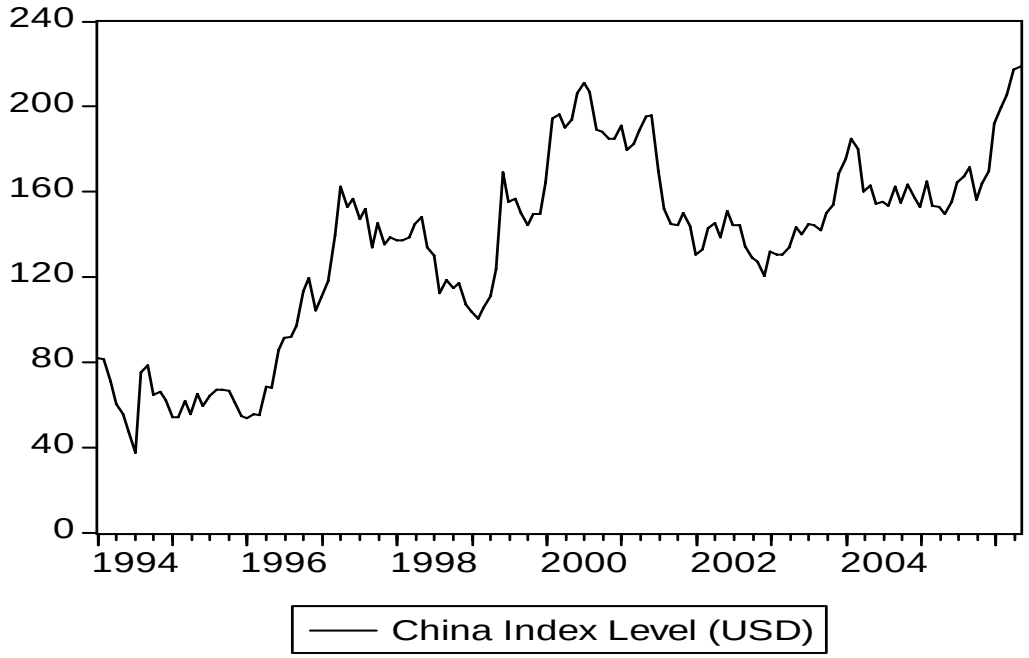
4. Background on Equity Market Development in China and India

4.1 China

China is often cited as an important counterexample to the findings of traditional finance (Allen et al 2006, Tian, 2002). China's stock markets did not exist until 1992, but has been growing very rapidly. Despite the fast growth of the Chinese stock markets, they are not efficient in the traditional sense (Tian, 2002). In general, prices and domestic investor's behavior do not reflect fundamental values of listed firms (Allen et al, 2006). China's domestic stock exchanges Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE), with combined size and volume, rank the ninth among the largest stock exchanges in the world. Table 3 shows that in terms of number of transactions that the SHSE

ranks 4th and the SZSE ranks 8th in 2003 and 2004. Graph 1.3a presents the evolution of the Chinese equity index over the period 1994 to 2005.

Graph 1.3a: Chinese Global Index Level



One distinctive characteristic of the Chinese equity markets is that the shares are of two primary types. There are tradable and nontradable shares. The nontradable shares are either held by the state or by other legal entities. Among the tradable shares, Classes A and B shares are listed in either Shanghai Stock Exchange or Shenzhen Stock Exchange. Class A shares are issued to Chinese investors and class B shares to foreign investors including overseas Chinese. The restriction on holding class A shares by foreigners was relaxed in 2002 (Lin et al, 2005).

The A shares of each listed company are divided into three categories; state owned shares, legal person shares, and tradable shares. The first two types of shares are held by the government, government agencies, state owned enterprises, or other enterprises. They were not tradable on the stock exchanges until very recently when the government started the process of gradually making all shares tradable (Allen et al, 2006). At the beginning of 2006,

there were 216 billion state-owned shares, 165 billion legal person shares, 232 billion tradable A shares, 23 billion tradable B shares, and 41 billion other tradable shares (Bai, 2006). The total stock market capitalization was 3.2 trillion Yuan, while the market capitalization of all tradable shares was 1.1 trillion Yuan[17].

Several papers have looked at the differences between A and B classes of securities in China. Shirai (2002) and Chen, Lee and Rui (2001) both found a significant price discount for Class B shares held by foreigners, as compared to Class A shares held by Chinese. However, B shares move more closely with fundamentals than A shares. Additionally on the issue of government ownership, Tian (2001) finds that firm value is negatively affected by government ownership.

Two major differences that academic literature has shown to be unique to the Chinese equity market are the separation of three types of shares and the dominant role of the government[18]. The separation of three different types of shares (i.e. A, B and nontradable) has its costs in terms of low market efficiency and corporate governance. First, with three different types of shares and many non-tradable shares, there are two segmented markets for securities with the same claim on cash flows. Consequently, the efficiency of the stock market is low. This low efficiency in turn influences the role of the market in allocating capital and in improving corporate governance (Chen et al, 2003).

Second, when state owned shares are not tradable, the largest shareholder is often the government. This gives the government the dominant position in the corporation. Even if the government wanted to reduce its dominant position, it cannot sell its shares easily because its shares are not tradable on the stock market. Finally, the separation makes it very difficult for the firm to be taken over even if the firm performs poorly. As a result, it is difficult for the poor management team to be replaced as pointed out by Tian (2001).

[17] Information gleaned from SHSE, SZSH and Bai (2006)
[18] See Allen, Qian and Qian (2005) for a summary of this literature.

Additional factors affecting the development of the Chinese equity market that have been cited in the financial press as well as mentioned in academic literature are the fact that there are very few stocks that would fit the definition of "blue-chip" trading on China's mainland exchanges[19]. Whereas most developed markets are dominated by a limited number of large-cap stocks[20], China's market has a disproportionate number of small-cap stocks. This feature allows for increased speculation and higher turnover (see appendix A). Another factor that has influenced speculation is the fact that the Chinese market is a retail market and a related matter is the reliance of China's market on external expansion, that is, expansion through the issuance of new shares rather than the appreciation in value of existing stocks (Chen et al, 2003). Over my sample period, new listings in China have accounted for 6% of market capitalization as compared to a half a percent in the US (EMDB).

There is also very stringent regulation of IPO's in China. The government sets the quota for new listings each year, selects the qualified companies based on provincial and sector allocations, and until 2001, even determined where the new shares would list. China, is the only country in which the government completely controls the size of the stock market, the pace of issue, and the allocation of resources. In addition, under current laws in China, no company is allowed to list without three years of continuous profitability, which has been cited as a law that favors state owned companies (Gao, 2002).

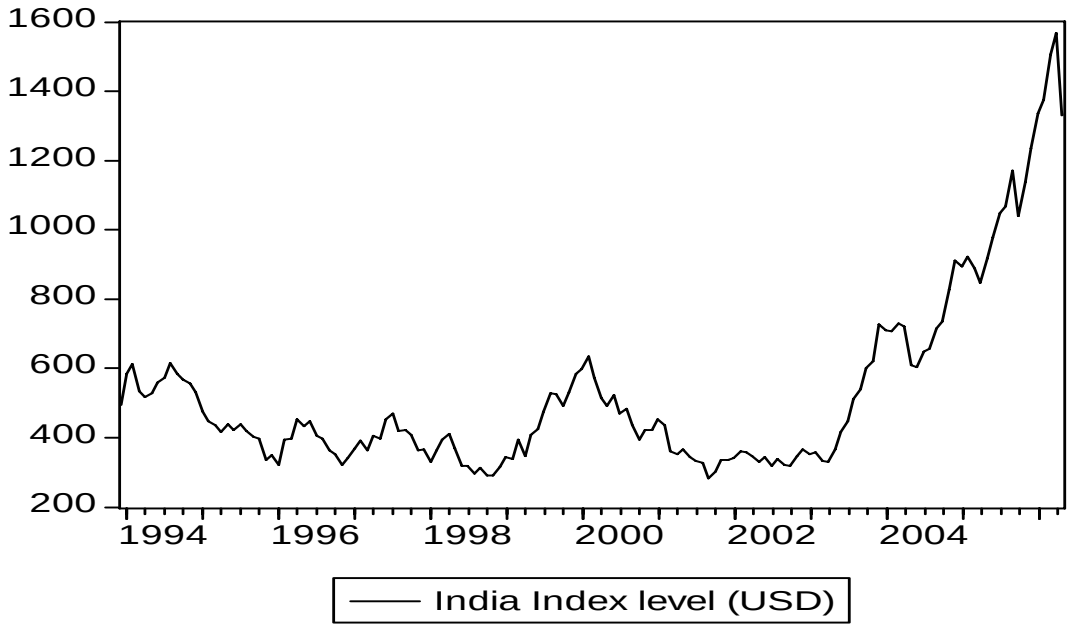
Another issue associated with the Chinese equity markets is that many of the larger companies are listed overseas or in Hong Kong, which leave the domestic market with primarily small firms and has been blamed for the Chinese markets volatile first fifteen years.

[19] See Gao (2002)
[20] An common example is Nokia in the Finnish market which accounts for roughly 70% of Finland's total market value. In China, the top fifteen companies account for only about 11% of market capitalization.

4.2 India

The Bombay Stock Exchange (BSE) has a long history and was established in 1875. As of early 2006, there were about 3,500 Indian companies listed with the stock exchange. The trading volume of the BSE ranks in the world's top ten as Table 3 indicates. As of October 2006, the market capitalization of the BSE was about 730 billion USD[21]. The Indian equity market has been unpredictable and is often given the label of a volatile market (see graphs 4a and 4b). Indian equity index volatility is not unlike that of Korea in the recent period. However, the Indian equity market has been much more volatile than that of the United States. Graph 1.4a presents the evolution of the Indian index for the period 1994-2005.

Graph 1.4a: Indian Global Index Level



India, after United States, hosts the largest number of listed companies. Investors now seek India as a location for investment (Griffith-Jones, 2004). India officially opened its stock markets to foreign investors in September 1992 and has received considerable amount of portfolio investment from foreigners in the form of Foreign Institutional Investor's investment in equities. In January of 1993, foreign brokerage firms were also allowed to

[21] Information gleaned from the BSE webpage

operate in India. This has become one of the main channels of international portfolio investment in India for foreigners (Padmanabhan, 2005).

During the liberalization period of 1992-1993, the gates to the Indian stock market were thrown open and the result was a series of major 'scams' with the regulators being blamed for inexperience, laxity, and outright corruption (Rao, 2002). However, since that time the number of 'scams' has decreases and over the past four years, the number of registered foreign institutional investors has risen from 490 to 637, and the number of sub-accounts has risen from 1,372 to 1,785. Growth of these two measures is desirable insofar as it indicates a more diverse, and hence more stable, pool of foreign investors.

The total amount of foreign institutional investment in terms of market capitalization has steadily climbed to about 9% of the total market capitalization of BSE (which, in turn, accounts for over 90% of the total market capitalization in India). With US-based institutions accounted for slightly over 41%, of total equity flows (World Bank, 2005).

The growing sophistication of the market was visible in a slew of very large recent issues. The mean IPO size increased twenty fold over the period 2001-2004 (BSE). The success of these large issues has dispelled earlier doubts about the feasibility of billion-dollar offerings in the Indian market. Another major development is in the Indian primary market (Padmanabhan, 2005). The primary market has introduced "screen based book building", where securities are auctioned through an anonymous screen based system, and the price at which securities are sold is discovered on the screen. This eliminates the delays, risks, and implementation difficulties associated with traditional procedures. Despite considerable skepticism about the extent to which computers could replace the services of highly skilled investment bankers, it is reported that resource mobilization through book building rose steadily from 25 per cent of public equity offerings in 2001 to 53 percent in 2002, 64 per cent in 2003 and 99 per cent in 2004 (Padmanabhan, 2005).

The average value of transaction in India is small by world standards. India has a very large number of transactions, which are required to be implemented by commensurately large and yet low-cost IT systems (Padmanabhan, 2005). The Indian market, unlike that of the US, has widespread retail participation that spans the country, where households directly own the bulk of securities. However unlike the US or the UK, the Indian market does not have the same disciplinary role. The shareholding pattern in India is not conducive for the market to discipline. Given the high promoter stakes, hostile takeover bids are unlikely to succeed. In fact, there have been very few such bids in India and even these turned out to be attempts at making fast money rather than seeking management control to improve performance of the target firm (Rao, 2002). There is evidence that corporate governance maybe improving with insider trading laws enacted in 1992 and first conviction under these laws occurring in 1998 (Rao, 2002).

5. Research Questions and General Approaches

The broad purpose of this chapter is to understand the relationship between portfolio equity flows and equity returns in China and India. Do US institutional flows affect asset returns? Do equity returns influence flow? These questions have been of recurrent interest of investors, economists, and policy makers, and are posed with greater urgency during times of financial upheaval or changes in the distribution of capital. Frequently, the answers to the above questions have cast international investors in a negative light. It is often argued that foreign equity flows lead to price overreaction and when withdrawn contagion. An alternative efficient markets view is that equity flows are merely the process by which information is incorporated into asset prices.

While there are numerous strongly held views, there is surprisingly little information on the behavior of international portfolio flows and their relation to asset returns, particularly

in China and India. In the previous sections, I identified several alternative explanations for the relationship between asset returns and equity flows. These hypotheses were developed and tested on a variety of different types of countries. However, the large concentration of flows being funneled to China and India makes understanding the nature of the relationship between equity returns and flows in these countries of particular interest, and the relationship between equity flows and financial markets has not been extensively considered in current literature for these two countries. China and India are special economies, with huge market potential and high growth rates, coupled with the unique financial market in China makes understanding how equity flows affect these financial markets particularly interesting. In this essay I pose and attempt to answer two sets of questions, the first set of questions concerns the relationship between equity flows and equity market returns and the second set of questions asks why international investors are trading in the manner we observe. The first set of questions this paper addresses are:

1. *Do flows influence returns?*

My a-priori hypothesis is that large institutional flows have a significant impact on returns. Consistent with the efficient market and the base broadening theories, I hypothesize that unexpected shocks to flows should have a permanent effect on prices, as these flows signal positive information. I would assume that this effect would be greater in India for two major reasons, first a larger portion of equity flows are from the US and second the Indian market does not have the issues of government interference as in China.

2. *Do returns influence flows?*

My a-priori hypothesis is that I should observe similar results to other emerging markets, where lagged returns significantly influence future flows. I would also presuppose that lagged returns should have a greater impact on flows in China, where information asymmetry is more acute. To answer the first two questions I plan to use vector

autoregressive techniques. Questions three and four are complementary to the first two questions, and I plan to use granger causality methods in answering the issues raised in the next two questions.

3. *Do flows forecast returns?*

I hypothesize that flows should not forecast returns, because of the known autocorrelation in equity inflows. Since equity inflows are autocorrelated I would assume that much of the information contained in flows should already be incorporated into prices. However, I would hypothesize that unexpected equity inflows should forecast flows positively.

4. *Do returns forecast flows?*

I hypothesize that returns, particularly excess returns (returns greater than US returns) will forecast flows positively as investors' up-date their expected returns based on realize returns. I would also hypothesize that the forecastablilty of flows from return should be greater in China than India, due to the likely greater information asymmetry in China. Since the Chinese economy is state controlled, investors are unable to receive accurate information about earnings and other fundamentals, thus when formulating expected returns in China, past returns should carry more weight than in India, where information is relatively more accurate and easier to obtain.

The second set of questions this chapter addresses relate to the issue of why investors are behaving in the observed manner. The following questions are addressed using a structural autoregressive approach:

1. *Are US investors acting as informed investors*?

My a-priori hypothesis would be that US investors are informationally deficient. This hypothesis is consistent with literature that foreign and domestic investors behave differently. While it is difficult to quantify informational differences, I address this issue by analyzing US

investors' behavior following unexpected price shocks and unexpected fundamental or dividend shocks. If investors' behavior can be explained better by fundamental shocks, then this would indicate that they are not trading simply based on index levels, and would provide information against the idea that US portfolio investors are informationally disadvantaged.

2. *Do fundamental (i.e. dividend) and flow shocks affect the prices differently in markets that are heavily regulated?*

I would hypothesize that fundamentals will have less influence on the Chinese equity market compared to the Indian equity market. In order to test this I look at the response of equity index levels to fundamental and flow shocks. Comparing the results of China and India will allow me to see how these two markets react to each type of shock.

Understanding the relationship between flows and returns in China and India is important, because if flows forecast returns positively, then a reversal of flows would have dire consequences for the equity markets in these two large emerging economies. On the other hand, if US equity investors are trading based on information and flows simply reflect information being disseminated into the financial markets, then the possibility for contagion is lower if financial crisis ensued. Additionally, understanding the degree to which the equity market of China and India reflect fundamental determinates of value has interesting implications for investors who trade in these markets. If for example (similar to the US) dividends forecast future returns, this would indicate a fair degree of efficiency on the other hand if prices were detached from fundamentals this would indicate a more treacherous investment environment. More generally, understanding the relationship between equity flows and returns is called for since these flows are now large and variable.

6. Methodology

6.1: Correlations

In order to understand the dynamic relationship between returns and equity flows, and to address my first set of questions, my primary tool is vector autoregressive (VAR) models. VAR allows for the quantification of the relationship between equity flows and returns and will allow for the estimation of impulse response functions (IRF) and variance decomposition[22]. IRFs provide the time path of the short-run dynamic relationships that result from a shock to the variables in the system, while the variance decompositions provide the forecast error variance explained by variations in the variables.

The VAR represents a reduced form of many structural models (Sims, 1980). For example, my analysis controls the fact that past flows are highly autocorrelated. The impulse response functions of returns after a shock to flows controls for the fact that flows tend to predict flows. One can think of VAR as a sort of filter and I use this tool to isolate specific effects (Enders, 2004).

Before estimating the VAR models, I investigate the correlation structure of flows and returns in India and China. In particular, I follow the spirit of Froot et al (2001) and estimate correlations between flows and returns over various lags. I decompose the correlation structure between net flows, gross flows, and returns. The correlation between lagged returns and flows provides preliminary evidence of return chasing or portfolio rebalancing. A positive correlation would be an indication of return chasing, while a negative sign would indicate that the portfolio-rebalancing hypothesis might better describe the data. The correlation between contemporaneous returns and flows will give some indication about the relevance of the information story of Brennan and Cao (1997). The correlation between future returns and flows will give us some ideas about the predictability of returns from

[22] Equity flows are standardized by market capitalization following Bekaert, Harvey, and Lumsdaine (2002).

flows. If for example, future returns are positively correlated with contemporaneous flows, then flows could be a useful factor in predicting future equity returns. One the other hand, if returns are negatively correlated with contemporaneous flows, then this would provide preliminary evidence of the price pressure hypothesis.

To further understand the correlation structure of flows and returns, I use the fact that equity flows are highly autocorrelated and decompose flows into expected and unexpected and report the correlation structure[23]. Tests for autocorrelation of the residuals are performed using the generalized LaGrange multiplier test to check for first order autocorrelation. I estimate an autoregressive model using the full sample and use the coefficients to predict one-step-ahead values of inflows (i.e. anticipated inflows). This gives both an expected and an unexpected inflow series where the unanticipated flows are the residual from the autoregression model (Warther, 1995).

I then look at the correlation of returns and unanticipated flows. The correlations between unanticipated flows and lagged returns will provide evidence of whether investors are chasing returns. The efficient market hypothesis combined with the base broadening hypothesis would suggest that the contemporaneous correlation between unexpected flows and returns should be positive, because new information should be quickly integrated into the market and higher levels of flows reduce the cost of capital. In order to test this hypothesis formally I estimate following equation, similar to Warther (1995) and Clark and Berko (1997) to test base broadening:

$$R_{it} = \alpha_o + \beta_1(uf_t) + \beta_2 E_t(f_t) + \varepsilon_t$$

(10)

where R_{it} is return of market i at time t, uf_t is unexpected net equity flows (again also look at gross US purchases), $E_t(f_t)$ is expected net equity flows. I would expect to find that

[23] Results of LaGrange multiplier tests show that inflows are autocorrelated.

returns should show significant covariance with unexpected inflows but less with expected inflows.

The correlation between future returns and unanticipated flows will give us some idea of the predictability of returns from unexpected flows; a negative correlation would indicate a reversal and provide evidence for the price pressure hypothesis. I estimate the following equation following Clark and Berko (1997) and Warther (1995) to test the price pressure hypothesis:

$$R_{it} = \alpha_o + \sum_{i=1}^{n} \beta_i (uf_{t+1-i}) + e_{it} \tag{11}$$

where uf_{t+1-i} is the unanticipated net equity flows. If the positive feedback hypothesis were correct, I would expect to find that lagged unexpected inflows have significant negative coefficients.

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6.2 Vector Autoregression (VAR)

In order to understand the dynamic relationship between flows and returns I estimate several vector autoregressive models. A VAR model is composed of a system of regressions in which the dependent variables are expressed as functions of their own and each other's lagged values (Enders, 2004). For example, consider the following bivariate VAR with a one period lag:

$$\begin{aligned} R_{it} &= b_{10} - b_{12} f_{it} + \beta_{11} R_{it-1} + \beta_{12} f_{it-1} + \varepsilon_{rt} \\ f_{it} &= b_{20} - b_{21} R_{it} + \beta_{21} f_{it-1} + \beta_{22} R_{it-1} + \varepsilon_{ft} \end{aligned} \tag{12}$$

where R_{it} and f_{it} are returns of market i and inflows (also will look at net purchases in this framework) from the US to country i (either China or India). VAR is basically, simultaneous equation modeling (Sims, 1980). VAR is useful especially for forecasting systems of interrelated time-series variables and is the common in modeling equity flows (Hoti, 2005). Due to the feedback inherent in the VAR process equation, the primitive equation (12) cannot

be estimated directly. The reason is that R_{it} is correlated with the error term ε_{ft} and f_{it} is correlated with the error term ε_{rt}. Standard estimation techniques require that all repressors be uncorrelated with the error term. In order to deal with this problem of estimating equation (12) one must use matrix algebra to transform the system of equations into the following form:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} R_{it} \\ f_{it} \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{21} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} \\ \beta_{21} & \beta_{22} \end{bmatrix} \begin{bmatrix} R_{it-1} \\ f_{it-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{rt} \\ \varepsilon_{ft} \end{bmatrix} \tag{13}$$

This can be written in a more compacted form:

$$Bz_t = \Gamma_0 + \Gamma_1 z_{t-1} + \varepsilon_t$$

where:

$$B = \begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix},\ z_t = \begin{bmatrix} R_{it} \\ f_{it} \end{bmatrix},\ \Gamma_0 = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix},\ \Gamma_1 = \begin{bmatrix} \beta_{11} & \beta_{12} \\ \beta_{21} & \beta_{22} \end{bmatrix},\ \varepsilon_t = \begin{bmatrix} \varepsilon_{rt} \\ \varepsilon_{ft} \end{bmatrix}$$

Then one can simply premultiply by the inverse of the B matrix giving the standard form of a VAR model as:

$$z_t = A_0 + A_1 z_{t-1} + e_t \tag{14}$$

where: $A_0 = B^{-1}\Gamma_0,\ A_1 = B^{-1}\Gamma_1,\ e_t = B^{-1}\varepsilon_t$

Now e_t is a vector of uncorrelated structural shocks $[\varepsilon_t \sim N(0,\Omega]$. In a bivariate framework of only equity flows and returns (or return differentials), the diagonal coefficients represent conditional momentum in flows and returns, while the off-diagonal coefficients represent flows following returns and returns following flows. The off-diagonal elements of Ω capture the price-impact effects of flows on returns. It is important to note that the error terms in equation (14) are composites of two shocks ε_{rt} and ε_{ft}. Arranging our primitive VAR into the reduced form allows us to estimate the two elements of A_0 and the four elements (in the case of a first order auto regressive problem) A_1. Moreover, after obtaining

the residuals from the two regressions, it is possible to calculate estimates of the variance and covariance of the elements in e_t.

The issue with VAR is whether it is possible to obtain the information present in the primitive system (12) using equation (14). This is not possible unless one is willing to impose restrictions on the primitive system. In a bivariate system, one must restrict one parameter and more generally, $(n^2 - n)/2$ parameters must be restricted to achieve identification of the primitive system.

It has become standard in VAR to restrict parameters assuming that one variable has no contemporous effect on the other; this is known as Choleski decomposition. Identification of the primitive model is achieved as follows, because the reduced form covariance matrix Ω has three distinct elements, three restrictions are already imposed on the four parameter in A_0 matrix by assuming as above that z_t has a moving average representation ($z_t = A(L)\varepsilon_t$ where $E[\varepsilon_{rt}\varepsilon_{ft}] = I$) imply $A_0 A_0^{'} = \Omega$. To just identify the primitive equation, one extra restriction is needed. This extra identifying restriction often takes the form of a zero restriction on one of the off-diagonal elements of A_0. For example, if one assumes that returns respond to flow innovations with a one-period lag or that inflows respond to innovations in returns with a one period lag, identification is achieved. This sort of identification mechanism can sometimes lead to sensitivity of the results to the ordering of variables. This can be illustrated by the following examples: If I order flows first, my identifying assumption is to let current flows affect contemporous returns as well as future returns and flows, on the other hand if I order returns first then returns are allowed to affect flows contemporous and influence both future returns and flows. However, my results did not appear to be influenced substantially by various ordering of variables, likely due to the nature of my data (i.e. monthly observations).

This exact identification scheme was used by Froot et al (2001), Bekarert et al (2002), and Dahlquist and Robertsson (2004). Additionally, the finding that the major results of a VAR of flows and returns are not influenced by the ordering of the variables is consistent with Bekarert et al (2002) and Dahlquist and Robertsson (2004).

Nevertheless, this type of identification has been criticized as being 'ad hoc' or atheoretical. To counter this problem I also use a Blancard and Quah style decompositions in my SVAR estimations. The lag length for the VAR is chosen using Akaike information criterion (AIC). I will also estimate impulse response functions, which provide the time path of the short-run dynamic relationships from a shock to the variables in the system. Additionally, granger causality tests will be conducted in the bivariate VAR, to test if lags of one variable are significant in forecasting the other variable. In higher order VARs the equivalent of granger causality is the F-test for block exogeneity.

A pair VARs with an exogenous (control) variables are also estimated (VARX). I will only include one exogenous variable, which is more of a control variable for extreme observations of equity flows. I include a dummy variable for extreme observations on equity flows[24]:

$$z_t = A_0 + A_1 z_{t-1} + Bx_t + e_t \qquad (15)$$

where x_t is a vector of dummy variables for extreme observations of equity flows. In order to control for other endogenous factors, I estimate a three variable and a four variable VAR using industrial production as additional endogenous variables motivated by the work of Griffen et al (2004), which showed that wealth is endogenously related to equity flows. I also estimate a four variable VAR including industrial production and dividend yields. Dividend yields are commonly assumed to be endogenously related to equity returns and equity flows from the works of Fama and French (1992) and Dvorak (2003). I will then use the estimated

[24] Extreme observations are observations two standard deviations or more above the mean.

VAR and VARXs to examine the response of the system to random shocks. These impulse response functions describe the responses of flows on returns to an unexpected shock to flows or returns. F-tests for block exogeneity are also estimated to test if lagged values of other endogenous variables have forecasting power for other variables in the system.

Because Choleski decompositions restrictions are ad hoc, I attempt to achieve identification of the primitive system using logical/theoretically based restrictions to achieve identification. The next section discusses these theoretical issues and demonstrates the implications of this identification scheme and the usefulness of the SVAR approach for answering my second set of questions.

6.3 Structural VAR (SVAR)

The motivation for the decomposition used in this paper partly comes from the work of Dvorak (2003) who extends Brennan and Cao (1997) to look at the implied relationships between returns and gross flows. According to Dvorak (2003), the relationship between flows and returns arise from the fact that shocks affect flows as well as prices. At the crux of Dvorak's argument is that informed investors respond positively to dividend or fundamental shocks and uninformed investors respond in the opposite direction, because every market has two sides, if informed buyers buy, uninformed investors must be net sellers. Since informed investors respond positively to the dividend shocks, their purchases are positively correlated with returns because fundamentals are correlated to prices. This paper is the first, to my knowledge, to empirically address the dynamic behavior of flows to fundamental shocks. Fundamental shocks are generally classified in literature as shocks that affect the theoretical underlying value of an equity market. In this essay I proxy fundamentals with dividend yields.

To understand the motivation for my variable selection, I begin with a simple model of stock prices. Campbell, Lo, and Mackinlay (1997) discussed the following model[25]:

$$P_{t+1} = E_t\left[\sum_{j=1}^{K}\left(\frac{1}{1+R_t}\right)^j D_{t+j}\right] + E_t\left[\left(\frac{1}{1+R_t}\right)^K P_{t+K}\right] \quad (16)$$

where P_{t+1} is the stock price level, D_{t+j} is the dividend, E_t is the conditional expectations operator based on information available to market participants at time t, and K is the investor's time horizon, as K gets large the second term on the right approaches zero, leaving the familiar Gordon growth model. R_t is the rate of return used by market participants to discount future value (i.e. the cost of capital). Where R_t is a decreasing function of the number of foreign investors. To understand why R_t is decreasing in the number of foreign investors, I appeal to a model discussed earlier and developed by Merton (1987). Merton developed the base-broadening hypothesis in the context of capital market equilibrium with incomplete information.

The basic argument is still best summarized by Merton's (1987) paper in equation 18 of his original paper:

$$V_k = V_k^* - \delta(1-q_k)s_k^2 I_k^2/(q_k MR) \quad (17)$$

where V_k is market value of firm k (or market k), V_k^* is equilibrium market price, δ is a parameter in the investor utility function, q_k is the fraction of all investors who know about security k, s_k^2 is a parameter in the firms production function, *I* denotes physical investment, *M* is income and *R* is return in the aggregate economy. From inspection of this equation, one can see that the value of market k will increase as q increases. In the context of equity flows, this would suggest that as more equity flows to a country's capital market the 'investor base'

[25] This model was recently adopted by Chowder (2006).

should increase and therefore increase the value of the market. Merton shows this result more directly in his comparative statics section where he derives the following result:

$$\frac{\partial V_k}{\partial q_k} = V_k \delta x_k \sigma_k^2 / q_k^2 > 0 \qquad (18)$$

where x_k is the fraction of the market portfolio invested in security k, σ_k^2 is the standard deviation of security *k*. This result directly shows that as the number of investors increases the value of the firm increases. Merton's (1987) model has very interesting implications for studying the relationships between equity market prices and equity flows. If one considers the *q* in Merton's model to be the number of foreign investors then increases in purchases of foreign investors should increase the value of the market or firm. It has been empirically found that foreign portfolio flows as a percentage market capitalization will increase as relatively positive information is released about a foreign market (Henry, 2000).

Researchers have found that as markets are liberalized, and more foreign investors enter the equity market, the cost of capital declines. Bekaert, Harvey and Lumsdaine (2002) have argued that the higher firm value is a result of a permanent reduction in the cost of capital, which they found empirical support for when using dividend yield to proxy the cost of capital.

Merton (1987) developed the radar or base broadening hypothesis in the context of capital market equilibrium with incomplete information. However, few studies have applied this methodology to explain the relationship between equity flows and equity markets[26]. The combination of Merton's base broadening theory and Bekaert, Harvey and Lumsdaine's (2002) empirical findings motivates the use of flows divided by market capitalization, as a proxy for the change investor base (or information). If institutional foreign investors increase their purchases of market capitalization, more information is available to the market. If the

[26] See Bekaert, Harvey, and Lumsdaine (2002)

percentage of foreign investors increases in the equity market, one could assume that foreign investors are buying based on some perceived advantage in that market.

We would also assume that if foreign investors are informed then a shock to flows as a percentage of market capitalization should be associated with a positive innovation in prices, and even if they are uninformed then a shock to flows should increase prices via Merton's base bordering result. This result could also be expected based on the nature of portfolio equity flow found in previous literature (Froot et al, 2001). Since portfolio equity flows are autocorrected, after a positive shock to flows, rational foreign and domestic investors would expect greater demand from foreign investors in the future. This would cause prices to be bid higher following the flow shock.

Dividends on the other hand, proxy the fundamental determinants of equity prices (see Fama and French, 1992). These variables have been found to contemporaneous affect each other (see Froot et al, 2001), which argues for a dynamic econometric methodology. However much of the previous literature has arbitrarily imposed restrictions to achieve identification. This essay uses widely accepted financial theory to achieve identification.

In order to identify the shocks to the VAR without making ad hoc assumptions, which has been cited as a shortcoming of VAR, the following identification scheme in SVAR is adopted from Blanchard and Quah (1989), Enders (2004), Kim and Ying (2001) and Chowder (2006). Consider a 2 x 1 vector y_t consisting of the first difference in the log of stock prices, $\Delta index_t$ and the inflows as a percentage of market capitalization, $flowcap_t$: $y_t = [\Delta index_t, flowcap_t]'$. By Wold theorem, y_t has a bivariate moving average representation (VMA):

$$y_t = [\Delta index_t, flowcap_t]' = B(L)\varepsilon_t \tag{19}$$

where $index_t$ = the log of stock price; $flowcap_t$ = inflows/market capitalization; ε_t is a 2 x 1 vector consisting of ε_t^p and ε_t^i; ε_t^p =price shock; ε_t^i = investor base shock; L is the lag operator (i.e. $L^n x_t = x_{t-n}$), $B_{ij}(L)$ for i, j = 1,2 is a polynomial in the lag operator L (i.e. $B_{ij}(L) = \sum_k b_{ij}(k)L^k$ with $\sum_k \equiv \sum_{k=0}^{\infty}$), Δ is the first-difference operator; the innovations are orthonormalized such that $\text{var}(\varepsilon_t) = I$.

This representation implies that we interpret stock returns and inflows as a percentage of market capitalization to be driven by price and investor base disturbances/shocks[27]. The time paths of the dynamic effects of the two types of disturbances on stock prices and flows as a percentage of market capitalization are implied by the coefficients on the polynomials $B_{ij}(L)$. Using Blanchard and Quah's (1989) methodology, I identify price disturbances ε_t^p as having a permanent effect on stock prices but investor base (or information) disturbances ε_t^i as having only a temporary effect on stock prices.

The justification for this assumption comes from finance theory. According to the efficient market hypothesis, information is disseminated quickly in financial markets, since inflows as a percentage of market capitalization is easily obtainable, the implications of these flows to financial markets should be integrated into prices within a month. Since $b_{12}(k)$ is the effect of ε_t^i on $\Delta index_t$ after k periods, the identifying restriction is represented by the restriction that the coefficients in $B_{12}(L)$ add up to zero (Blanchard and Quah, 1989):

$$B_{12}(L)|_{L=1} = B_{12}(1) = \sum_k b_{12}(k) = 0 \qquad (20)$$

The VMA in equation (16) is derived by inverting a bivariate vector autoregression. By estimating the following VAR of: $y_t = [\Delta index_t, flowcap_t]' = B(L)\varepsilon_t$:

$$y_t = A(L)y_{t-1} + u_t \qquad (21)$$

[27] SVAR's with net flows are also estimated

where $A(L) = [A_{ij}(L)] = [\sum_k a_{ij}(k)L^{k-1}]$ for i, j=1,2, $u_t = [u_{1t}, u_{2t}]' = y_t - E(y_t \mid y_{t-s}, s > 1)$

with $\text{var}(u_t) = \Omega$. By inverting the VAR of y_t, we obtain a VMA of y_t:

$$y_t = [I - A(L)L]^{-1} u_t \tag{22}$$

Estimates of B(L) can be obtained by the fact that

$$B_o E_t = u_t \tag{23}$$

and that

$$y_t = B(L)\varepsilon_t = [I - A(L)L]^{-1} u_t \tag{24}$$

Using the equations (19) and (20) implies that

$$B(L) = [I - A(L)L]^{-1} B_o \tag{25}$$

To calculate B(L), we solely need to estimate B_o . This can be found by taking the variance of each side of equation (20):

$$B_o B_o' = \Omega \tag{26}$$

Here we obtain three restrictions for the four elements of B_o : $b_{11}^o, b_{12}^o, b_{21}^o b_{22}^o$. Coupled with the other restriction:

$$B_{12}(L)\,|_{L=1} = B_{12}(1) = \sum_k b_{12}(k) = 0$$

We can estimate the model. The above framework can be extended to a three variable case including dividend yield (D_{it}) as a proxy for fundamentals. The following assumptions are made and are consistent with accepted financial economic theory.

1) **Price Shock (Shock 1)**: Allowed to have long run and contemporaneous impacts on all variables. Index levels are integrated of order one, but models will be estimated with variables in stationary form (Enders, 2004).
2) **Fundamental Shock (Shock 2)**: No long run impact of price because of fundamental information should be quickly integrated into the market, allowed to have

contemporaneous and long run impact on flows, which is supported by the finding in literature that foreign investors build up positions slowly (see Stulz 1999). Dividend yield is integrated of order one, but variable will be used in its stationary form.

3) **Information Shock or Investor Base Shock (Shock 3)**: Is assumed to have no long run impact on dividend yield or index, but is allowed to have contemporous impacts. This is consistent with the view that equity inflows have an impact on valuations on they are undertaken because of information that have not been incorporated into the market. While inflows are integrated of order one, inflows divided by market capitalization is stationary and not cointergrated with either variable.

One advantage of the above approach is that, by exploiting the long-run properties, it makes few arbitrary assumptions to recover structural shocks. The assumptions such as zero long-run effects of changes in dividend yields on stock prices are relatively uncontroversial in financial literature[28].

6.4 Robustness Checks and Comparative Models

To test the stability of my results, I perform various robustness checks on the conditional relationship between equity flows and returns. In particular, to gauge the stability of the relationship, I specify several models using sub-sets of my full sample. Also as an additional robustness check, I estimate a pair of vector error correction (VEC) models. A potential problem arises with the VAR framework if the variables in the system are non-stationary. Therefore, to assess the stationary of the variables, I perform augmented Dickey-Fuller unit root tests. In each case, I could not reject the null hypothesis of a unit root at 5% significance level for non-normalized inflows and index levels. Under certain conditions, a

[28] The empirical method to recover the structural shocks from the observed variables is based on structural VAR analysis pioneered by Shapiro and Watson (1988) and Blancard and Quah (1989). Clarida and Gali (1994), Rogers (1998), and Chowder (2006) have applied the framework to analyze various economic and financial phenomena

process is non-stationary while both the first-differenced process and the linear combinations are stationary (see Johansen, 1996). To test for this, I obtain the number of cointegrating vectors using the trace and max eigan value tests. I then obtain parameter estimates using the VEC model[29].

A vector error correction (VEC) model is a restricted VAR designed for use with nonstationary series that are known to be cointergrated. The VEC has cointergration relations built into the model, so that it restricts the long-run behavior of the endogenous variables that converge to their conintegrating relationships while allowing for short-run adjustment dynamics (Enders, 2004). The cointergration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The reason VEC models are interesting when analyzing inflows and equity indexes is that they allow for the isolation of the short-run dynamics from the long-run trend. Using a VEC models should help me better explain the short-run relationship between equity market index levels and gross non-normalized flows as well as providing a comparison to the VAR results.

7. Data

7.1 Data Description[30]

The data for this paper consists of equity flows, industrial production, dividend yields, market capitalization, and returns on global market indices. The source for monthly data on equity flows is the U.S Treasury International Capital System (TIC) reporting system[31]. US net purchases of securities in a given country are defined as gross purchases (inflows) of foreign securities by U.S. residents from residents of that country minus gross sales

[29] Note: Returns, inflows as a percentage of market capitalization, log of dividend yield, log difference of industrial production are all I(0), see tables 1.13 and 1.14.
[30] See appendix B for variable construction and definitions.
[31] See Tesar and Werner 1995 for a complete description and analysis of this data.

(outflows) of foreign securities from U.S. residents of that country. One of the potential problems with my data on equity flows is that it is limited to bilateral portfolio flows into and out of the United States, hence; it does not include other countries investment in China and India. The ideal data set for a study on equity flows is a world matrix of flows at the highest frequency possible. Such a data set does not exist, as very few countries collect bilateral equity flows data.

I use the International Financial Corporations Emerging Market Database (EMDA) for US dollar returns for Global market indices, market capitalization, and dividend yields for China and India. Industrial production is taken from the International Financial Statistics database (IFS). The sample period for this study is January 1994 to May 2006 for both China and India. The reason this sample period is chosen is to allow for a significant period for the effects of liberalization to taper out. Henry (2000) and Berkaert et al (2002) both indicate that equity flows follow a distinctively different pattern surrounding liberalization. Henry (2000) also looks at the impact of stock market liberalization on 12 emerging markets equity prices. He finds that on average, after a country's government allows foreigners to purchase shares; aggregate equity price index experiences a positive abnormal return of 3.3%. Kim and Singal (2000) similarly find that emerging market stock returns are abnormally high in the months leading up to liberalization. Additionally, Berkaert and Harvey (2000) show that aggregate dividend yields decline after liberalization, which they claim is evidence of a lower cost of capital after liberalization.

For the reasons mentioned above, only data from post liberalization is used in this study. This will allow for the isolated study of the dynamics of capital flows and equity returns without the contamination that occurs when studying data including pre and post liberalization. The timeliness of this study makes this study one of the first to look at a significantly long time-series that contains only post liberalization data.

7.2 Summary Statistics

Summary statistics of major variables used in this study are reported in Tables 1.4a and 1.4b for China and India respectively. The average monthly inflow from US institutional investors into China over the sample period was about 109.5 million (USD) in China, which is approximately 0.1019% of market capitalization. While this number may seem insignificant, over the course of a year about 1.2% of the market capitalization of China flows to the country from the US. Net equity flows had a positive mean of 55.32 million over the sample period. This indicates that US institutional investors are increasing their portfolio weights in the Chinese equity market. In contrast, the average monthly equity flow from US institutional investors to India was 268.72 million (USD) accounting for approximately 1% of market capitalization. Similar to China, India also had a positive mean net equity flow, similarly indicating that US investors are building up portfolio investments in India. Monthly returns in China averaged roughly 1% over the sample period, which was very close to the average return on the Indian market of 0.98%. Both markets average performance was above the U.S market by approximately 0.3% in China and 0.28% in India per month.

Table 1.4a: Summary Statistics (CHINA): January 1994 to June 2006

Means, standard deviations and extreme values for data equity flow and return data are reported in the table below. INLFOW represents inflows from the USA to China, OUTFLOW represents outflows from China to the USA, NETFLOW represents inflow minus outflow, the raw flow data are in millions of USD. NIFLOWUS is inflow normalized by market capitalization, NOFLOWUS is outflow normalized by market capitalization and NNFLOWUS is net flow normalized by market capitalization. INDEXUS is the Chinese index level in USD, RUSD is the return on the Chinese index in USD; ERUSD is the Chinese index return minus the US index return. DIV1 is the natural log of the dividend yield; LNIP is the log difference of industrial production. All flow data was taken from the US treasury department's TIC database and all of the return data is from the Emerging market database.

	Obs	Mean	S.D	Min	Max
China					
INFLOW	149	109.50	274.65	1.00	2823.00
OUTLFOW	149	54.17	70.44	0.00	395.00
NETFLOW	149	55.32	251.13	-265.00	2660.00
NIFLOWUS	149	0.0011	0.0023	0.0004	0.0210
NOFLOWUS	149	0.0005	0.0005	0.00	0.0041
NNFLOWUS	149	0.0006	0.0022	-0.0030	0.0208
LNIP	149	0.0081	0.5369	-0.2004	0.2148
DIV1	149	0.0022	0.0012	0.0002	0.0626
INDEXUS	149	134.15	43.99	37.59	218.91
ERUSD	149	0.0035	0.1174	-0.2361	0.9597
RUSD	149	0.0111	0.1161	-0.2046	0.9973

Table 1.4b: Summary Statistics (INDIA): January 1994 to June 2006

Means, standard deviations and extreme values for data equity flow and return data are reported in the table below. INLFOW represents inflows from the USA to India, OUTFLOW represents outflows from India to the USA, NETFLOW represents inflow minus outflow, the raw flow data are in millions of USD. NIFLOWUS is inflow normalized by market capitalization, NOFLOWUS is outflow normalized by market capitalization and NNFLOWUS is net flow normalized by market capitalization. INDEXUS is the Indian index level in USD, RUSD is the return on the Indian index in USD; ERUSD is the Indian index return minus the US index return. DIV1 is the natural log of the dividend yield; LNIP is the log difference of industrial production. All flow data was taken from the US treasury department's TIC database and all of the return data is from the Emerging market database.

	Obs	Mean	S.D	Min	Max
India					
INFLOW	149	268.72	379.49	7.00	2962.00
OUTLFOW	149	220.88	330.03	2.00	1717.00
NETFLOW	149	47.85	156.21	-604.00	1245.00
NIFLOWUS	149	0.0102	0.0145	0.0003	0.1168
NOFLOWUS	149	0.0083	0.0124	0.0008	0.0677
NNFLOWUS	149	0.0019	0.0062	-0.0238	0.0491
LNIP	149	0.0050	0.0501	-0.1479	0.1141
DIV1	149	0.0162	0.0052	0.0063	0.0295
INDEXUS	149	525.66	259.37	281.40	1566.86
ERUSD	149	0.0022	0.0805	-0.1930	0.2198

The results of the contemporaneous correlations between variables used in this study are reported in Tables 1.5a and 1.5b for China and India respectively. Several noteworthy correlations are uncovered. For example, the correlation between dividend yield and index level in both China and India are negatively correlated at -49% in China and at -34% in India. This finding is consistent with the notion that rapidly growing economies reinvest earnings rather than paying out dividends and could indicate that future growth is expected.

Table 1.5a: Correlation China: January 1994 to June 2006

	INDEXUS	RUSD	DIV1	INFLOW	OUTFLOW	NETFLOW	NIFLOWUS	NOFLOWUS
INDEXUS	1							
RUSD	0.071	1						
DIV1	-0.491	-0.020	1					
INFLOW	0.267	0.023	-0.004	1				
OUTFLOW	0.576	0.041	-0.142	0.448	1			
NETFLOW	0.127	0.013	0.036	0.968	0.209	1		
NIFLOWUS	0.009	-0.085	0.003	0.688	0.165	0.706	1	
NOFLOWUS	0.396	0.025	-0.187	0.254	0.784	0.058	0.131	1
NNFLOWUS	-0.070	-0.090	0.040	0.641	0.009	0.699	0.980	-0.069

Table 1.5b: Correlation India: January 1994 to June 2006

	INDEXUS	RUSD	DIV1	INFLOW	OUTFLOW	NETFLOW	NIFLOWUS	NOFLOWUS
INDEXUS	1							
RUSD	0.238	1						
DIV1	-0.344	-0.070	1					
INFLOW	0.891	0.104	-0.059	1				
OUTFLOW	0.860	0.147	-0.093	0.906	1			
NETFLOW	0.221	0.136	-0.098	0.108	0.520	1		
NIFLOWUS	0.860	0.147	-0.093	0.906	0.975	0.520	1	
NOFLOWUS	0.891	0.104	-0.059	0.894	0.906	0.108	0.906	1
NNFLOWUS	0.221	0.136	-0.098	0.108	0.520	0.933	0.520	0.108

There is also a small negative correlation between equity flows and dividend yields, which is consistent with the base broadening hypothesis as adapted by Bekaert, Harvey and Lumsdaine (2002). If one uses dividend yield to proxy the cost of capital then one would expect, according the base-broadening hypothesis, that as inflows increase the cost capital should decline. This correlation is small however, and more powerful tests are needed, to verify the base broadening hypothesis.

There is a strongly positive correlation between inflows and outflows. Tesar and Werner first pointed out that international capital markets are characterized by large turnovers. They show that turnover of foreign equity holdings is roughly twice that of domestic holdings. If one measures excess flows as the difference between total flows (outflows + inflows) and the absolute value of net flows, we see that excess flows are huge compared to net flows. This indicates that the size of inflows and outflows are similar. In China net flows account for about 33% of total flows and in India net flows account for only about 10% of total flows on average. The size of total flows compared to net flows, particularly in India, suggests that turnover is high, demonstrating that US investors are constantly changing positions based on changing environments. In China, the evidence is not so strong, with net flows being roughly equal to outflow.

One can also observe that gross inflows and out flows are positively correlated. Gross inflows and outflows are positively correlated at over 45% in China and at 90% in India. This appears to indicate that investors, particularly in India, adjust their portfolios within a given month between different stocks in India.

8. Results

8.1 Correlation Structure

In this section, I investigate the bivariate behavior of flows and returns, in order to address the following questions: How are returns and flows related? Do flows forecast returns or vice versa? My first evidence is simply visual. Graphs 1.1a and 1.3a for China and Graphs 1.2a and 1.4a for India suggest that flows and prices move together at low frequencies. The co-movement could be ascribed to a variety of factors, including overreaction, information shocks, or demand shocks. Tables 1.5a and 1.5b report the contemporous correlations between flows and related financial variables for China and India

respectively. It is evident from the tables that flow correlations are small. In India, the small positive correlation between flows and returns is consistent with the findings of previous literature (i.e. Froot et al, 2001). China, on the other hand, appears to demonstrate a small negative correlation between flows and returns.

To get a better sense of the correlation structure, I estimate the relationship implied by Rey and Hau (2006) and outlined in equation 6. As mentioned before this test is flawed, especially in the case of China. However, in order to get a preliminary indication of the correlation structure between excess flows and returns, I estimated the Rey and Hau results for three sub-periods. Table 1.6 reports very different results in the cases of China and India. Over the entire sample period China and India display opposite correlation structures. The correlation between returns and net flows in India are positive for the entire sample and all sub-periods. It is interesting to note that there appears to be an increasingly positive correlation between flows and returns in recent years.

Table 1.6: Rey and Hau (2006): Correlation

Reported are correlations of the monthly foreign stock market index returns (in local currency) relative to the US market index return (in dollars), and the net foreign stock ownership increase (or net foreign inflow), which is defined for this test as net US purchases of foreign equities minus net foreign purchases of US equities, and normalized as a proportion of the average absolute level of net foreign stock ownership increase by US residents over the pervious twelve months. The theory predicts that $Corr\left[(dR_t^{j*} - dR_t^h)/\overline{P}, (dK_t^f - dK_t^{h*})\right] < 0$.

	Full Sample	1994:01-1998:12	1999:01-2003:12	2004:01-2006:05
China	-0.14**	-0.17*	-0.13*	0.10*
India	0.15**	0.003	0.25**	0.36**

*** Significance at 1%, ** significance at 5% and *significance at 10%

The results reported in Table 1.6 provide preliminary evidence that US institutional investors appear to be following high returns into the Indian market, though one must be cautious about drawing conclusions from this simple contemporaneous relationship. This correlation is consistent with the results of Brennan and Cao's (1997) paper, which derives a positive correlation between flows and returns. This type of correlation has been taken to

imply that investors are less informed about markets than local investors. However, this positive correlation could also be evidence of exogenous shifts in US investor demand for foreign securities.

China, again, provides an important counterexample to India. The negative correlations between excess returns and net flows appear to indicate that foreign institutional investors have been making decisions to maintain portfolio weights in China. Additionally, the recent positive correlations between flows and excess returns indicates that US institutional investors maybe increasing their weights in the Chinese equity market to take advantage of the recent strong performance of the Chinese markets, coupled with the relaxation of the restriction on investing in A class shares (i.e. an exogenous shift in the demand for Chinese equities).

The next step to understand to the correlation between flows and returns is to estimate the lead and lag correlation structure between flows and returns. Table 1.7 reports the results of correlation between excess returns and normalized net flows and inflows. The correlation between lagged returns and flows is strongly positive in both countries preliminarily indicating that flows appear to follow returns. This also tells us something about the predictability of flows. If flows are correlated with lagged returns, this indicates that excess returns have some predictive power as to the purchasing behavior of US institutional investors. Contemporaneously, flows are positively correlated in India and negatively correlated in China. The model developed by Brennan and Cao (1997) demonstrated that if domestic investors have a net information advantage that flows and returns should be positively correlated. We find that this model holds in the case of India, but in the case of China, we see the opposite effect. This could be because of a number of reasons related to the degree of regulation in the Chinese market. As far as the predictability of future returns from current flows, again we get opposite results in China and India. In

China, flows are negatively correlated with future returns, but in India, inflows are correlated positively with future returns. This could indicate that price pressure is be present in India, as US investors make up 41% of equity flows to the nation.

Table 1.7: Monthly Correlation Structure

Reported are correlations of the monthly foreign stock market index returns (in USD) and inflows and net flows. Column one reports the correlation between flows and lagged returns for four months. Column 2 reports the contemporaneous correlation between returns and inflows and returns and the final column reports the correlation between flows and four month future returns.

	Flows and lagged returns (4 months)	**Contemporaneous correlation**	**Flows and future returns (4 months)**
China (net flows)	0.405	-0.113	-0.188
China (inflows)	0.403	-0.106	-0.194
India (net flows)	0.204	0.180	-0.093
India (inflows)	0.754	0.144	0.581

In order to explore in more details the relationship between equity inflows and returns, I take advantage of the fact that equity inflows are autocorrelated, due the fact that investor's build-up and unwind positions gradually. I fit an autoregressive model to the inflow data and decompose my inflow variable into anticipated and unanticipated equity flows. Table 1.8 reports the results of these correlations. Lagged excess returns appear to be positively related to unexpected inflows. This is consistent with the logic of Warther (1995) and Clark and Berko (1997). For example, this correlation structure implies that after the Chinese or Indian equity market outperforms the US markets, US institutional investors increase their purchases of equities in China and India, by more than could be anticipated by using lagged flows. Contemporaneously, there is also a positive relationship between excess returns and flows in the case of India and only a slightly negative correlation for China. As far as the predictability of returns from unexpected flows, we see that again, in the case of China, high unexpected flows are negatively correlated with future excess returns and in India future excess returns are positively correlated with unexpected flows.

Table 1.8: Monthly Correlation Structure: Unanticipated Inflows

Reported are correlations of the monthly foreign stock market index returns (in USD) and unanticipated inflows. Unanticipated inflows are calculated as the residual of an AR(2) model similar to Warther (1995). Column one reports the correlation between unanticipated inflows and lagged returns for four months. Column 2 reports the contemporaneous correlation between returns and unanticipated inflows and returns and the final column reports the correlation between unanticipated flows and four-month future returns.

	Flows and lagged returns (4 months)	**Contemporaneous correlation**	**Flows and future returns (4 months)**
China (uiflows)	0.280	-0.023	-0.230
India (uiflows)	0.256	0.128	-0.194

While the correlation results suggest that price pressure could be a factor in case of India, formal regression models similar to Warther (1995) and Clark and Berko (1997) fail to find evidence of a statistically significant result. This finding is consistent with the finding of Warther (1995) who also failed to find evidence of price pressure for mutual fund flows in the US. Similarly, Clark and Berko (1997) fail to find evidence that US portfolio investment in Mexico was pressuring prices higher. Since my formal tests of price pressure failed to find significant results, I also ran regressions similar to Clark and Berko (1997) to formally test the base broadening hypothesis. Again, I fail to find statistically significant results in the cases of both China and India.

8.2 Bivariate VAR

While correlation tell us broadly about predictability, more substantial will be obtained by examining the conditional covariation results outlined in the VAR equations outlined in the methodology section. A pair of VARs were estimated for both countries. The first VAR is between excess returns and net flows and the second VAR estimated is between inflows and excess returns. The results were very similar, this is likely due to the high correlation between net flows and inflows in both countries (see tables 1.5a and 1.5b). Only the results of the VARs with inflows and excess returns are reported in Table 1.9.

Table 1.9: Vector Autoregression of Excess returns and Standardized Inflows for China and India

This table presents results from the bivariate vector autoregessive (VAR) specified for each endogenous variable. ERUSD is the monthly percentage excess return of the Chinese or Indian country index over the USA monthly index return. IFLOW is the monthly inflows scaled by market capitalization. All terms are expressed in US dollars. The VAR is estimated separately for either China or India. Panel A report coefficient estimates, their standard errors in parenthesis and t-statistics in brackets, adjusted R-squared and F statistics are reported.

	VAR: China		*VAR: India*	
	ERUSD	**INFLOW**	**ERUSD**	**INFLOW**
Variables				
ERUSD (-1)	-0.05	0.002	0.02	0.01
	(0.08)	(0.00)	(0.08)	(0.00)
	[-0.56]	[1.27]	[0.21]	[1.78]
ERUSD (-2)	-0.10	0.010	0.18	-0.001
	(0.08)	(0.00)	(0.08)	(0.01)
	[-1.19]	[7.42]	[2.24]	[-0.13]
INFLOW (-1)	1.28	0.004	-1.46	0.95
	(4.34)	(0.07)	(1.50)	(0.13)
	[0.29]	[0.03]	[-0.98]	[7.08]
INFLOW (-2)	-3.10	0.18	2.29	0.15
	(4.35)	(0.07)	(1.53)	(0.14)
	[-0.71]	[2.60]	[1.50]	[1.12]
Intercept	0.001	0.00	-0.005	-0.00
	(0.01)	(0.00)	(0.01)	(0.00)
	[0.50]	[4.30]	[-0.57]	[-0.21]
R-squared	0.01	0.29	0.06	0.77
F-stat	0.53	14.89	2.21	118.71

The VAR estimates for China show that lagged returns are strongly related to inflows, lag length was chosen using AIC. The coefficient lagged excess returns (two lags) is statistically significant at the 1% level and indicates that a one percent increase in lagged excess returns leads to a statistically significant increase in equity inflows in China, controlling for the autocorrelation in inflows. This result does not appear to be sensitive to the ordering of variables.

For each VAR system, I apply an F-test for the exclusion of the lags on one variable from the VAR. Technically, granger causality is a measure of the marginal contribution of a

variable to the forecasting of some other variable. The causality tests are reported in Table 1.10, for three different VAR specifications, and support the notion that excess returns granger cause inflows at the 1% significance level[32]. These results show that lagged excess returns are strongly significant in predicting future flows. Lagged flows are also significant in predicting future flows as can be seen by the cumulative impulse response functions, reported in Graph 1.5b, and the parameter estimates on two month lagged inflows reported in able 1.9.

Table 1.10: Summary of Granger Causality Tests

The table below presents a summary of two Granger causality tests: Granger 1: Flows do not Granger cause returns. Granger 2: returns do not Granger cause flows for each country. Chi-square statistics are reported. Results are summarized for three VAR models under three different specifications.

Model	**VAR [inflows, ERUSD)**	**VAR [unexpected inflows, ERUSD]**	**VAR [inflows, ERUSD, Dummy]**
China			
Flows Causing Returns	0.58	1.06	0.23
Returns Causing Flows	55.95***	60.14***	42.84***
India			
Flows Causing Returns	3.30	3.82	3.33
Returns Causing Flows	3.21	1.00	8.38**

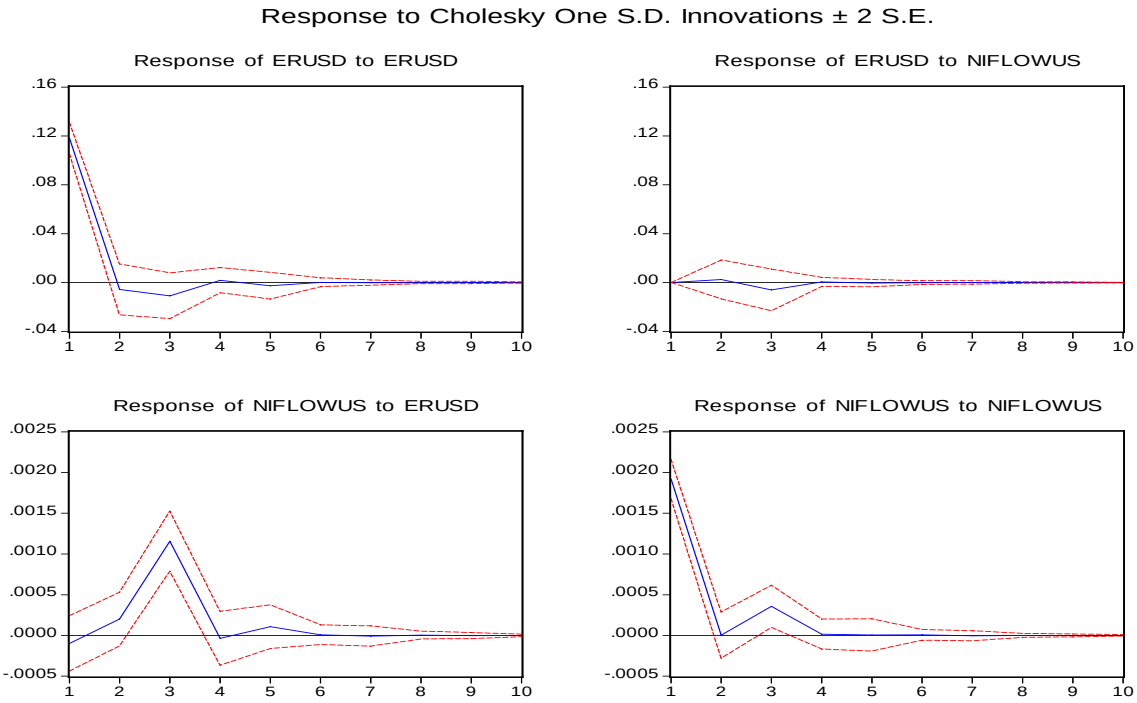
**** Significance at 1%, ** significance at 5% and *significance at 10%*

The results of the impulse response functions show that a one standard deviation shock in monthly excess returns cause an increase in unexpected flows as a percentage of market capitalization of 0.001% with a one month lag. This is economically significant and implies in that in the month following an excess return shock approximately 395 thousand USD will flow to China. The results of the cumulative impulse response functions are reported in graphs 1.5a and 1.5b. The results demonstrate that, again, at shock one standard deviation will lead to an accumulated response over the next 10 months of 0.0013% of market capitalization or about a half million additional USD flowing to China.

[32] Similar Granger causality results were found with net flows.

Graph 1.5a: Standard Impulse Response Functions (China)

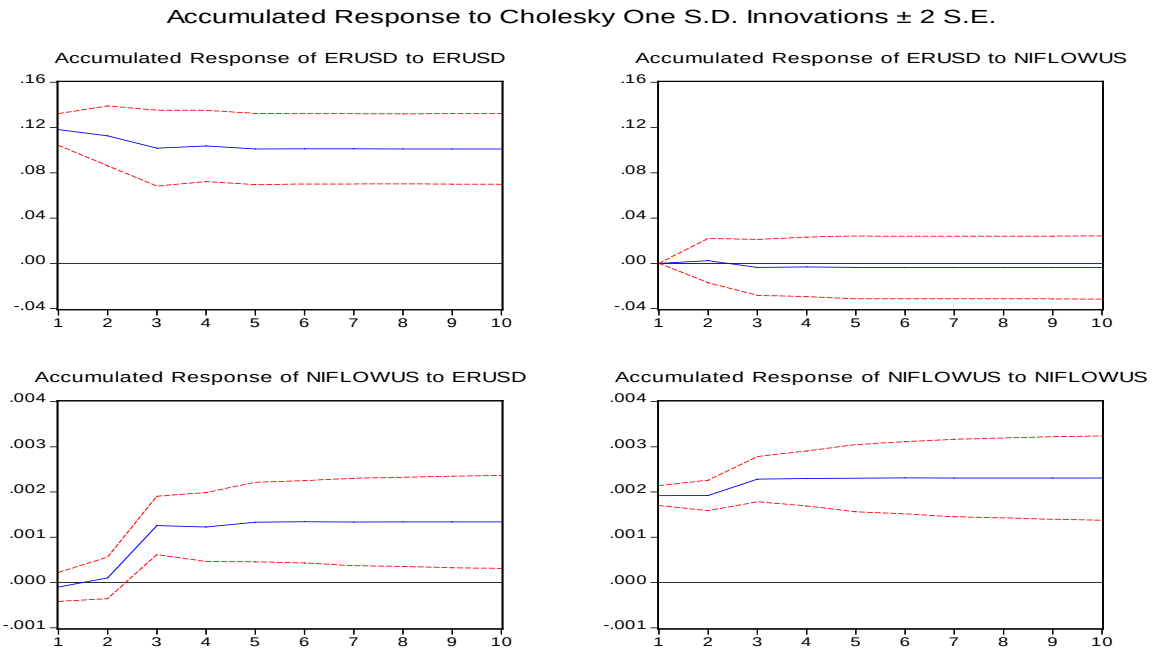
Graph 1.5a presents standard impulse response functions for flow and return equations in table 1.9.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

Graph 1.5b: Cumulative Impulse Response Functions (China)

Graph 1.5b presents cumulative impulse response functions for flow and return equations in table 1.9.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

The evidence for the predictability of returns by flows is, however, more ambiguous and appears not to be significant in the bivariate case for China. The insignificant impulse response functions and granger causality results indicate that US investors' do not have the ability to time the market and their behavior does not appear to be influencing Chinese returns.

When these initial results are interpreted in the context of existing literature, the return chasing hypothesis appears to explain the observed relationship between flows and returns best. It can be observed from the impulse response functions, reported in graph 1.5a, that a shock to excess returns causes a statistically significant increase in net flows over the next two to four months[33]. The impulse response function gives the estimated response of each variable in the VAR to a pure shock to one of the variables in the system. A pure shock is defined as a shock to one of the variables that is uncorrelated with any of the shocks to the other variables in the system. The impulse response captures the dynamics of the system. Included in the figures is the 90% confidence intervals calculated using the Monte Carlo procedure suggested by Sims and Zha (1999).

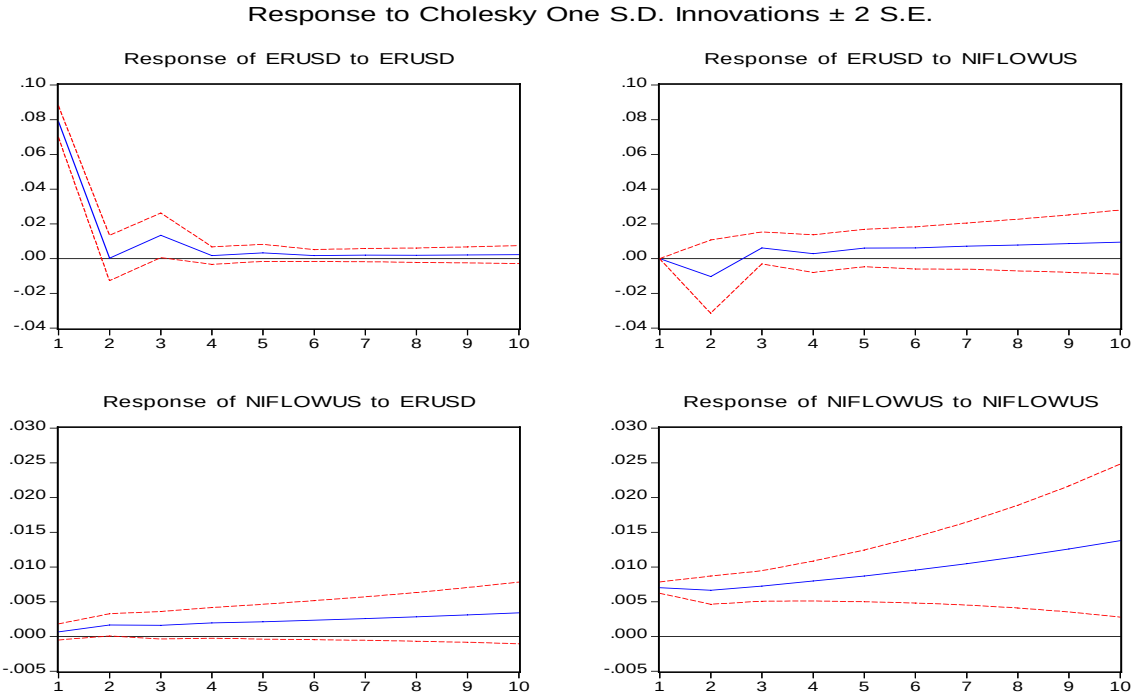
Table 1.9 (above) presents the results for India. The findings are less conclusive; inflows do predict future inflows as demonstrated by the statistically significant coefficient on lagged inflows; however, there is no relationship between excess returns and flows as found in China. Broadly, the results of this baseline models indicate that foreign investors are involved in positive feedback trading in China, but not in India. Grinblatt and Keloharju (2000), Froot et al (2001), and Kim and Ying (1996) documented similar results for different markets. Foreigners momentum trading has implications for the behavior of domestic investors also, as aggregate domestic investor then has to be a contrarian. Unfortunately, my data does not allow for this comparison, but Grinblatt and Keloharju (2000) have documented

[33] Standard errors for impulse response functions were calculated using Monte Carlo Simulation and the bands represent 90% confidence levels.

a contrarian behavior of domestic non-institutional investors for the Finish market. Graphs 1.6a and 1.6b report the results for the impulse response functions for India. The impulse response functions show no statistically significant relationships between flows and returns, as was uncovered in China.

Graph 1.6a: Standard Impulse Response Functions (India)

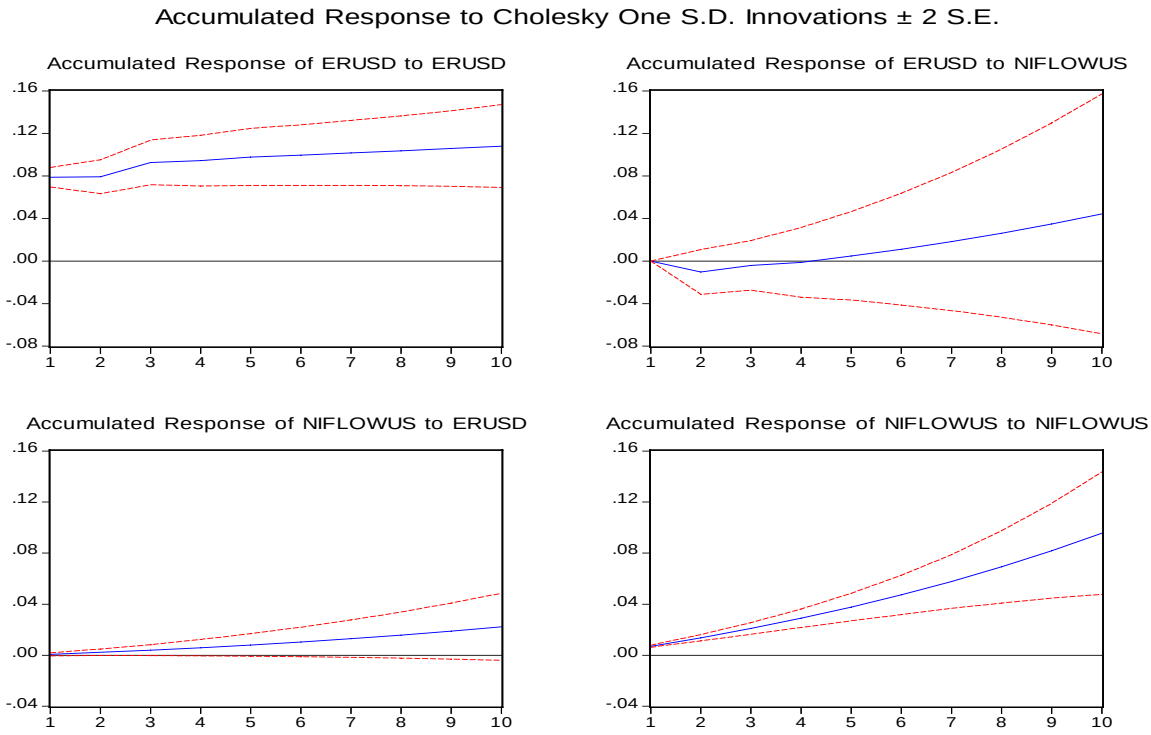
Graph 1.6a presents standard impulse response functions for flow and return equations in table 1.9.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

Graph 1.6b: Cumulative Impulse Response Functions (India)

Graph 1.6b presents cumulative impulse response functions for flow and return equations in table 1.9.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

A second set of Vector autoregressions are estimated using unanticipated inflows and excess returns. The results for both China and India are reported in Table 1.11 and causality test are summarized in column two of table 1.10, above. The results reported for China confirm the results found in the previous estimated VAR. Excess returns are found to granger cause unexpected flows. Additionally, unexpected flows are negatively related to future unanticipated flows, indicating that foreign investors' reaction to positive shocks in the Chinese equity market is a one time rational response, followed by a return to pre-shock flow levels. This finding indicates that US institutional investors are trading rationally based on information, because shocks to excess returns are reflected quickly into flow behavior, and the effects of these shocks are not persistent.

Table 1.11: Vector Autoregression of Excess Returns and Unanticipated Inflows for China and India

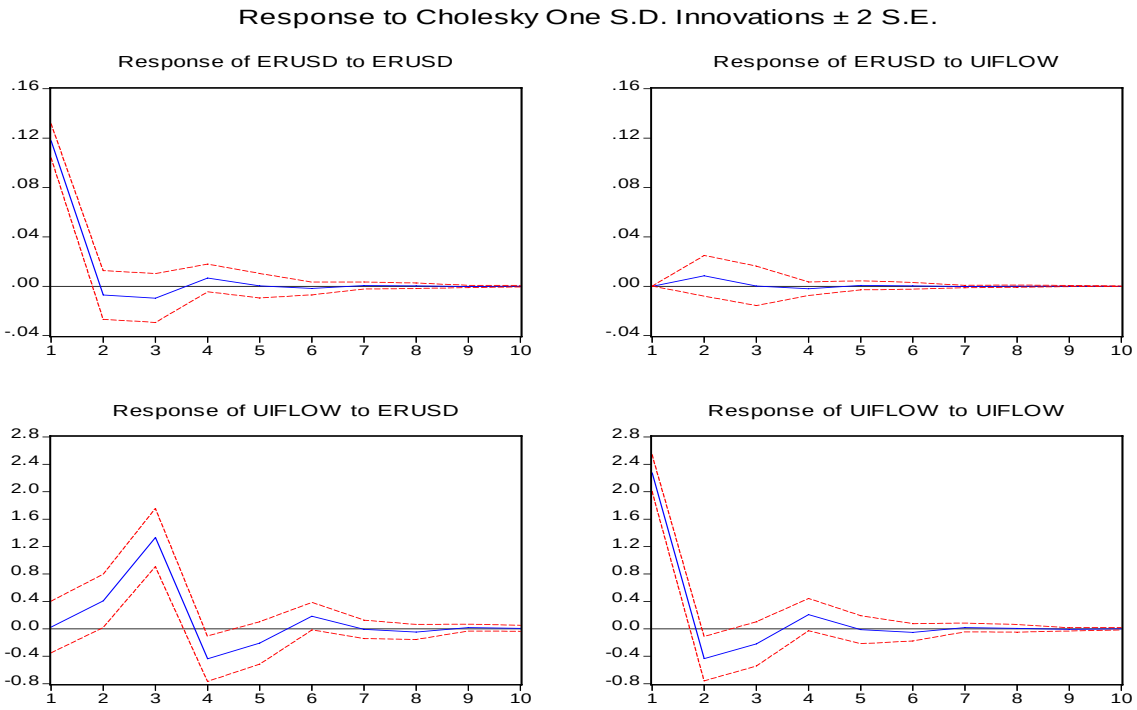
This table presents results from the bivariate vector autoregessive (VAR) specified for each endogenous variable. ERUSD is the monthly percentage excess return of the Chinese or Indian country index over the USA monthly index return. UIFLOW is the monthly unexpected inflows. All terms are expressed in US dollars. The VAR is estimated separately for either China or India. Panel A reports coefficient estimates, their standard errors in parenthesis and t-statistics in brackets, adjusted R-squared and F statistics are reported.

	VAR: China		*VAR: India*	
	ERUSD	**UIFLOW**	**ERUSD**	**UIIFLOW**
Variables				
ERUSD (-1)	-0.06	3.52	0.01	-44.19
	(0.08)	(1.61)	(0.08)	(120.22)
	[-0.74]	[2.18]	[0.09]	[-0.37]
ERUSD (-2)	-0.10	12.22	0.18	110.62
	(0.08)	(1.62)	(0.08)	(119.09)
	[-1.18]	[7.53]	[2.13]	[0.93]
UIFLOW (-1)	0.04	-0.19	-0.00	-0.13
	(0.003)	(0.07)	(0.00)	(0.09)
	[1.01]	[-2.72]	[-0.76]	[-1.53]
UIFLOW (-2)	0.001	-0.15	0.00	-0.19
	(0.003)	(0.07)	(0.00)	(0.10)
	[0.29]	[-2.16]	[1.37]	[-1.98]
Intercept	0.003	1.08	0.001	-1.15
	(0.01)	(0.21)	(0.01)	(9.40)
	[0.26]	[5.16]	[0.24]	[-0.12]
R-squared	0.02	0.33	0.05	0.05
F-stat	0.68	17.18	1.71	1.73

The results of the impulse response functions for China and India are reported in graphs 1.7a and 1.7b, respectively. The results for China are very significant showing that one standard deviation shock leads to an increase in unexpected flows of 1.2% by the third month.

Graph 1.7a: Impulse Response Functions (China)

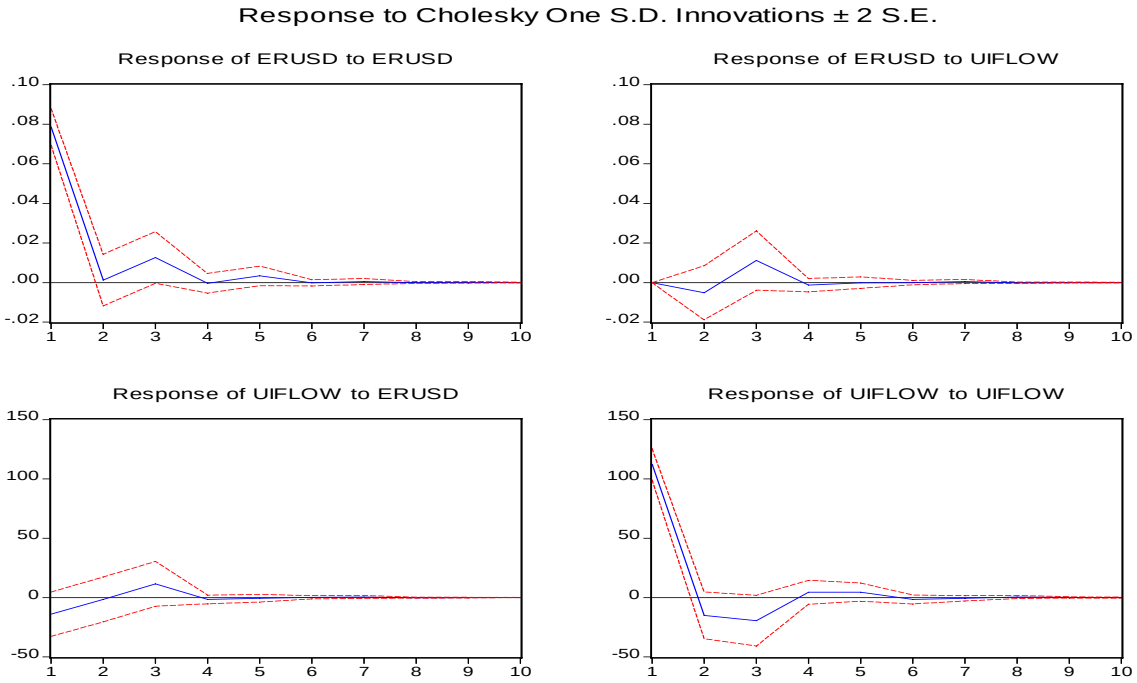
Graph 1.7a presents standard impulse response functions for flow and return equations in table 1.11.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

Graph 1.7b: Impulse Response Functions (India)

Graph 1.7b presents standard impulse response functions for flow and return equations in table 1.11.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

In the case of India, causality running from excess returns to flows remains statistically insignificant, however, a similar negative relationship between lagged unanticipated flows is also found at the 10% significance level. This result can be seen in the impulse response function, reported in Graph 1.7b. The granger causality results, reported in Column two of Table 10, while not significant at the 10% level, has a p-value of less than 12% and provides some tentative evidence that price pressure maybe a factor in the Indian equity market. The contrasting results between China and India with respect to unanticipated inflows and returns can be partially explained by the fact that 41% of portfolio equity inflow to India is from the US, while only about 1% of portfolio flows to China are from American institutional investors.

8.3 VAR with Controls

Two sets of VARX models are estimated including an exogenous dummy variable to control for extreme values, results of granger causality tests are reported in Column three of Table 1.10[34]. The motivation for including a dummy variable for extreme observations can be seen in Graphs 1.1a and 1.2a. It is clearly evident that there are a few significant outliners and in order to understand the general nature of the relationship between flows and returns in these economies these 'spikes' must be controlled out.

Results for China are not affected significantly (although goodness of fit measure improved). The results for India, however, show that lagged returns are significant in predicting returns at the 5% level. This result indicates that in general the positive feedback explanation fits the data well in India, in the 'average' month.

[34] Extreme values are observations two standard deviations or more from the mean.

To summarize my results to this point, in a bivariate system, it appears that there is strong evidence of returns forecasting flows positively in China. In India, the evidence of returns forecasting flows is more ambiguous. Froot et al (2001) found positive forecastability of flows from returns in emerging markets, but in more developed markets forecastablity flows from past returns was ambiguous. If my findings are interpreted in terms of relative information asymmetry between the US and China and the US and India, one could conjecture that in China information asymmetries are more acute, for two reasons. First, total gross flows are significantly less than India, and second, there is a far greater relationship between returns and flows, indicating that US investors revise their priors by more in China as compared to India after changes in relative returns.

The finding that flows have almost no affect on returns in China is likely an artifact that flows into China from US investors are relatively small compared to market capitalization. One the other hand, while not statistically significant, there is some indication of limited price pressure in India.

8.4 VAR with Additional Endogenous Variables

Although the regression coefficients from the bivariate model provide useful summary information, they are univariate relations, which may obscure some dynamic patterns. For example, there may be a positive relationship between current equity flows and lagged equity returns, but part of this correlation may come indirectly through the effect of industrial production (a la Griffen et al, 2004) on equity returns. With the trivariate and four-variable models, I seek to determine whether the relations I uncovered in my bivariate model exist after controlling for dividend yields and industrial production. As previously discussed, dividend yield is frequently hypothesized to be an important factor in determining equity prices and possibly the investor decision making process. Trivariate and four-variable VAR

are estimated and results for China and India do not significantly change in either case. Table 1.12 and graphs 1.8 and 1.9 report the results of the four-variable VAR.

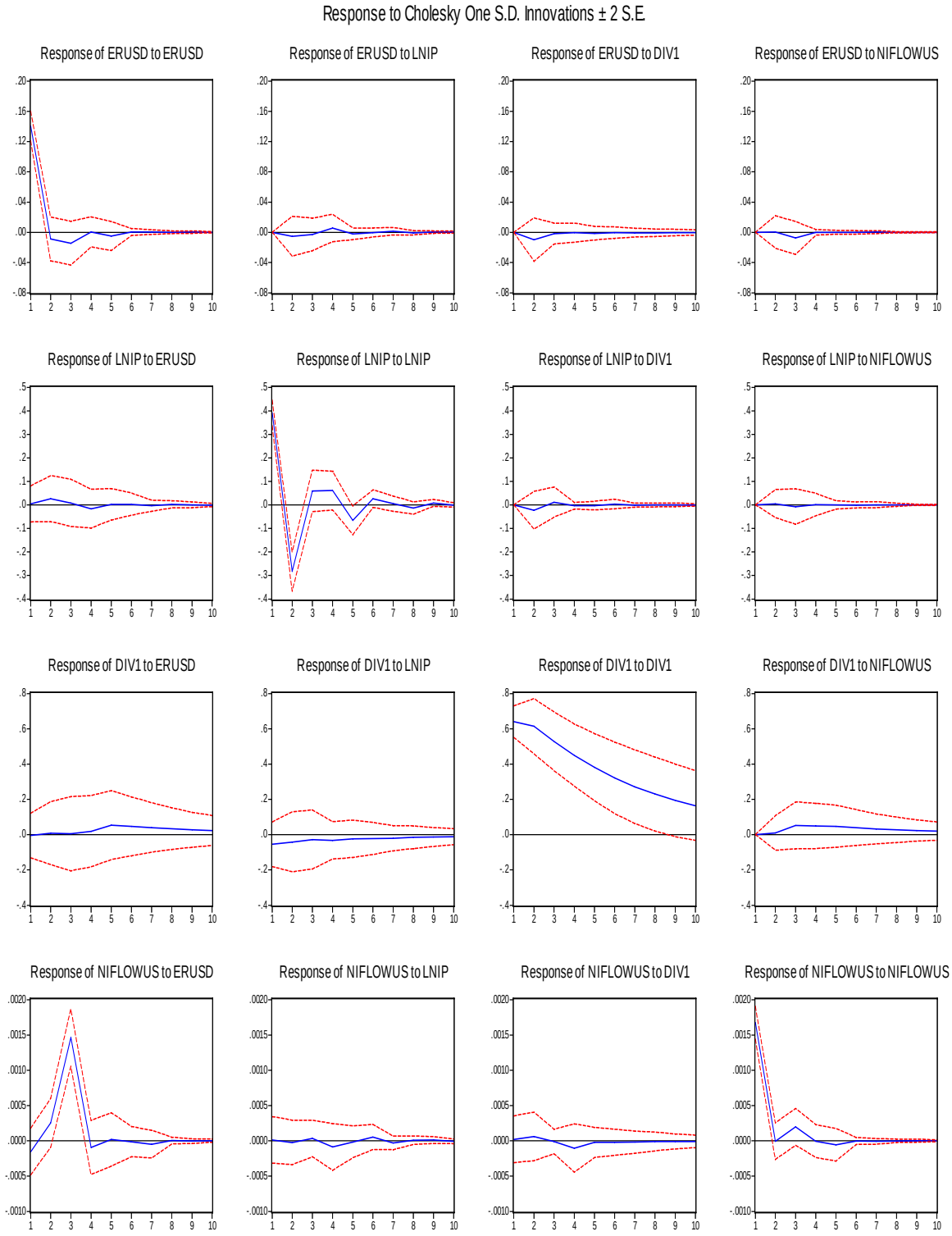
Table 1.12: Vector Autoregression of Excess returns, Standardized Inflows, Log Industrial Production and Log of Dividend Yield for China and India

This table presents results from the vector autoregessive (VAR) specified for each endogenous variable. ERUSD is the monthly percentage excess return of the Chinese or Indian country index over the USA monthly index return, inflow is scaled by market capitalization, LNIP represents the log difference of industrial production and DIV1 is the log of dividend yield. The VAR is estimated separately for either China or India. Panel A reports coefficient estimates, their standard errors in parenthesis and t-statistics in brackets, adjusted R-squared and F statistics are reported.

	VAR: China				*VAR: India*			
	ERUSD	**LNIP**	**DIV1**	**INFLOW**	**ERUSD**	**LNIP**	**DIV1**	**INFLOW**
Variables								
ERUSD (-1)	-0.064	0.208	0.095	0.002	-0.036	0.048	0.269	0.010
	(0.103)	(0.288)	(0.473)	(0.001)	(0.093)	(0.050)	(0.26)	(0.008)
	[-0.614]	[0.721]	[0.201]	[1.467]	[-0.386]	[0.961]	[1.04]	[1.192]
ERUSD (-2)	-0.107	0.214	-0.006	0.011	0.146	-0.121	-0.168	0.001
	(0.104)	(0.290)	(0.475)	(0.001)	(0.086)	(0.047)	(0.24)	(0.008)
	[-1.03]	[0.739]	[-0.01]	[8.557]	[1.700]	[-2.60]	[-0.70]	[0.120]
LNIP (-1)	-0.016	-0.728	0.028	0.000	-0.041	-0.449	-0.426	0.001
	(0.034)	(0.094)	(0.155)	(0.00)	(0.152)	(0.083)	(0.43)	(0.014)
	[-0.472]	[-7.72]	[0.179]	[-0.13]	[-0.265]	[-5.41]	[-0.99]	[0.092]
LNIP (-2)	-0.020	-0.373	0.037	0.000	0.051	-0.013	-0.113	0.000
	(0.031)	(0.087)	(0.143)	(0.000)	(0.151)	(0.082)	(0.42)	(0.014)
	[-0.637]	[-4.269]	[0.260]	[0.178]	[0.337]	[-0.16]	[-0.27]	[-0.008]
DIV1 (-1)	-0.015	-0.036	0.959	0.000	0.013	-0.039	0.947	-0.004
	(0.022)	(0.063)	(0.103)	(0.000)	(0.033)	(0.018)	(0.09)	(0.003)
	[-0.681]	[-0.571]	[9.334]	[0.351]	[0.388]	[-2.14]	[10.1]	[-1.42]
DIV1 (-2)	0.010	0.029	-0.093	0.000	0.021	0.046	-0.053	0.003
	(0.022)	(0.062)	(0.102)	(0.000)	(0.034)	(0.018)	(0.10)	(0.003)
	[0.467]	[0.473]	[-0.92]	[-0.317]	[0.637]	[2.501]	[-0.56]	[1.002]
INFLOW (-1)	0.195	2.985	5.783	-0.003	-0.729	-0.326	1.226	0.931
	(6.430)	(17.895)	(29.39)	(0.077)	(1.504)	(0.818)	(4.22)	(0.139)
	[0.030]	[0.167]	[0.197]	[-0.041]	[-0.485]	[-0.399]	[0.29]	[6.706]
INFLOW (-2)	-4.319	-2.050	25.261	0.117	1.764	0.283	-2.002	0.166
	(6.417)	(17.860)	(29.32)	(0.077)	(1.538)	(0.836)	(4.31)	(0.141)
	[-0.673]	[-0.114]	[0.861]	[1.520]	[1.147]	[0.338]	[-0.464]	[1.173]
Intercept	0.020	0.013	0.282	0.001	-0.064	-0.004	0.185	0.002
	(0.028)	(0.078)	(0.129)	(0.000)	(0.024)	(0.013)	(0.07)	(0.002)
	[0.723]	[0.172]	[2.190]	[1.870]	[-2.690]	[-0.277]	[2.769]	[0.890]
R-squared	0.028	0.390	0.783	0.445	0.101	0.317	0.827	0.773
F-stat	0.341	7.532	42.428	9.436	1.916	7.889	81.123	57.856

Graph 1.8: Impulse Response Functions (China)

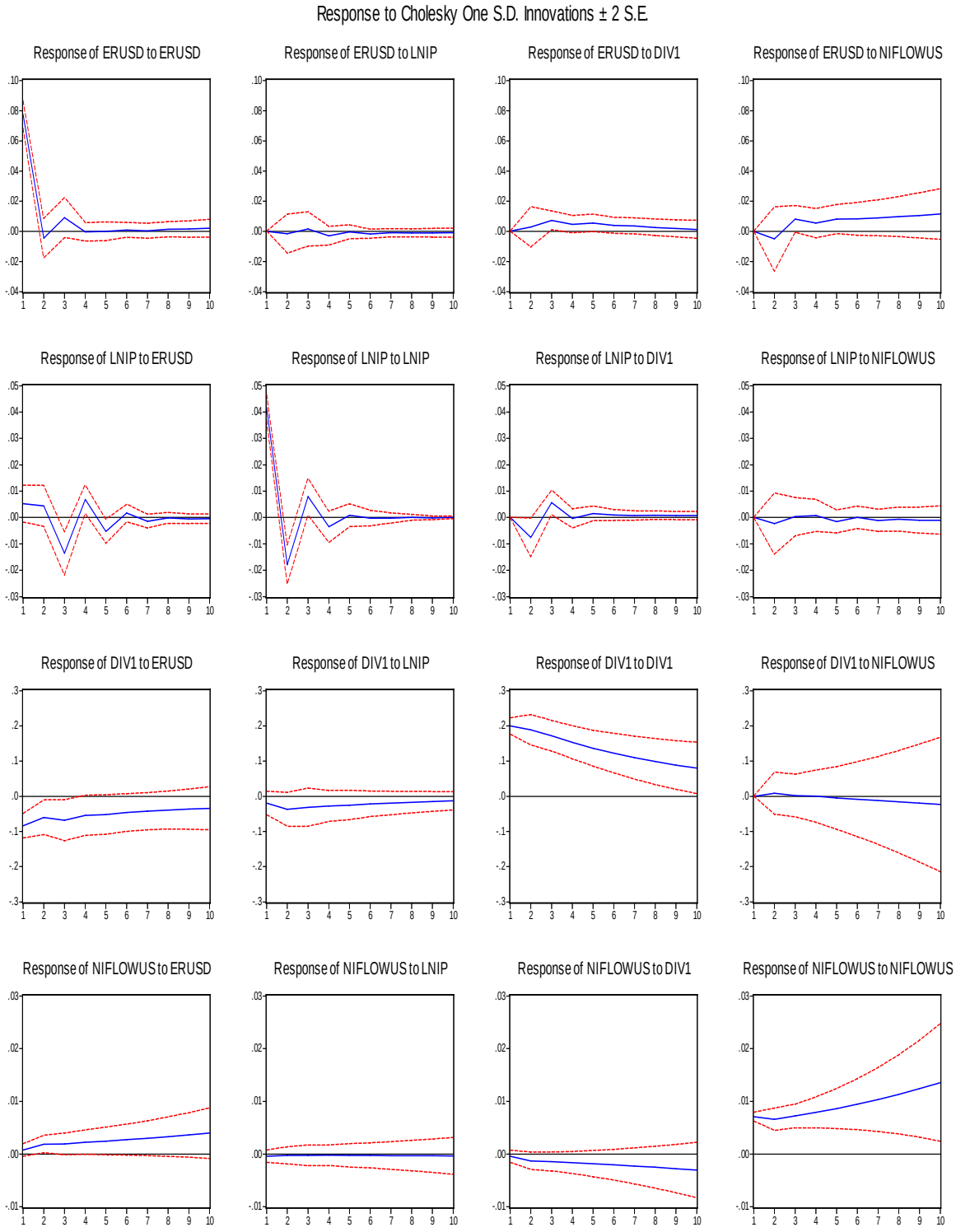
Graph 1.8 presents standard impulse response functions for flow, return, dividend and industrial production equations.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

Graph 1.9: Impulse Response Functions (India)

Graph 1.9 presents standard impulse response functions for flow and return, dividend and industrial production equations.



Dotted lines are 90%-conidence bounds, which were generated by a Monte-Carlo simulation with 1000 draws from the posterior distribution.

Results remain ambiguous for India in both the trivariate and four variable cases[35], as reported in Table 1.12 and Table 1.13. Some interesting patterns do appear in the coefficient estimate, reported in Table 1.12, dividends appear to be persistent in both China and India, and the coefficient on lagged dividend yield is positive and statistically significant at the 1% level for both countries. Table 1.13 reports the results for the F-tests for block exogeneity; the only significant causal relationship in China is that excess returns are still statistically causing inflows. Interestingly there is no causality running between dividend yields and returns in China. This is in contrast to the case of India. In India, consistent with the finding of developed markets, dividends appear to have predictive power for forecasting returns.

Table 1.13: Summary of Granger Causality Tests

The table below presents a summary of pair wise Granger causality tests for China and India for the model that includes returns, inflows, dividend yield and log of industrial production. Chi-squared statistics are reported.

	ERUSD	**Inflows**	**Dividends**	**Industrial Production**
Pane1 A: China				
ERUSD causing	n/a	74.34***	0.04	1.02
Inflows causing	0.45	n/a	0.8	0.04
Dividends Causing	0.55	0.12	n/a	0.33
IP causing	0.42	0.11	0.07	n/a
Panel B: India				
ERUSD causing	n/a	1.43	1.61	7.83**
Inflows causing	3.49	n/a	0.34	0.16
Dividends Causing	6.84**	2.66	n/a	6.45**
IP causing	0.34	0.01	1.04	n/a

*** Significance at 1%, ** significance at 5% and *significance at 10%

The contrasting findings in the cases of China and India further lead credence to the idea that the Chinese market is not operating efficiently (Tian, 2002). One can also see that returns on the Indian market as well as dividend yields are significant for forecasting future industrial production. This, again, is consistent with the findings in developed markets that

[35] Results for 3 and 4 variable VAR are very similar and hence only the results of the 4 variable VAR are reported.

equity markets lead real markets. Since expectations are built into equity market, returns and firms make dividend policy decisions based on estimated future productivity.

8.5 China: Bivariate SVAR

To understand my second set of questions and to get an indication of whether US investors trade based on fundamentals, I use the identification procedure of Blancard and Quah (1989) and Clarida and Gali (1994) to impose long-run restrictions to identify my VAR for China and India. I then estimate the coefficient matrices, impulse response functions and decompose the forecast variance. Tables 1.14a and 1.14b presents the results of augmented dickey fuller tests, which show that index in level form and inflows are integrated of order one. Since at least one of the variables is non-stationary, it is appropriate to employ a Blancard and Quah style decomposition; however, for estimation purposes all variables must be in stationary form (see Clarida and Gali, 1994). Once we identify price and information/investor base disturbances by imposing the appropriate restrictions, we can examine dynamic effects of each type of shock on stock returns and flows over various horizons.

Table 1.14a: Unit Root Rest Results (China): January 1994 to June 2006

The table below presents the results of unit root tests. Reported are the Augmented Dickey-Fuller statistic along with the p-value and the order of integration.

	ADF Static	p-value	Order of Integration
China			
INFLOW	-0.61	0.45	I(1)
OUTFLOW	2.15	0.99	I(1)
NETFLOW	-3.79	0.00	I(0)
IFLOWUS	-2.02	0.04	I(0)
OFLOWUS	-0.27	0.59	I(1)
NFLOWUS	-2.91	0.00	I(0)
INDEXUS	-0.67	0.86	I(1)
INDEXLC	-0.56	0.84	I(1)
DIV	-0.53	0.48	I(1)
ERUSD	-12.75	0.00	I(0)
RUSD	-2.67	0.00	I(0)
LNIP	-3.68	0.00	I(0)

Table 1.14b: Unit Root Test Results (INDIA): January 1994 to June 2006

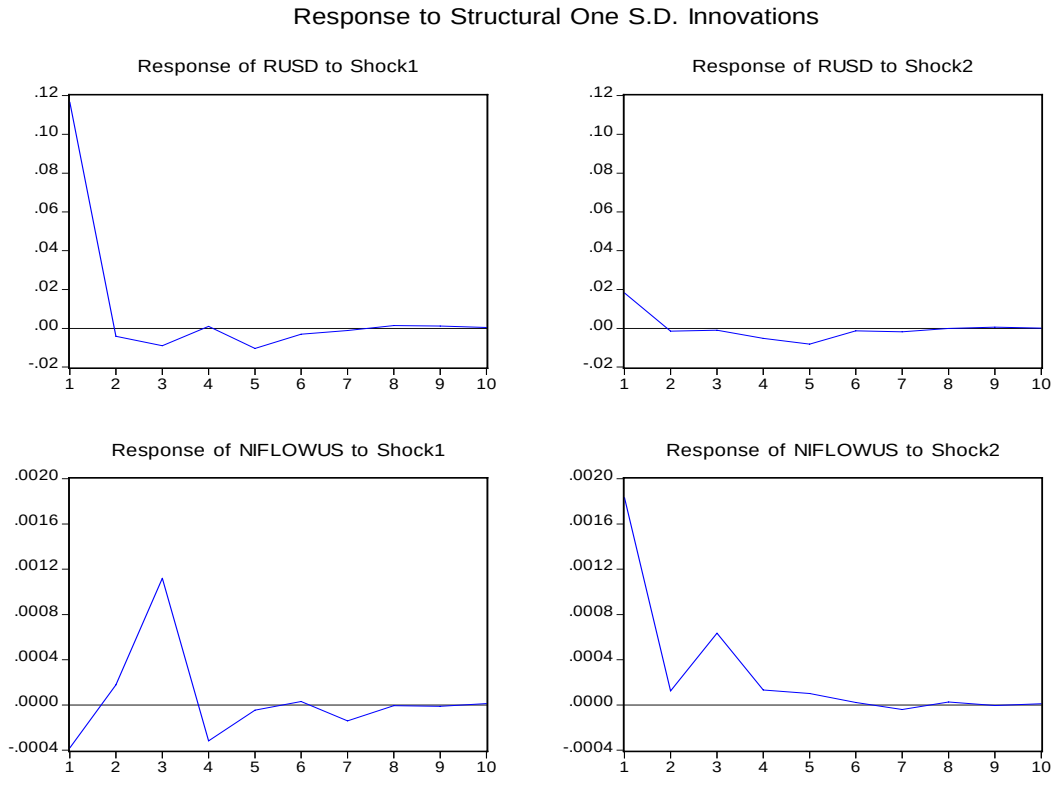
The table below presents the results of unit root tests. Reported are the Augmented Dickey-Fuller statistic along with the p-value and the order of integration.

	ADF Static	p-value	Order of Integration
India			
INFLOW	4.23	1.00	I(1)
OUTFLOW	5.81	1.00	I(1)
NETFLOW	-0.00	0.68	I(1)
IFLOWUS	-11.64	0.00	I(0)
OFLOWUS	-10.30	0.00	I(0)
NFLOWUS	-13.78	0.00	I(0)
INDEXUS	2.19	0.99	I(1)
INDEXLC	2.98	0.99	I(1)
DIV	-0.59	0.46	I(1)
ERUSD	-4.47	0.00	I(0)
RUSD	-6.58	0.00	I(0)
LNIP	-1.18	0.23	I(1)

Graph 1.10 is a plot of the orthonormalized moving average coefficients. The impulse response function gives the impact on the system of a structural shock to one of the variables in the system. The results for inflows and net flows are very similar and hence only the results of inflows are reported to be consistent with the theory model of Dvorak (2003). In panel A, the IRF's show that flows respond positively to a structural price shock over the next 2-3 month period, which indicates that investors are trend chasing. However, foreign investors may be reacting to fundamental shocks, which will be analyzed in the next section. Flows also appear to positively respond to shock in flows, indicating that investor build up positions slowly.

Graph 1.10: Structural Vector Autoregression of Returns and Standardized Inflows for China

Graph 1.10 presents impulse response functions from a Blanchard-Quah decomposition. Shock 1 is a structural shock to prices; Shock 2 is a structural shock to inflows.



The variance decomposition results are reported panel A and B in table 1.15 for China and India respectively. Variance decomposition measures the historical contribution of each variable to the variance of the other variable in the system. Variance decomposition provides evidence on the relative importance of each of the shocks. The variance decomposition measures the historical contribution of each variable to the variance of the other variable in the system. The variance decomposition indicates that the variance in returns are relatively unaffected by innovations in foreign portfolio investments, for example only 2.40% of variance in returns can be attributed to shocks in flows. On the other hand, the variance in flows is strongly influenced by returns. Particularly, after three to four months, the role of a price shock in explaining the variance of US ownership changes in China is only about 4% in the first month or two following a shock, but increases to over 28% over the ten month decomposition period.

Table 1.15: Variance Decomposition of Structural Shocks

Table 1.15 presents the structural variance decomposition. Shock are identified using the Blanchard and Quah decomposition. Standard errors and the percent of variation in each variable explained by structural shocks to itself and other variables in the system are reported.

Panel A: China				Panel B: India		
	Std. error	**Price Shock**	**Flow Shock**	**Std error**	**Price Shock**	**Flow Shock**
	Variance Decomposition Price: China			*Variance Decomposition Price: India*		
Period						
1	0.12	97.60	2.40	0.08	67.47	32.53
2	0.12	97.59	2.41	0.08	67.48	32.52
3	0.12	97.60	2.40	0.08	69.51	30.49
4	0.12	97.41	2.59	0.08	69.44	30.56
5	0.12	96.97	3.03	0.08	69.42	30.58
6	0.12	96.96	3.04	0.08	69.54	30.46
7	0.12	96.94	3.06	0.08	69.41	30.59
8	0.12	96.94	3.06	0.08	69.13	30.87
9	0.12	96.94	3.06	0.08	68.86	31.14
10	0.12	96.94	3.06	0.08	68.52	31.48
	Variance Decomposition Inflow: China			*Variance Decomposition Inflow: India*		
Period						
1	0.00	4.08	95.92	0.01	21.96	78.04
2	0.00	4.91	95.09	0.01	17.14	82.86
3	0.00	27.45	72.55	0.01	15.34	84.66
4	0.00	28.72	71.28	0.01	13.11	86.89
5	0.00	28.69	71.31	0.01	11.19	88.81
6	0.00	28.70	71.30	0.02	9.96	90.04
7	0.00	28.95	71.05	0.02	9.12	90.88
8	0.00	28.95	71.05	0.02	8.53	91.47
9	0.00	28.95	71.05	0.02	8.09	91.91
10	0.00	28.95	71.05	0.02	7.76	92.24

Now we can also move to the analysis of the impact of identified shocks on returns and flows. As a precautionary note, one should mention that as in any reduced form structural-econometric model, the estimated responses to different shocks might be subject to structural changes over longer periods. It will be useful to look at the implied long-run multipliers for the impact of shocks on the two endogenous variables. These variables turned out to be highly significant as reported in table 1.16. The estimated long-run multiplier

matrix indicates that a positive return shock leads to a rise in future returns as well as an increase in inflows.

Table 1.16: Long-run Multiplier Matrices

The table below presents a summary of the cumulative long-run multiplier matrices for two variables SVAR. Coefficient estimates, standard errors and z-stats are reported.

	Panel A: China			Panel B: India		
	Coefficient	**Std. Error**	**z-Statistic**	**Coefficient**	**Std. Error**	**z-Statistic**
	SVAR [Returns, Flows]: China			*SVAR[Returns, Flows]:India*		
Long Run response to shocks	0.089***	0.005	17.263	0.102***	0.006	17.204
Price on Price	0.049***	0.008	6.295	0.014*	0.008	1.678
Price on Flows	0.003***	0.000	17.263	0.066***	0.004	17.205
Price on Flows						

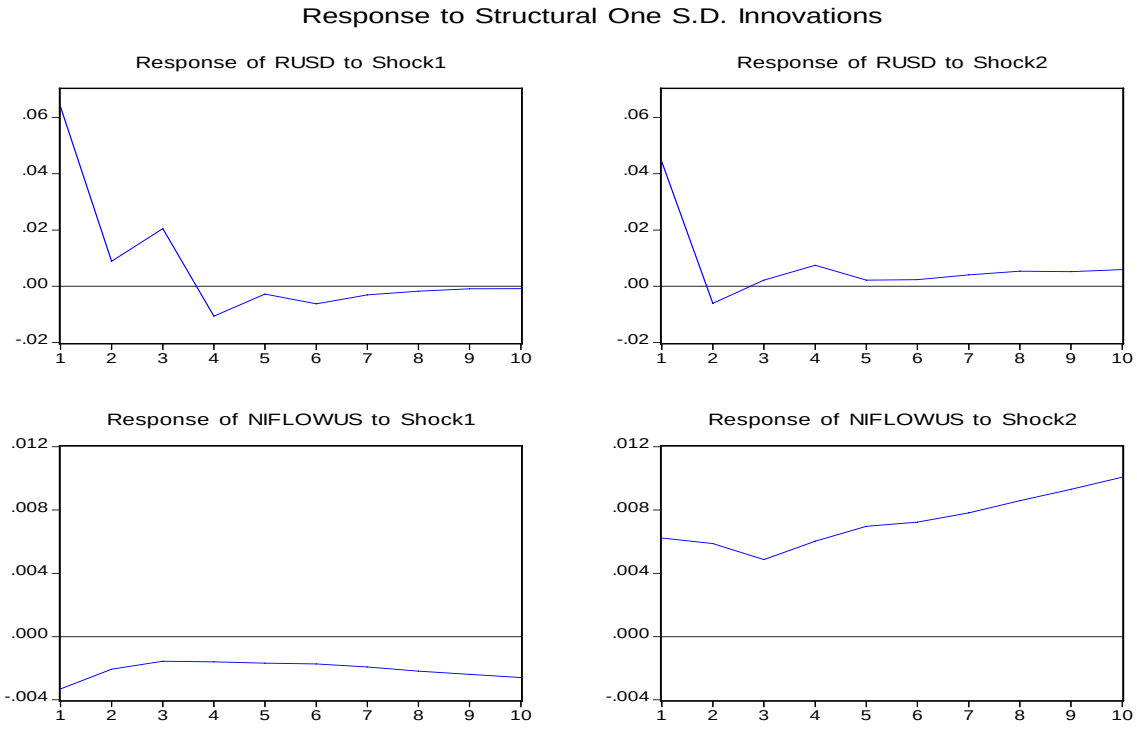
*** Significance at 1%, ** significance at 5% and *significance at 10%

8.6 India: Bivariate SVAR

Graph 1.11 is a plot of the orthonormalized moving average coefficients for the SVAR for India. Again, in the case of India net flows and inflows display broadly the same patterns. However, the results in India are strikingly different from the results in China. The variance in flows appear to be unaffected by returns, only roughly 3% of the variance in flows are explained by price shocks, as reported in Panel B of table 1.15. In contrast to China, a significant amount of the variance in returns can be explained by changes in flows, between 30-33%. Part of the reason for this phenomenon in India is the large portion of the equity market owned by US investors, when compared to China. Impulse response analysis, reported in Graph 1.11, indicates that returns appear to respond positively to a shock in flows.

Graph 1.11: Structural Vector Autoregression of Returns and Standardized Inflows for India

Graph 1.11 presents impulse response functions from a Blanchard-Quah decomposition. Shock 1 is a structural shock to prices; Shock 2 is a structural shock to inflows.



These findings provide preliminary evidence that foreign investors are leading the market, which would support the notion that foreign investors may not have an informational disadvantage as is commonly accepted. The results of the long-run multiplier matrix are summarized in table 1.16, indicate (though only significant at the 10% level) that a structural shock to returns in India also lead to accumulated increase of inflows as a percentage of market capitalization.

8.7 China: SVAR with Fundamentals

Our first result concerns the variance decomposition of flows as a percentage of market capitalization reported in table 1.17. The contribution of fundamental shocks (i.e. dividend shocks) to the variance of returns is only approximately 10% and a shock to flows has a negligible effect on the variance of equity returns. However, more interesting result is

the variance decomposition of equity flows. Panel A of Table 1.17 shows that between 51.87% and 68.76% of the variance in equity flows can be explained by shocks to fundamentals. These results indicate that the behavior of US institutional investors is influenced more by fundamental determinants of value than price shocks or flow shocks. This finding provides the first empirical support for the model developed by Dvorak (2003).

Table 1.17: Variance Decomposition of Structural Shocks

Table 1.17 presents the variance decomposition where the shock are identified using the Blanchard and Quah decomposition outline in the text. Standard errors and percent of variation in each variable explained by itself and the other variables in the system are reported. Panel A reports the results for China and Panel B reports the results in India.

Panel A: China

	Std. error	Price Shock	Div. Shock	Flow Shock
		Variance Decomposition RUSD: China		
Period				
1	0.12	89.73	9.37	0.91
2	0.12	89.43	9.32	1.25
3	0.12	88.83	9.49	1.68
4	0.12	87.91	9.98	2.10
5	0.12	87.29	10.63	2.08
6	0.12	87.27	10.63	2.09
7	0.12	87.26	10.65	2.09
8	0.12	87.26	10.64	2.10
9	0.12	87.24	10.64	2.12
10	0.12	87.21	10.64	2.15
		Variance Decomposition Dividend: China		
Period				
1	0.56	0.71	80.00	19.29
2	0.79	0.37	80.39	19.24
3	0.98	0.51	83.33	16.16
4	1.09	0.44	85.16	14.40
5	1.18	0.46	86.63	12.91
6	1.26	0.43	87.54	12.03
7	1.34	0.38	88.22	11.40
8	1.41	0.34	88.66	10.99
9	1.48	0.31	89.04	10.65
10	1.54	0.29	89.36	10.35
		Variance Decomposition Flows: China		
Period				
1	0.00	12.51	68.76	18.73
2	0.00	12.91	67.32	19.78
3	0.00	26.68	55.85	17.46
4	0.00	28.12	54.54	17.34
5	0.00	27.64	53.52	18.84
6	0.00	27.38	52.94	19.68
7	0.00	27.44	52.58	19.99
8	0.00	27.29	52.28	20.43
9	0.00	27.18	52.09	20.73
10	0.00	27.06	51.87	21.06

Panel B: India

Std error	Price Shock	Div. Shock	Flow Shock
	Variance Decomposition RUSD: India		
0.08	57.46	22.65	19.89
0.08	57.14	23.32	19.54
0.08	57.57	22.13	20.30
0.08	57.47	22.28	20.26
0.08	57.51	22.25	20.23
0.08	57.48	22.26	20.26
0.08	57.46	22.26	20.28
0.08	57.43	22.25	20.32
0.08	57.41	22.24	20.35
0.08	57.38	22.23	20.39
	Variance Decomposition Dividend: India		
0.22	0.22	75.75	24.03
0.30	0.18	81.30	18.52
0.37	0.13	86.01	13.87
0.43	0.09	88.54	11.37
0.48	0.08	90.10	9.83
0.53	0.06	91.12	8.81
0.57	0.06	91.86	8.09
0.60	0.05	92.40	7.55
0.64	0.04	92.83	7.13
0.67	0.04	93.17	6.79
	Variance Decomposition Flows: India		
0.01	1.34	78.62	20.04
0.01	1.51	78.93	19.57
0.01	1.59	78.83	19.58
0.01	1.64	78.77	19.59
0.01	1.65	78.71	19.65
0.01	1.65	78.64	19.71
0.01	1.65	78.55	19.80
0.01	1.65	78.47	19.88
0.01	1.65	78.39	19.97
0.01	1.64	78.30	20.06

Graph 1.12 is a plot of the orthonormalized moving average coefficients for the SVAR for China including dividend yield. Inflows are significantly negatively affected by shocks in dividends and this effect slowly dissipates.

Graph 1.12: Impulse Response Functions (China)

Graph 1.12 presents impulse response functions from a Blanchard-Quah decomposition. Shock 1 is a structural shock to prices; Shock 2 is a structural shock to dividends, shock 3 is a structural shock to inflows.

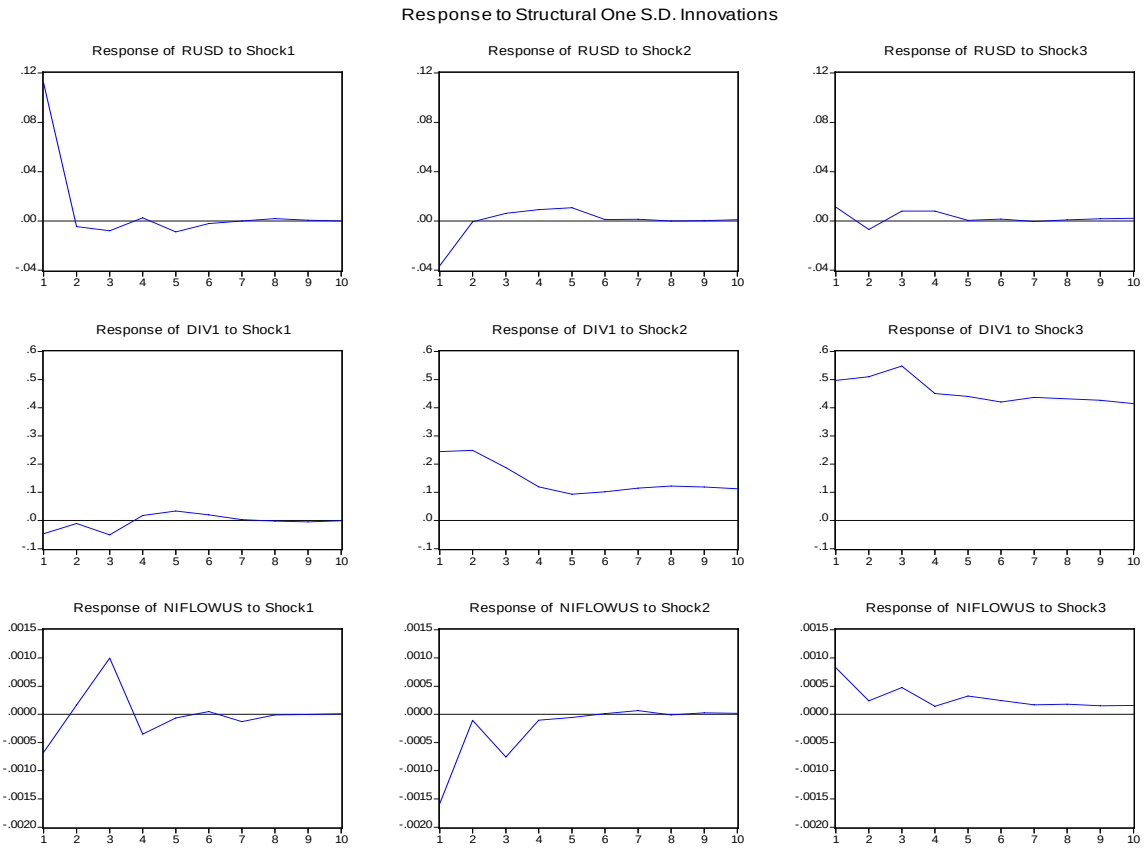


Table 1.18 reports pair-wise granger causality tests. The results show that both returns and dividend are statistically significant for forecasting inflows. Again, this supports the idea that foreign investors are acting on both price and fundamentals when making investment decisions. An alternative explanation for these results is that the positive correlation between flows and returns is not because domestic investors have superior information, but rather because foreign investors are adjusting their equity positions due to a fundamental shock, which affects the price. Overall, the results indicate that foreign investors in China appear to be more responsive to fundamental shocks, which supports the notion that investments are made for the long horizons rather than for short-term trading profit (Kim and Ying, 2001). This is logical in the setting of the Chinese equity market where prices are known to have wide variation from fundamental levels because of

government intervention, lack of 'real blue chip' firms and reliance on external expansion (Gao, 2002).

Table 1.18: Summary of Granger Causality Tests

The table below presents a summary of granger causality results for two and three variable SVAR.

	Price	Inflows	Dividends
Panel A: China			
Price causing	n/a	62.63***	0.31
Inflows causing	0.56	n/a	1.61
Dividends Causing	1.92	63.53***	n/a
Panel B: India			
Price causing	n/a	0.57	0.48
Inflows causing	1.1	n/a	0.11
Dividends Causing	6.08**	6.13**	n/a

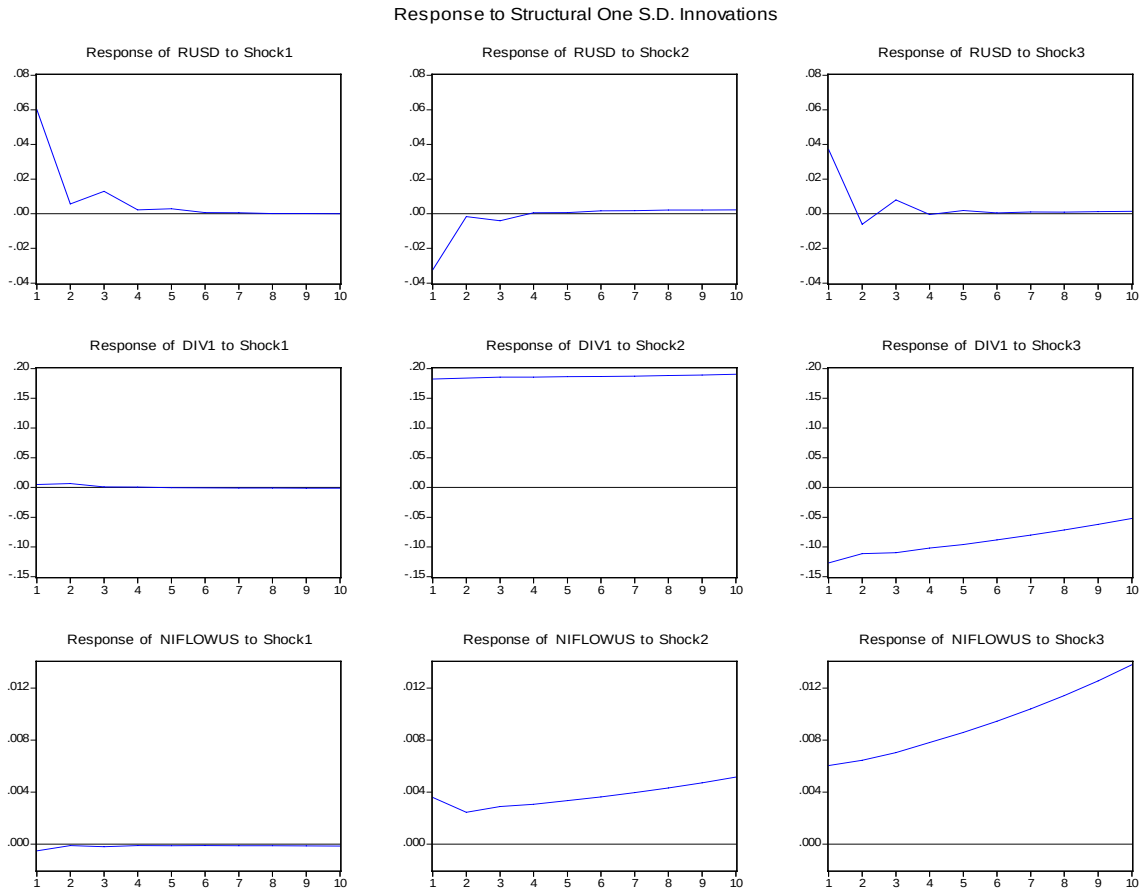
*** Significance at 1%, ** significance at 5% and *significance at 10%

8.8 India: SVAR with Fundamentals

Graph 1.13 is a plot of the orthonormalized moving average coefficients for the SVAR for India including dividend yield. In India, net flows and inflows display similar patterns. The most interesting IRF is the response of flows to a shock in dividends. Flows are strongly affected by a shock to dividends and this effect does not dissipate quickly. This indicates that investors are responding to 'fundamental information' and not price signals.

Graph 1.13: Impulse Response Functions (India)

Graph 1.13 presents impulse response functions from a Blanchard-Quah decomposition. Shock 1 is a structural shock to prices; Shock 2 is a structural shock to dividends, shock 3 is a structural shock to inflows.



Panel B of Table 1.17 reports the variance decomposition, interestingly, return variance is explained by both dividends and flows, which is different from China where the variance of returns were mostly unaffected by shocks in other variables to the system. This could be because India has a much more open financial system and returns are affected by fundamental determinants of value. The variance decomposition of inflows shows that the majority of the variance (78%) of inflows can be attributed to fundamental shocks. This provides strong evidence that US institutional investors in India are responding to fundamental shocks rather than price shocks. This conclusion is supported by the significant causality result that dividends are significant in forecasting equity inflows, whereas returns do not granger cause flows, as reported in Table 1.18.

8.9 SVAR: Long-run Multiplier Matrix

Panels A and B in Table 1.19 reports the long-run multiplier matrix for the trivariate SVAR for China and India respectively. The estimated long-run multiplier matrix for China indicates that a positive price shock leads to a rise of equity inflows as a percentage of market capitalization, and no significant long run effect on dividend yield. This is likely a result of government influence in the Chinese equity market, which leads to this counter intuitive result. On the other hand, a fundamental shock leads to a statistically significant long run increase in equity flows from US institutional and an increase in returns. Additionally, the long-run multiplier matrix indicates that a consistent with other literature that a shock to flows leads to a long run increase in flows. Panel B of Table 1.19 reports the results for India. The results are very similar. A price or return shock leads to a positive long-run effect on future returns, dividends, and flows. The case of India is consistent with intuition that increases in returns and subsequent market value of a firm leads to long run increases in dividends. Additionally, a shock to fundamentals leads to a long run increase equity inflows to India, further supporting the idea that foreign investors may not be informationally deficient. The long-run multiplier matrix also indicates consistent with other literature that a shock to flows leads to a long run increase in flows, which is similar to China. Economically the results are very significant.

Table 1.19: Long-run Multiplier Matrices

The table below presents a summary of the cumulative long-run multiplier matrices for two and three variables SVAR. Coefficient estimates, standard errors and z-stats are reported.

	Panel A: China			Panel B: India		
	Coefficient	**Std. Error**	**z-Statistic**	**Coefficient**	**Std. Error**	**z-Statistic**
	SVAR [Returns, Dividends, Flows]: China			*SVAR [Returns, Dividends, Flows]: India*		
Long Run response to shocks						
Price on Price	0.088***	0.005	17.263	0.086***	0.005	17.205
Price on Dividends	0.011	0.007	1.557	0.037***	0.007	5.049
Price on Flows	0.043***	0.234	17.263	0.019***	0.127	17.205
Dividends on Dividends	0.052***	0.008	6.623	0.032***	0.008	4.031
Dividends on Flows	0.074**	0.334	2.201	0.054***	0.183	2.967
Price on Flows	0.003***	0.000	17.263	0.067***	0.004	17.205

*** Significance at 1%, ** significance at 5% and *significance at 10%

A one standard deviation shock to price will have a cumulative impact on flows of 0.043% as a percentage of market capitalization China. While this may seem like an economically insignificant percentage, it accounts for approximately 153 million USD. In India, a one standard deviation shock in prices will have a cumulative impact of 0.019% on flows, which accounts for about 139 million USD and 0.037% increase in dividends. Additionally a one standard deviation shock in dividends will have a cumulative effect of 0.074% or 260 million USD increase in inflows to China and 0.054% in India, which accounts for 394 million USD. The long-run multiplier matrices show that a shock to dividend has a much greater influence on the amount of dollar that flow to both China and India, than does a shock to returns.

8.10 Robustness Checks and Comparative Models:

To gauge the stability of the relationship found in the pervious section, I estimate several VAR using sub-samples. The results for China appear to be consistent for periods before 2003, see table 1.20 for a summary of the granger causality results for sub-periods. The previous estimated relationship does not hold for the last two and a half years of my

sample period. This could be in part due to my data limitations and the fact that after 2002 foreign investors were allowed to invest in both 'A' and 'B' shares, the method that the S+P adjusted its index level after this period could be contaminating and distorting the relationship between flows and returns. In the case of India, the results appear to continue to be slightly ambiguous, with the period from 1999-2003 having statistically significant causality, running from excess returns to flows.

Table 1.20: Summary of Granger Causality Tests for Sub-periods

The table below presents a summary of granger causality tests: Granger 1: Flows do not Granger cause returns. Granger 2: returns do not Granger cause flows for each country. Chi-square statistics are reported.

Period	**1994-1998**	**1998-2003**	**2003-2006**
China			
Flows Causing Returns	0.48	0.85	1.03
Returns Causing Flows	39.51***	12.77***	0.88
India			
Flows Causing Returns	0.47	4.92*	0.12
Returns Causing Flows	0.45	8.10**	2.55

*** Significance at 1%, ** significance at 5% and *significance at 10%

To further test the robustness check of the results, I estimate the relationship between index levels and raw inflows. It was found that index levels and inflows are cointergrated for both China and India, see appendices C and D[36]. Since index levels are found to be non-stationary using standard augmented dickey fuller tests and also cointegrated with inflows (see appendix C and D), estimation of VAR in differences would be inappropriate. The existence of at least one cointegrating relationship between a set of variables implies that an error-correction model exists, because, as established by the Granger representation theorem, for any set of I(1) variables error-correction and cointergration are equivalent representations. The appropriate model is a VEC models and the lag length is chosen to eliminate autocorrelation and serial correlation in the residuals (Enders, 2004).

[36] At the 5% significance level with the max eigan value test and the 10% significance level with the trace test. Both max eigan value and trace test support one conintergrating relationship at the 5% significance level.

Table 1.21: Summary of Granger Causality Tests

The table below presents a summary of granger causality results for the VEC model.

	Index	Inflows
Panel A: China		
Index causing	n/a	8.59*
Inflows causing	3.17	n/a
Panel B: India		
Index causing	n/a	6.08
Inflows causing	14.04**	n/a

Results of the VEC model, reported Table 1.21 support the major findings of the VAR and SVAR analysis. However, in the case of India the VEC model shows that first differences inflows appear to granger cause returns, which provides some evidence that US institutional investors are potentially moving the market.

9. Conclusion

This research has uncovered several important aspects of the Chinese and Indian equity markets and the influences of US institutional equity portfolio investment on these two emerging giants. In this paper, I apply VAR and structural VAR methods to investigate the factors that influence US equity flows. The results from my VAR analysis indicate that US institutional investors are chasing returns into China. Similar results are not found in India. Some evidence is found that US institutional investors' behavior might be influencing the India equity market, while no evidence of US equity flows influencing the Chinese market is discovered. In China, returns appear to forecast future inflows positively; in India, the results are more ambiguous.

To decompose the factors influencing the behavior of US institutional investors, I impose long-run restrictions following Blanchard and Quah (1989). The results of this

decomposition demonstrate that the variance of the Indian equity index is influenced by foreign activity and dividend yields, whereas the Chinese equity index is statistically unaffected by foreign investor behavior and fundamental determinates of value. This supports the ideas espoused in the financial press that the Chinese government still plays a major role in determining prices (Gao, 2002). In both markets 'fundamental shocks' has stronger influence on the variance US institutional purchases than price shocks. This finding points toward the conclusion that foreign investors are responding to 'real' information and not simply returns, which are likely noisy proxies for underlying value. Additionally the finding that the cumulative response to a dividend shock leads to approximately 120 million USD more in unexpected inflows than a comparative shock in prices in China. In India a similar result was found with dividend shocks leading to a 134 million USD more increase in unexpected inflows in India than price shocks. This finding demonstrates that US investors are reacting more strongly to shocks in fundamentals in both markets. The finding of foreign investors responding to fundamental information is in contrast to much of the literature that assumes that domestic investors are better informed than foreign investors (see Brennan and Cao, 1997). These results are consistent with the theoretical work of Dvorak (2003) and the recent empirical work of Albuquerque, Bauer, Schneider (2002), Seasholds (2004), and Froot and Ramadori (2005).

Taken together, the results of this essay indicate that US institutional investors are making purchasing decisions based on long-run fundamental determinants of value and not simply 'chasing returns' or responding to transient price signals. The results of this essay suggest that many of the criticisms of portfolio equity investors may be unfounded, because their behavior reflects investments being made based on fundamental value.

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Chapter 2

Empirical Determinants of US Equity Flows to Developed Nations: Does Valuation Matter?

1. Introduction

The past two and a half decades have been characterized by a dramatic increase in international capital mobility. In 1975, gross cross-border transactions in bond and equity flows for the US were equivalent to only 4% of GDP, this share increased to 100% in the early 1990's and has continued to increase to 245% at the turn of the century. Furthermore, a growing percentage of these portfolio flows consist of equity (Rey and Hau, 2004). However, empirically, there are few established results on the determinants of equity flows between nations (Portes and Rey, 2005).

Empirical work has been stymied by data problems, imperfect mobility of capital, and behavior of international investors which is contrary to established theory. Empirical agreement has also been difficult to reach because different researchers focus on different time-periods and different sets of countries. For example, Calvo, Leiderman and Reinhart (1994) focus on the role of external (push) and internal (pull) factors as potential determinants of foreign investment using a cross section of developing nations. They found that low interest rates in the US played an important role in accounting for the revival of equity flows to these nations in the 1990's. Edwards (1991) shows that government size and openness are important determinants of inward investment from OECD to developing countries, during the period 1971-1981.

Using data on bilateral portfolio equity flows from a set of 14 industrialized countries during 1989-1996, Portes and Rey (2005) find evidence that imperfection in the international credit markets and variables that proxy information asymmetries have the greatest influence

on cross-border equity flows. In addition, among a set of developing countries, Lane (2004) finds credit market frictions to be a determinant of debt flows during 1970-1995.

This paper investigates the factors motivating cross-border equity flows to developed countries from large US investors[37]. The traditional literature on the empirical determinants of equity flows have not paid particular attention to the overall role that equity markets play in shaping long-term portfolio investment decisions among a cross-section of developed nations. Equity market variables have been considered in the portfolio approach to modeling capital flows[38], but this literature is concerned with addressing the issues of the lead and lag relationships between equity flows and prices. In the traditional literature on the determinants of equity flows for a broad cross-section of countries, the role of equity market valuation has only been considered peripherally[39]. This essay primarily focuses on the role of equity market valuation as a determinant of long-term US cross-border equity flows.

The effects of diversification on cross-border equity flows have been dealt with extensively in literature (Stulz, 1999, Griffen, Nardari, and Stulz, 2004, Rey and Hau, 2006). In the portfolio approach to understanding equity flows, authors are primarily concerned about modeling the linkages between equity flows and equity markets. This chapter focuses on the long-term empirical determinants of equity flows using traditional capital flows equations and a cross section of countries. Most theoretical models and empirical studies have correctly assumed that cross-border equity flows are the outcome of home investors attempting to optimally diversify and the resulting equity flows reflect the behavior of investors adjusting portfolio weights[40]. The influence of equity market valuation on cross-border equity flows to developed nations has not been considered in the traditional capital flow literature. However, in reality relative value trading is common, The US Offshore

[37] My sample of equity flows includes mainly institutional investors.
[38] See Rey and Hau (2006), Bohn and Tesar (1996) for a couple examples.
[39] See Chulan et al 1998.
[40] See Rey and Hau (2006) or Griffen et al (2004) for two recent examples.

Funds Directory (1999) lists several dozen hedge funds that use 'pair trading' as one of their principle equity investment strategies. This finding indicates that relative market valuations are important, to one sub-group of American investors.

There is theoretical support that longer term US investors may have an advantage over hedge funds in relative value trading. Shleifer (2000) and Brunner and Nagel (2004) suggest that longer-term investors have an advantage over short-term hedge funds. For example, suppose a hedge fund manager sells an overvalued stock short. If overpricing increases before it reverses, she may be obligated to close the position due to the margin requirements or the agency problem, suggested by Brunnermeir and Nagel (2004), which shortens the horizon period. The fact that hedge funds are engaged in relative value trading implies that there is incentive for longer-term US investors to also be engaged in such strategies.

Further evidence that valuation may be an important factor in understanding why equity flows between nations is evidenced by empirical findings of 'Siamese twin' stocks, which shows that the same stock can trade at different prices in different markets. Froot and Dabora (1999) find that Royal Dutch and Shell transport have often not been priced in line with their relative claims on cash flows. In the early 1990's, the two companies merged with an agreement that entitles Royal Dutch and Shell to split the two entities' combined cash flows on a 60:40 basis. This agreement was in place until the two firms officially merged in 2005. Theoretically, Royal Dutch should have been priced at 60:40=1.5 times the value of Shell. However, the stock price was observed to vary between 36:40=0.9 and 66:40=1.65 times the value of Shell. Since Royal Dutch and Shell trade in possibly the two best functioning financial markets (USA and UK) and other 'twin' shares display similar behavior (Froot and Dabora 1999), it is likely that relative mispricing of corporate equities across

international capital markets is common. The Royal Dutch shell experiment ended with the final combination of the two entities.

The possibility that valuation of equity markets is a determinant of equity flows is important, because it implies that if the equity of an individual country becomes relatively undervalued, large US investors will reallocate their investment to the country whose equity is temporarily undervalued in hopes to make excess returns as the financial markets corrects this mispricing. Additionally, evidence that equity market valuation is one determinant of cross-border equity flows could help to explain some portion of the home bias puzzle. The observation that US investors do not optimally diversify, while partially explained by information asymmetries, may also be explained by relative value trading by large US institutions. More generally, the fact that equity flows are increasing and variable implies that understanding the determinants is called for.

There is a dearth of studies of the influence of equity market valuation on gross equity flows. The majority of the literature in this area (see Stulz, 1999, Rey and Hau, 2006, and Bohn and Tesar, 1996) has assumed cross-border equity flows occur in an integrated and efficient international capital market and are result of portfolio allocation decisions. This paper steps back from this assumption and introduces the possibility that equity flows may be motivated by equity market valuation in an international capital market that is not completely integrated or efficient. As the Royal Dutch Shell case, coupled with the relative value trading patterns of large hedge funds illustrates, the world market is likely not completely integrated. The primary objective of this chapter is to consider the implications of stock market valuation as a determinant of cross-border equity flows. Specifically, this essay considers the role of equity market valuation on cross-border equity flows between the US and 20 industrial countries. The questions this essay addresses are: How does source country valuation influence long term patterns of equity flows, How does host country valuations

influence long term patterns of equity flows, and How do equity flows respond to 'fundamental' vs. 'non-fundamental' components of valuations. In addition, this essay contributes to the literature in nature of the data. This essay presents results that span almost three decades, for 21 nations, and controls for fundamental determinants of equity flows found in previous literature. The relatively long time horizon of this data allows for testing of other fundamental determinants of equity flows without some of the time horizon problems in other literature[41].

To test whether relative valuations help to explain equity flows between countries, I study how equity flows depend on host and source country stock market valuations. The key econometric issue is to determine whether the correlation between equity flows and stock market valuation is due to relative value trading or, alternatively from traditional determinants of equity flows. I start with a general empirical methodology that helps to determine the presence of a valuation effect. I apply this methodology to my main sample, which merges the Treasury International Capital (TIC) data on equity flows and the extended international stock market valuation and returns data assembled by Kenneth French. The merged sample spans 1977-2005, and includes observations on 21 countries.

My preliminary analysis involves simple regressions of equity flows on source and host country stock market valuations measures. I find that Equity flows are very strongly negatively related to the average market-to-book, price-to-earning, price-to-cash earnings, and dividend yield ratios of publicly traded firms in the host country. This is potentially consistent with relative value trading, or US investors increasing allocations to undervalued markets. The finding that, host country valuations have as strong or stronger effect than essentially any other determinant of equity flows I consider. At the same time, equity flows

[41] Compared to 7 years in Portes and Rey (2005).

are strongly positively influenced by US market valuations. This suggests that high US valuation encourages long-term reallocation abroad.

Stock market valuations capture not only relative pricing but many other 'traditional' determinants of equity flows. The strong relationship between equity flows and host country valuations is only a necessary, but not a significant condition as evidence for valuation as a determinant of equity flows. In order to document an independent valuation effect, I apply the logic that mispricings (i.e. relative value differences) that do appear tend to correct over time[42]. I follow recent literature and use ex post stock market returns to instrument for the component of host country market-to-book and price-to-earnings that reflects ex ante mispricing (Baker, Foley and Wrugler, 2007).

I find that equity flows are particularly strongly negatively related to this component. In other words, equity flows are high prior to periods of low host country valuations, or equity flows are low prior to periods of high host country valuations. Equity flows are also positively related to the residual or more fundamental component of market-to-book or price-to-earnings. The following results indicate, that the strong empirical relationship between host country valuations and equity flows reflects both traditional fundamental factors, which are captured in high valuations that are not temporary, as well as over/undervaluation that soon reverts. The fact that portfolio equity flows appear to be negatively related to the temporary component of valuation and positively related to the fundamental component indicates that US equity flows appear to be rational decisions made by investors who are informed.

To test the robustness of these findings, I divide my sample into country groupings, and find consistently that valuation is an important determinant of long-term equity flow patterns. This essay also finds consistent with other literature on the empirical determinants

[42] The notion that relative mispricing corrects overtime was also discussed by Lakonishock, Sheifer, and Visney (1994) who argue that markets over value growth stocks, creating pricing errors, as these pricing errors correct, low price earnings ratio (or market-to-book) stocks out perform high price-to-earning stock (or market-to-book).

of equity flows: 1) That proxies for information asymmetries are negatively related to equity flows, 2) That as interest rate spreads increase (i.e. foreign interest rate above US rates) equity flows decrease, 3) That equity flows are negatively related to tax rates of host countries. This essay also proxies institutional quality with legal origin and finds weak evidence that civil origin discourages US cross-border equity flows in my sub-sample of Asian countries.

The remainder of this essay is structured as follows: Section 2 reviews the literature, Section 3 outlines my hypotheses and general methodology, Section 4 presents my detailed econometric methods, Section 5 discusses and describes my data, Section 6 presents my results, and Section 7 concludes.

2. Literature

The importance of capital flows to an economy is well recognized and well documented (World development report, 1995: report of the research of the IMF, 1991). Capital flows have been generally welcomed and even encouraged in most countries for several years. Some of the advantages of foreign investment are risk sharing with the rest of the world, greater external market discipline on macroeconomic policy, broader access to export markets, greater liquidity to meet domestic financing needs, broadening and deepening of the national capital markets, and improvement of financial sector skills (Worldbank 1995). These benefits occur as long as international financial markets can correctly evaluate the portfolio preferences of savers, identify and fund investments that have the highest excepted rate of return, appropriately price financial assets because of their underlying risks and return, and provide information to reduce uncertainty (Obsterfeld and Rogoff, 1996). One of the contributions of this essay is to look at the implications of financial assets not being priced efficiently between borders.

Due to the perceived economic benefits mentioned above, the motivation of cross-border equity investment has been an active research area for about 20 years[43]. However, there is little consensus on the empirical determinants of equity flows. Recent literature has suggested many competing hypotheses for the behavior of US portfolio managers.

Much of recent literature distinguishes between two sets of factors that effect equity flows. The first are country specific, or pull factors that reflect risk or opportunity. The second set of determinants of equity flows are global or push factors. For example, the sharp increase in US equity flows, in the 1980's has been attributed to the fall in interest rates (Calvo, Leiderman and Reinhart, 1994).

In a widely cited paper, Chuhan, Claessens and Mamingi (1998) explore in detail the role of global (push) and country (pull) factors for bond and equity flows in developing nations. They use many interesting variables, including a market price of debt, credit rating, stock price to earning ratios, relative returns of a country's equity market, and black market premium. Econometrically, they use a panel data approach with nine Latin American countries and nine Asian countries. Overall, they find that global factors (i.e. US factors) are important in explaining capital flows to Latin America, whereas for Asia their results show that country specific factors are more important. For bond flows, it appears that a countries credit rating is the most important factor. Additionally, they find that equity flows are more sensitive than bond flows to market factors, particularly a countries price earnings ratio and relative rates of return. This finding was not interpreted in terms of equity valuation, but does provide preliminary motivation for the importance of the valuation of equity markets as a potentially important factor when explaining equity flows. Chuhan, Claessens and Mamingi's (1998) finding that price earning ratio is an important factor in

[43] Tesar and Werner (1995) represent an early example of equity flow literature.

motivating equity flows indicates that more exploration is needed in understanding the role of market factors as longer term determents of cross-border equity flows[44].

In a similar study, Calvo, Leiderman, and Reinhart (1994) find that capital flows into Latin America are at least partly explained by external factors[45]. They also find that price to earning ratio is a significant factor in explaining equity flows to Latin America.Another paper by Ying and Kim (2001) uses a bivariate vector auto regression (VAR) to empirically look at the determinants of capital flows to Mexico and Korea and found that US business cycles and foreign interest rates account for more than 50% of the capital inflows to Mexico and Korea in the past two decades.

More recently, Portes and Rey (2005) explore the determinants of bilateral cross-border equity flows using panel data from 1989-1996. They uncover a specific geographic pattern in international asset transactions. Their results show that a 'gravity' model explains transactions in financial assets as well as it does in goods trade. Their empirical model explains seventy percent of the variation in transaction flows using a parsimonious set of variables. They find only weak evidence for the diversification motive for cross-border equity flows. Their results show that information variables have the greatest explanatory power. They use distance as one of their proxies for information costs and information asymmetry and find that it is strongly significant. This finding further supports the idea that diversification, while an important motivation for equity flows, is not a complete explanation. Theoretically, investors should want to invest more heavily in countries that are further away because there is likely to be less correlation between two distant countries' business cycles (Frankle and Rose, 1998). The results of this paper seem to indicate that information asymmetry is a more important factor determining capital flows than optimally diversifying. They also do not find evidence of 'return chasing'.

[44] P/E is a commonly used variable in asset pricing models, Fama and French 1998.
[45] For example, they find US recession and international interest rates are significant.

In another recent paper, Griffin, Nardari and Stulz (2004), assuming home bias and information asymmetry show that unexpectedly high worldwide returns lead to new equity flows to small countries. Empirically they find that equity flows are positively related to host country stock returns as well as market performance aboard. This indicates that global stock performance is an important factor in understanding equity flows. Major questions they considered empirically are, whether investors are return chasing, and do flows predict price movements. They find evidence for both return chasing and flows predicting price movements. They examine nine countries (mostly developing), Indonesia, Korea, Philippines, Taiwan, Thailand, Hong Kong, Sri Lanka, Slovenia and South Africa. They do not explore the potential of valuation to be a factor driving their results. Underpriced assets would tend to be followed by good performance as the underpricing is corrected, which would explain the observed behavior of flows predicting returns as found by Griffin, Nardari and Stulz (2004).

Another line of literature has focused on the lead lag relationships between equity flows and equity market returns. Bohn and Tesar (1996) and Froot, O'Connell, and Seasholes (2001) have suggested that money managers seem to be 'chasing returns' in foreign markets while Rey and Hau (2006) suggests that diversification is the primary motivation for cross-border equity flows. Empirical literature finds that diversification may be an incomplete explanation. For example, the finding of the well-documented 'home bias' in OECD investment, high turnover in foreign markets investments and that in general, the patterns of foreign equity investment are far from what an international portfolio diversification model would predict (Tesar and Werner, 1995, Stulz, 1999).

A key concept in economic theory is that equilibrium is the outcome of an adjustment process; differential profit rates induce capital mobility between markets, which should continue until profit rates are equalized. However, this process could be hindered in

international market because of imperfect mobility. Both net and gross capital flows should respond to economic fundamentals, official policies, and financial market imperfections (Obstfeld and Rogoff, 1996). However, in reality, market are not always or ever perfectly intergrated.

Rosenthal (1990) discusses cases of 'Siamese twin' shares whose relative price behavior seems best explained by some form of relative market valuation. In addition, studies of closed-end mutual funds by Bodurtha, Kim and Lee (1995) offer another setting in which valuation of a set of cash flows appears to depend on where it trades. Additionally, support for relative mispricing also comes from the liberalization literature. Bekaert (1995), Bekaert and Harvey (1995) and Henry (2000) all find evidence of stock market segmentation which could lead to mispricing in a large sample of countries.

Theoretical background from asset pricing literature is also available, which motivates my consideration of valuation as a determinant of equity flows. Domestic asset pricing research has looked at the ability to predict a cross-section of stock returns using lagged values of things like price-to-book, earnings to price, or other factors (Ferson and Harvey 1998, 1996 and Fama and French, 1992, 1998). Many have suggested that things like price-to-earnings or market-to-book represent fundamental valuation measures, which may be used to find securities that are systematically undervalued (Lakonishok, Shliefer and Visney, 1994, Haugen and Baker, 1996).

Using attributes of countries to price assets have been used for several years (Basu, 1977, and Fama and French, 1998). These studies have for the most part found that firm-specific attributes are important for explaining equity returns. Ferson and Harvey (1998), finds similar variables are important at a country level. Fama and French (1992) showed that value estimated based on firm's ratio of book-to-market value of equity have power to forecast stock returns. Similarly, Lakonishok, Shleifer and Visney (1994) showed that value

based on a firm's cash-flow-to-price ratio has power to forecast stock returns. Earnings to price ratio was the first valuation ratio and was suggested first as an alternative to the CAPM for individual stocks by Basu (1977). Chan, Hamao and Lakonishok (1991) found that the price to cash flow ratio was more relevant in Japan than earnings to price ratio. Further motivation for using financial ratios to proxy valuation comes from Kothari and Shanken (1997) who show that book-to-market and dividend yield have predictive power not only in a cross section but also can capture time series variation.

If returns can be predicted with some degree of accuracy, and if equity flows have been found to follow returns, the maybe large US investors are actually following low valuations into the markets.

3. Hypotheses and General Approach

This essay addresses three major questions.

Q1: How does source country valuation influence long term patterns of equity flows?

Ho: The null hypothesis for all three questions is an efficient integrated world capital markets. Under this null hypothesis, risk premium are set in the world capital market, and variation in valuation ratios reflect either variation in expectations of cash flows or in risk inherent in those cash flows, but not in risk premium, because they are not country specific under the null hypothesis (Obstfeld and Rogoff, 1996).

H1: Source country valuation will positively influence equity flows to host nations. This hypothesis is consistent with relative value trading, and the notion that greater perceived wealth will increase the demand for diversification.

Q2: How do host country valuations influence long term patterns of equity flows?

H0: Should be no effect under the null hypothesis of an integrated efficient world market.

H2: I would anticipate that host country valuations should be negatively related to equity flows from US equity investors. This is again consistent with relative value trading.

Q3: How do equity flows respond to 'fundamental' vs. 'non-fundamental' components of valuations?

H0: There should be no effect under the null hypothesis of an integrated efficient world capital market.

H3: If large US investors are informed, then I would expect there to be a positive association with the fundamental component of valuation and a negative or insignificant relationship with the non-fundamental component.

In order to test these conjectures, I use panel data methodology, which is common in traditional capital flow literature. Panel data methodology is employed and is appropriate for several reasons. First, panel data techniques solves or at least reduces some of the problems by associated with few degrees of freedom by increasing the data points. Second, it is the appropriate estimation technique to alleviate the effects of omitted time-invariant variables that are correlated with explanatory variables. Third, panel structure recognizes that each country can have its own country specific effects, which can be correlated or uncorrelated with some or all of the explanatory variables. Fourth, panel data estimation method is among the most efficient techniques to analyze the impact of a common set of factors across diverse country groupings (Greene, 2003 and Calvo, Leiderman and Reinhart, 1994).

I use country level stock market valuation ratios and returns to proxy valuation. Because of the problem with model misspecification, particularly the difficulty is to individually identify the effect of market valuation from the effects of other factors on equity flows, because of these considerations; I estimate several competing models (Baker, Foley and Wrugler, 2007).

Assume that equity flows from the US (indexed with i) to host country (index with j, give time t) is a function of the following:

$$f_{ijt} = (\delta_{it}, \delta_{jt}, \phi_{it}, \phi_{jt}) \quad (1)$$

where δ_{it} is the degree of overvaluation in country i at time t and ϕ_{it}, ϕ_{jt} represent vectors of control variables, for example past returns (Bohn and Tesar, 1996), interest rates spreads (Chulan et al, 1998), country dummy variables, and information variables (Portes and Rey, 2005). Hypotheses one and two are that controlling for the other determinants of equity flows that flows should decrease with the degree of valuation in host country or δ_{it} <0, and increase with the degree of valuation in the source country or δ_{jt} >0.

To empirically test the above hypotheses, this essay develops the relationship between valuation and gross equity flows using a couple different approaches. The first approach assumes that expected returns are a function of commonly used valuation ratios:

$$E(r_{it}) = f(M/B_{it}, P/E_{it}, D/P_{it}) \quad (2)$$

where M_{it}/B is the book to market ratio for country i at time t, P_{it}/E is the earning to price ratio for country i at time t and D/P_{it} is the dividend to price ratio for country i at time t. The determinants of differential stock returns are stable over time, and the forecasting power of Fama and French types of models are surprisingly high. (Haugen, 1996).

The variables used to valuation are common in literature, it has been found that market-to-book value serves as a rough proxy of underlying fundamentals; a low market-to-book suggests that the country's stock market is undervalued (Kothari and Shanken, 1997). Fama and French (1998) find that market-to-book is inversely related to future equity returns for international stocks and Basu (1983) and Fama and French (1992) find similar for US stocks. Additionally, Kothari and Shanken (1997) find that aggregate market-to-book is negatively related to subsequent returns.

They also find that in some time periods dividend-to-price outperforms book to market. Additionally, the common use of price to earning ratios by practitioners (Graham and Harvey, 2001) and the findings of Chuhan, Claessens and Mamingi's (1998) argues for the consideration of the earnings to price ratio. According to Kathari and Shanken (1997) one view of the predictive power of financial ratios reflect the degree to which the market is overvalued (high MB or PE) or undervalued (low MB or PE) at a given point in history. In the case of overvaluation, for example, future returns (and hence true expected returns) will be low insofar as the overvaluation is likely to be corrected over time. They find that overwhelming evidence that returns are forecasted by BM and dividend yields, casting doubt on the efficient market hypothesis.

4. Econometric Methods

I will consider several different models in order to get the most consistent and efficient results possible. The starting point will be a pooled ordinary least squares regression. Consider the following general panel regression framework (modified from Green, 2003):

$$f_{ijt} = z_i \alpha + x_{it} \beta + \varepsilon_{it} \tag{3}$$

where f_{ijt} is a scalar dependent variables, observed for country i at time t, x_{it} is a K dimensional vector of data that varies overtime, and z_i is a vector of data that varies across countries, but is constant over time. One could consider this a country effect. The first model I will consider is pooled regression. Pooled regression considers z_i to be observable for all countries, and common estimates of parameters should be found through ordinary least squares on pooled data. The problem is that if z_i is partially unobservable and if the unobservable portion is correlated with x_{it}, then the parameter estimates will be biased and

inconsistent. In order to correct this potential problem I will also consider estimating a fixed effects model. Fixed effects model assumes that $z_i\alpha = \alpha_i$, or estimates country specific intercepts that do not vary over time to capture unobserved heterogeneity (Greene, 2003). In order to determine whether fixed effects are appropriate I will estimate the following LM test for group effects. Under the null hypothesis $\alpha = \alpha_i$ for all countries. Under the alternative hypothesis intercepts vary from country to country. If we fail to reject the null hypothesis then the appropriate efficient estimator is pooled OLS. The F statistic for this test is calculated as:

$$F(N-1, NT-N-K) = \frac{(R^2_{FE} - R^2_{pooled}) \big/ N-1}{1-R^2_{FE} \big/ NT-N-K} \tag{4}$$

If I am able to reject the null hypothesis, then fixed effects model could be the appropriate method or potentially another class of panel data models may be appropriate. A random effects model assumes that unobserved heterogeneity is uncorrelated with x_{it} and models $z_i\alpha = \alpha + u_i$, where u_i is an individual specific disturbance that is drawn once and is not allowed to change over time. So random effects allow for differing intercepts across individuals, but the variation is the result of a draw from a random distribution. The appropriate estimation technique crucially depends on the nature of the latent variable. In order to test whether fixed effects or random effects is appropriate I will run a Hausman Wald Style test (Hausman and Taylor, 1981). Under the null hypothesis $\beta^{RE} - \beta^{FE} = 0$, this implies that both estimation techniques are consistent. If one fails to reject the null hypothesis then, while both estimation techniques are consistent random effects model will give more efficient parameter estimates. The Hausman test statistic is calculated in the following manner (Greene, 2003):

$$H = (\beta^{RE} - \beta^{FE})' \left[Var(\beta^{FE}) - Var(\beta^{RE} \right]^{-1} (\beta^{RE} - \beta^{FE}) \tag{5}$$

Which is distributed chi-squared with degrees of freedom equal to the number of parameters in the β^{FE} coefficient vector. Rejection of the null hypothesis rejects that the random effects model holds.

Although panel data approach is designed to reduce the problem of multicollinearity, some problems could remain and manifest themselves in the form of large standard errors or wrong coefficients (Maddala, 1988). To be sure that this is not an issue, I regroup variables which are both highly correlated or which I believe to exert a similar qualitatively influence on flows, for example I do not include real exchange rate and industrial production in the same regression, because they are both proxies for productivity. Additionally, because of the high correlation between inflations rates, interest rate spreads and exchange rates, coupled with the theoretical causality relationship between the three variables, I only include one of these variables together in my panel models to avoid the problem of multicollinearity.

I estimate the following model to see whether valuation ratios better explain cross-border flows than lagged returns (i.e. return chasing), by including lagged returns as an additional variable.

$$f_{ijt} = \alpha + b_1\left(\frac{m}{b_{it}}\right) + b_2\left(\frac{m}{b_{jt}}\right) + b_3(\log dis_{ijt}) + b_4(R_{it-1}) + \varepsilon_{ijt} \qquad (6)$$

If we find that $b_1 < 0$ this does not prove the hypothesis and $b_2 > 0$ [46]. As market-to-book, earnings-to-price, or dividend to price may be a good proxy for δ in the above regressions do not control for other factors, which may influence equity flows. For example, some theories link interest rate differentials, industrial production, tax rates, country of legal origin, and exchange rates with equity flows and these fundamentals may be correlated with the stock market. This will result in the betas above being bias estimators. However, market to book, price to earning and dividend to price ratios are exchange rate invariant and may be a

[46] I also estimate the following model using other ratios to proxy market valuation

good proxy for δ. I will control for several of these factors directly. Then the following panel regressions will be run to determine the basic relationship between valuation and equity flows.

$$f_{ijt} = \alpha_i + \beta_1(m_{it}/b) + \beta_2(m_{jt}/b) + \beta_4 X_i + \varepsilon \quad (7)$$

where X represents a vector of control variables and f_{ijt} represents inflows as a percentage of initial stock. I also run the above model using cash earning to price, price-to-earnings, and dividend yield. If cross-border equity flows are influenced by equity market valuation then $\beta_1 < 0$ and $\beta_2 > 0$. In addition, the marginal difference in valuation to induce flows will be lower for more developed economies, because the amount of friction is smaller. To control for this I include a variable to proxy time varying information asymmetry and institutional development. Additionally, country level fixed effect should control for these concerns.

To motivate the empirical methods I use in the second stage of this essay a simple model of returns, similar to Ferson and Harvey (1996) and Pontiff and Schill (2002). An equilibrium model expected returns in an efficient market setting or in the absence of mispricing. Pontiff and Schill's (2002) model contains two parts, K_1 and K_2. Where K_1 can be thought of as the part of the model that calculates expected return and K_2 is unknown and thus cannot be used in the empirical model. Actual returns are comprised of three components, mispricing, M, an expected return component that is derived by the model, K_1 and K_2, and an error term e_1. The error term is usually assumed to be uncorrelated with M, K_1 and K_2. If M is positive (negative) the security is underpriced (overpriced) and is expected to have an abnormally high (low) return in the following period. If we assume that the return on a market can be written as (see Pontiff and Schill, 2002):

$$r = M + K_1 + K_2 + e_1 \quad (8)$$

The problem with this model, which will be addressed in the empirical portion of the paper, is the measure of K_1. K_1 is observed with some error because of potential model misspecification. Thus, the estimate of expected returns is given by:

$$P = K_1 + e_2 \tag{9}$$

One then estimates mispricing by subtracting the actual return from the expected return proxy, yielding (Pontiff and Schill, 2002):

$$r - P = M + K_2 + e_1 - e_2 \tag{10}$$

This problem is known in literature as the Fama joint hypothesis problem. It is difficult to determine whether the abnormal return is because of model misspecification or mispricing.

To deal with the omitted variable bias, I follow Baker et al (2007). The first method is to use future returns on the source country as a proxy for mispricing. If the stock market were overvalued in say 1997, then one would expect lower returns in the following year as the market corrects the mispricing. Determining how many months it takes for mispricing to correct is a subject of debate. Too short of a horizon and the mispricing may not be corrected. I use one-year ahead forecasts to correct mispricings; this also matches the collected period for my equity flows data. The findings of Pontiff and Schall (1998) and Kothari and Shanken (1997) who find that aggregate market-to-book and dividend to price forecasts one-year ahead returns negatively support this approach. Putting the above into the context of equation one, the approach outlined below views returns at t+1 as a function of δ_{it}:

$$R_{it+1} = \alpha + f_1(\delta_{it}) + \varepsilon_{it+1} \tag{11}$$

where f<0 would indicate overvaluation at time t and would lead to lower average returns in t+1. Hence, overvaluation leads to lower returns in the future and not related to fundamentals ϕ. Or said another way, I assume that countries with higher levels of education, better legal systems, or more productive capital do not have systematically lower returns. So

if one regresses market-to-book, earnings-to-price, and dividend to price on future returns and use the fitted values to explain equity flows this will yield an unbiased estimate of b, since fitted values are uncorrelated with ϕ (Baker, Foley and Wrugler, 2007). This argues for estimating the equation below:

$$f_{ijt} = \hat{\alpha} + \hat{b}_2(\frac{\hat{m}}{b_{it}}) + \varepsilon_{it} \quad (12)$$

where $\frac{\hat{m}}{b_{it}}$ is the fitted value from a regression of returns t+1 on market-to-book and a constant intercept. This approach has other appealing features over just estimating the fixed effects models. If accounting systems or other omitted variables change over time in a way that generates measurement error and biases my inferences, the approach outlined above of using future stock returns as an instrument for the component of MB or PE that reflects mispricing serves a dual purpose of decomposing market-to-book effect and alleviating concerns about measurement error (Baker, Foley and Wrugler, 2007).

For example, consider the approach to measurement error outlined by Greene (2003). Since I would like to observe the component of market-to-book that reflects mispricing without measurement issues, M, but instead I only observe it with measurement issues M* with M*=M+u. If future returns are correlated with the component of market to book of price earnings that we want to capture and uncorrelated with u, then instrumenting for M* with future returns yields consistent estimates of the effects of source country mispricing on equity flows. The identifying assumption here would be that changes in countries accounting system are over time largely uncorrelated with future returns.

5. Data

5.1 Equity Flow Data

Portfolio flows are distinguished from other international capital flows by the degree the flows can be reversed. Some clarification and definitions may be useful. Capital flows

are generally broken into three flows: Direct Foreign Investment (FDI), bond flows, and equity flows. FDI flows are distinguished from other international capital flows by the degree to which the investor owns or controls the firms. FDI is typically defined as the direct or indirect ownership or control by a single domestic entity of at least ten percent of the voting securities of an incorporated foreign business firm or the equivalent in an unincorporated enterprise[47]. Bond flows represent flows from the US to foreign bond markets for portfolio reasons. Similarly, equity flows used in this study represent flows from US investors to foreign equity markets for portfolio reasons. The source for the equity flows used in this study is from U.S Department of the Treasury (TIC).

Data from the U.S Department of Treasury is the most comprehensive source of publicly available data for cross-boarder equity flows (Tesar and Warner, 1994). TIC is the appropriate data set to test the longer term influences of equity market valuation, because the data taken from reports are mandatory and are filed by banks, securities dealers, investors, and other entities in the U.S., who deal directly with foreign residents in purchases and sales of long-term securities (equities and debt issues with an original maturity of more than one year) issued by U.S. or foreign-based firms. The data reflect only those transactions between U.S. residents and counterparties located outside the United States. Flows are calculated from a foreign perspective (i.e. non-U.S resident). Hence, inflows to country i would be from the US minus outflows from country i to the US. The data span is 1977 to 2005 and include observations in which 20 countries are the host of equity flows out of the US. The series are reasonably complete, and they have been collected on a consistent basis over time. I measure equity flows as percentage of initial equity position, this is consistent with Tesar and Werner (1995), Chuhan et al (1998) as:

$$f_{usajt} = \frac{flow_t^{usa \to j}}{Position_{t-1}^{usa \to j}} \tag{13}$$

[47] Department of the Treasury.

where the US is the source country and j is the host. Scaling by initial position renders the equity flow measure more comparable across countries. While scaling is not important in regressions where I include country fixed effects, in regressions where I include legal origin, I prefer not to use country fixed effects, because time constant variables drop out of fixed effect estimations, so this scaling is appropriate. Additionally, since small initial positions can lead to outliers in this measure, I winsorize the measure at +100 percent. In reality, this variable is essentially the growth or increase in the stock of portfolio investment.

The stocks reported by TIC are calculated in a sophisticated fashion via survey techniques and attention is given to the valuation effects of the positions. Kraay, Loayza, Serven, and Ventura (2000) found that in developing countries that these measures were fairly accurate. Conceivably, one might also think of studying net equity flows from the US to the host country. The problem with this approach is that one cannot separately identify the effect of the source and host country valuations. In examining this sort of net flows, the source and host country effects are mechanically equal and opposite. For example, the net equity flow between the US and say Germany would appear in the data both as a positive flow between Germany and the US and the US and Germany and as a negative flow between US and Germany, and Germany and the US.

Equity flow data can be confusing, so just a simple example seems appropriate. The TIC data accounts are separated into equity flows out of the US (the US is the source country) and equity flows into the US (the US is the host country). If Citibank invests in Norway, flows to the Norwegian market are positive equity flows out of the US, while flows from the Norwegian market back to the Citibank in the US are counted as negative equity flows out of the US.

5.2 Equity Market Valuations and Returns

Stock market valuation and return are obtained data from Kenneth French's website (see appendix for construction)**.** This data includes annual observations of the capitalization-weighted market-to-book, dividend to price, cash earning to price, equity to price, and stock market returns in both dollars and local currency for 20 countries for the period of 1975 to 2005 for most countries. The countries included are: Austria, Australia, Belgium, Canada, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, and the United Kingdom. Kenneth French's data was constructed using MSCI, CRSP and COMPUSTAT data[48]. Fama and French (1998) claim that the construction used does not suffer from survivor bias. The raw data are from Morgan Stanley's Capital International Perspectives (MSCI). The set of firms whose data is used to construct country-level returns and valuation ratios is essentially the set of firms included in Morgan Stanley's stock index for that country. These tend to be large firms, and for a typical country cover roughly 80 percent of the domestic stock market capitalization.

Depending on the country and year, the indexes are based on a minimum of a few dozen large firms to a maximum of several hundred, Fama and French (1998). Table 1, discusses the construction of these variables. Fama and French (1998) claim that the construction used does not suffer from survivor bias. From the returns in local currency and returns in US dollars, I imply a foreign exchange rate as follows:

$\mathrm{Re}turn_{usd} = \mathrm{Re}turn_{lc} * forex$ which implies $forex = \frac{\mathrm{Re}turn_{usd}}{\mathrm{Re}turn_{lc}}$ where $forex$ is implied foreign exchange rate, $\mathrm{Re}turn_{usd}$ and $\mathrm{Re}turn_{lc}$ are returns on foreign markets in US dollars and local currency respectively. Implying the exchange rates this way eliminates some of the

[48] See Appendix E for detailed description

biases and data problems surrounding the unification of Europe. A number less than one would indicate that the USD strengthened relative to the foreign currency.

5.3 Country Characteristics and Controls

Control variables are gathered from several sources. The real exchange rate is calculated from nominal exchange rates and price indices from the IMF International Financial Statistics (IFS). Exchange rates are indexed with the US dollar exchange rate in 1995 set to one in each country. Real exchange rate is included to capture the increase in productivity over a given period, (Cavlo et al, 1994), Gross Domestic Product in current dollars are from the World Bank's World Development Indicators. Statutory corporate income taxes, representing the maximum marginal statutory corporate tax rates in that country in the given year, are from the World Tax Database maintained by the Office of Tax Policy Research at the University of Michigan. Tax rates proxy the attractiveness of the business environment in a country and one would expect that higher tax rates in foreign country would discourage equity flows; additionally Desai, Foley and Hines (2004) find that US companies move equity toward low-tax locations. Distance has been widely used as a proxy for information asymmetry (Portes and Rey, 2005). I construct a variable called relative distance, which is the average distance (in nautical miles) from the capital city of a particular country to Washington, D.C., this distance is then weighted by GDP of the foreign country. The GDP weights capture the negative relationship between size and information asymmetry. This time-varying proxy for information asymmetry is similar to Alfaro,Kalemli-Ozcan and Volosovych (2006).

Inflation rates, industrial production, and interest rates are taken from the IFS database. I use treasury yield or call money yield for my interest rate series, I construct interest rate yield spread as US interest rate minus host country interest rate. A positive yield spread

would indicate that US interest rates are higher than host country interest rates. La Porta, Lopez-de-Silanes, Shleifer, and Vishney (1997, 1998) emphasize the importance of the historical legal origins in shaping the current financial environment (i.e. attractiveness for portfolio investment). They examine the effect of legal origin on the laws governing investor protection, the enforcement of these laws, and the extent of concentration of firm ownership across countries. Most countries legal rules, either through colonialism, conquest, or outright borrowing, can be traced to four distinct European legal systems: English Common Law, French Civil Law, German Civil Law, and Scandinavian Civil Law. These legal origin variables have been adopted as exogenous determinants of institutional quality, in particular financial markets and institutions (Beck, Demirguc-Kunt and Levine, 2002). Thus I investigate (and control for) whether legal origins have a direct effect on equity inflows by adding legal origin dummies as additional right hand side variables in regressions without fixed effects**.**

5.4 Summary Statistics

Summary statistics for the transaction flow data, valuation ratios, and country characteristics are given in Table 2.1. I have a total of 494 observations, I lack full data sets (i.e. some early years of equity flow data are unavailable) for Ireland, Malaysia, New Zealand, Belgium, Austria, and Finland. Portfolio equity investment grew rapidly over the period. The mean of net flows for the US in the sample is positive, consistent with the idea that home bias is declining. In this annual data, the net equity flows are small by comparison with gross inflows and outflows. Average equity return for the 21 countries in this study for the sample of 1977-2005 was 17.13% in US dollar terms or 16.23% in local currency terms. This return compares to the historical market return for Small US firms.

Table 2.1: Summary Statistics

Means, medians, standard deviations, and extreme values for equity flows, stock market valuation ratios and returns are reported in the table below. RLC is the annual country return in local currency from Kenneth French's website, RUSD is the annual country return in USD, M/B is the book to market ratio, P/E is the earnings to price ratio, P/CE is the cash earnings to price ratio, YLD is the dividend yield. Flow data is from the US Treasury department TIC data, iflow is equity inflow (i.e. from the USA into country i), oflow is equity outflow (i.e. out of country i to USA), and nflow is net equity flow (inflow-outflow). Industrial production, interest rates, and real exchange rates are from IMF International Financial Statistics. Tax rates are from the World Tax Database maintained by the office of Tax Policy Research at the University of Michigan. Distance scaled by GDP is calculated using number of nautical miles divided by GDP in current dollars. GDP in current dollars is from World Bank's World Development Indicators. Panel A summarizes equity flow data, Panel B reports valuation ratios and returns and Panel C summarizes country controls and characteristics.

	N	Mean	Median	SD	Min	Max
			Panel A: Equity Flows			
Inflow (US to Foreign)	494	30995.47	6107	87026.70	0	676079
Outflow (Foreign to US)	494	32398.73	6625.50	88954.18	0	704559
Net Flow (Inflow-Outflow)	494	1596.74	277.50	6268.155	-46134	38493
			Panel B: Stock Market valuations and returns			
M/B	494	1.84	1.70	0.90	0.37	9.84
P/E	494	16.05	14.88	7.93	3.89	63.69
P/CE	494	8.35	7.74	4.26	1.30	38.76
Dividend Yield (%)	494	3.16	2.77	1.914	0.43	14.93
Return (USD)	494	17.13	15.83	27.27	-47.33	135.8
Return (Local Currency)	494	16.23	16.37	24.85	-38.91	121.01
			Panel C: Country Characteristics and controls			
Industrial Production	494	83.80	85.62	16.61	25.32	123.11
Distance (Scaled by GDP)	494	9.45	5.12	11.94	0.30	76.89
Implied change in foreign exchange (%)	494	6.68	1.00	24.40	-124.00	100.00
Real Foreign Exchange (1995)	494	106.38	103.81	20.65	57.73	179.45
Tax (%)	494	34.13	35.00	10.58	8.50	52.00
CPI (Base=1995)	494	81.21	86.84	20.38	19.92	113.34
Interest Rate (%)	494	6.77	5.52	4.36	0.07	19.80
UK Legal Origin	494	0.39				
French Legal Origin	494	0.42				
German Legal Origin	494	0.05				
Scandinavia Legal Origin	494	0.14				

**In regression models, log of CPI, Industrial production, real foreign exchange and distance are used.*

The country with the highest return in given year in my sample period was Italy, with its equity markets up 135% in 1985, while the worst return was reported by -47% in Hong Kong in 1982. The best average return for the 21 countries in my sample was 1985 with an average return of 56% and the worst year for world markets included in my sample was 2001 where markets lost on average of 12.58%. The highest median return in my sample was

21.76% in Hong Kong, and the lowest median return occurred in Austria at 5.47%. The average top marginal tax rate for the 21 countries was about 34% with the minimum of 8.5% occurring in Switzerland for the period of 2001-2005. The maximum tax rate of 56% occurred in Germany from 1977 to 1987. Of my sample about 39% was British legal origin, 42% were French legal origin, 4.6% were Germanic, with the balance of observations being Scandinavian in legal origin.

6. Results

6.1 Basic Specification

I begin with the estimation of a 'stripped' down model, to establish the basic correlation between equity flows and stock market valuation ratios. The dependent variable is inflow as a percentage of initial stock and the explanatory variables are the source countries valuation ratios and US valuation ratios. Table 2.2 presents the results of my initial estimations for the entire sample. I estimate pooled OLS, fixed effects and random effects models, parameter estimates for all three models are similar and with stable signs. In order to estimate the most efficient model, I perform an F-test for fixed effects and if I am able to reject the null hypothesis. I then proceed to estimate the Hausman test for random effects, under the null hypothesis both the fixed and random effects model are consistent, but the random effects model is more efficient, rejection of the null hypothesis implies that the fixed effects model is most appropriate. Under the null hypothesis, there is no correlation between the repressors and the residuals. The underlying idea of the Hausman test is to compare two sets of estimates, one of which is consistent under both the null and the alternative and another, which is consistent only under the null hypothesis. A large difference between the two sets of estimates is taken as evidence in favor of the alternative hypothesis, or in this case, the fixed effects model.

Table 2.2: Equity Flows and Stock Market Valuations (Full Sample): Regressions of equity flows as a percentage of initial position into host country on source and host country market-to-book, price-to-earnings, cash earnings-to-price and dividend yields. White heteroskedastic robust t-statistics are and p-values are reported.

Variable	Coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
M/B (For)	-2.10	-3.11	0.00									
M/B(USA)	5.97	3.92	0.00									
P/E (For)				-0.22	-1.71	0.09						
P/E (USA)				0.51	3.37	0.00						
P/CE (For)							-0.54	-11.58	0.00			
P/CE (USA)							0.68	11.42	0.00			
Dividend Yield (For)										-0.49	-3.15	0.00
Dividend Yield (USA)										2.62	11.56	0.00
Country		Fixed			Fixed			Random			Fixed	
Year		No			No			No			No	
N		494			494			494			494	
R-squared		0.16			0.17			0.15			0.14	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.

I follow this procedure for all panel estimates, except when time invariant parameters are included I estimate pooled OLS. P-values and t-statistics in all tables are derived using White hereroskedasticity robust standard errors. When the form of heteroskedasticity is not known, it may not be possible to obtain efficient estimates of the parameters using weighted least squares. OLS provides consistent parameter estimates in the presence of heteroskedasticity, but the usual OLS standard errors will be incorrect and should not be used for inference. White (1980) has derived a heteroskedasticity consistent covariance matrix estimator, which provides correct estimates of the coefficient covariance in the presence of heteroskedasticity of unknown form.

According to hypotheses one and two one would expect a negative coefficient on valuation ratios of the host country and a positive coefficient on the valuation ratios of the source countries. Table 2.2 reports preliminary results of the basic relationships between proxies for equity market valuations and equity flows. The results shed light on the influences of market valuations as long-term empirical determinants of equity flows. My preliminary results indicate that the effect of stock market valuation is two sided. High source country stock market valuations appear to spur outward equity flows and low host country valuation seems to attract inward equity flows, this finding is consistent with Chuhan et al (1998) who also find a negative sign on price-to-earnings ratio for both Asia and Latin America.

The results are both statistically and economically significant. A one-unit change in the market to book ratio of the host country leads to a 2% decrease in equity flows from the US. The relative wealth effect is substantially stronger for changes in the US with a one-unit increase in market to book ratio leading to an increase in equity flows abroad of 6%.

The results of the relationship between price-to-earnings ratio and cash-earning-to-price ratios are also negative and all significant at the 10% level, they too also appear to be

economically significant with an one unit increase in the price-to-earning ratio leading to a decline in the growth of equity flows of about a quarter of a percent. The results of the relationship between equity flows and valuation are consistent when dividend yield is used to proxy valuation. Increases in dividend yields in the host country leads to a decrease US equity flows. A potential explanation for this relationship, for the case of dividend yield, is that US institutional investors may avoid high dividend paying markets in an effort to avoid increased exchange rate risk or hedging activities. However, the positive significant coefficient on US dividend yield further supports the idea that as domestic wealth increases more equity is funneled abroad. If the results on the effects of source country valuation ratios were identified from only cross sectional variation, they would raise concerns. For example, the measured effects of the source valuation ratios might merely reflect the effects of country-level differences in accounting conventions (Joos and Lang, 1994, Ball, Kothari, and Robin, 2000).

To address such concerns, in unreported results, I ran regressions country-by-country and then averaged the coefficients to try to isolate the pure time component. The results were very similar. Additionally, the fixed effects estimator will also alleviate these problems (Greene, 2003). The next step of the analysis to attempt to control for other factors of that influences equity flows that may be correlated with valuation ratios in order to reduce omitted variable bias and test the stability of my results.

6.2 Results with Control Variables

Table 2.3 presents the results of regressions of market valuation proxies and control variables. The first regression, controls for 'return chasing behavior', widely documented in literature as a short-term determinant of equity flows. Bohn and Tesar (1996) coined the phrase 'return chasing', it is generally proxied in empirical work as a positive relationship

between lagged returns and equity flows. The second variable I control for in the first model of table 2.3 is the log of distance scaled by GDP following Alfaro et al (2005) [49]. The previous results showing that valuation ratios are important determinants of long-term equity flows remain significant both statistically and economically. The coefficient estimates are not significantly altered and the signs remain consistent.

Similar to Portes and Rey (2005), I find no evidence of returns chasing in the full data set. This could be in large part due to the nature of my empirical methodology, while the use of annual data is common for the determination of long-run factors that influence capital flows, to capture the dynamic relationship between variables as suggested by Bohn and Tesar (1996) more frequent observations are required. Distance, which was recently used by Portes et al (2005) to proxy information asymmetries, is found to be negative and statistically significant. This result is consistent with a large literature, which hypothesizes that information asymmetries lead to exaggeration of the home bias puzzle. The interpretation for the negative coefficient on my time varying measure of distance is logical. As the distance between nations shrinks or the size of the economy grows, information asymmetries decline and more equity flows to these countries. I estimate several more models including more variables that have been found to be significant in literature to see how my results are altered. When more controls are included, the positive coefficient on the valuation ratio for the US becomes insignificant. This indicates that my initial strong results for source country valuation ratios are suspect. However, the negative relationship between valuation of foreign markets and equity flows remains robust, using either price-to-earnings or market-to-book.

[49] See Bohn and Tesar (1996) and Froot et al (2001)

Table 2.3: Equity Flows and Stock Market Valuations (Full Sample): Regressions of equity flows as a percentage of initial position into host country on source and host countries market-to-book, price-to-earnings and controls. White heteroskedastic robust t-statistics are and p-values are reported.

Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (For)	-2.04	-9.64	0.00	-2.05	-10.51	0.00				-1.89	-8.38	0.00
MB (USA)	3.44	4.68	0.00	0.75	1.01	0.31				2.90	4.09	0.00
P/E (For)							-0.18	-6.49	0.00			
P/E (USA)							-0.08	-1.02	0.31			
P/CE (For)												
P/CE (USA)												
Dividend Yield (For)												
Dividend Yield (USA)												
Return (t-1)	0.00	-0.82	0.41									
Industrial Production (log)				4.68	5.23	0.00	5.72	5.95	0.00	4.27	3.71	0.00
Distance (log)	-2.10	-4.00	0.00	-1.07	-1.57	0.11	-1.06	-1.83	0.07	-1.36	-2.47	0.01
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.36	-6.01	0.00	-0.44	-6.75	0.00	-0.23	-4.09	0.00
Tax Rate				-0.06	-2.13	0.03	-0.05	-1.77	0.08	-0.08	-4.11	0.00
UK Legal Origin										0.64	1.30	0.19
French Legal Origin										-0.76	-1.49	0.14
German Legal Origin										-0.59	-0.69	0.49
Country		Fixed			Fixed			Fixed			Pooled OLS	
Year		No			No			No			No	
N		494			494			494			494	
R-squared		0.20			0.25			0.23			0.19	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Additional controls are also added to capture the relative productivity of the economy, interest rate spreads, and tax rates. Table 2.3 reports that when the spread between US interest rates and foreign interest rates increase, investors tends to decrease flows as a percentage of initial positions from the US to host nations. This is consistent with the finding of Calo, Leiderman and Reinhart (1993) who document that reduction in interest rate spread in Argentina lead to a sharp increase in capital flows. One explanation for this phenomenon is that increases in foreign interest rates will lead to depreciation of currency and therefore subject the US investors to increased interest rate risk. Alternatively, the fact that flows are negatively related to interest rate spreads can be explained, as simply US investors tend to stay at home when interest rates are relatively high. A third explanation is that high US interest rates may have decreased Americans wealth, and therefore decreased their risk tolerance, causing them to rebalance away from foreign equities.

Table 2.3 also reports a significant negative coefficient on tax rates. This is consistent with the findings of Densi et al (2002) that capital flows to environments with lower tax rates, and is also consistent with the findings that increases in taxes reduces expected returns. I also estimate a panel that includes dummy variables for legal origin. Several papers have found that legal origin proxies institutional structure and investiblity (Beck et al, 2002). However, in the full sample I do not find a statistically significant relationship. The signs on my legal origin variables are, however, consistent with other literature that finds that British origin indicates strong institutional structure, whereas French and German legal origin have a negative effect on flows.

I proceed to divide my sample into four groupings, Tables 2.4, 2.5, 2.6, and 2.7 report the results for these sub groupings for both 'stripped down' and models with various controls. The first grouping is for countries, which I have data for the entire sample period. The second grouping is the European Union countries, the third grouping is the G-7 nations, and the last

grouping is Asia. Table 2.4 reports my results for my balanced sample and the results are not substantially different than previously reported results. Table 2.5 reports the results for the European Union countries. The proxy for information asymmetries becomes less important when just EU countries are included in the sample. This is likely due to the long trading history between the US and the European Union. Owing to this long trading history, US investors likely understand the nature of the risks associated with investing in these economies. Additionally, highly advanced measures for hedging risks in the European Union are developed, which reduces the severity of informational asymmetries between these nations. I also find that returns in the US have a negative influence on equity flows into Europe. Consistent with my full sample I still find that equity flows negatively influenced valuation of the European equity markets, particularly when market-to-book ratios are used.

Table 2.4: Equity Flows and Stock Market Valuations (Balanced Panel): Regressions of equity flows as a percentage of initial position into host country on source and host countries market-to-book, price-to-earnings and controls. White heteroskedastic robust t-statistics are and p-values are reported.

Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (For)	-1.14	-5.36	0.00	-1.13	-5.21	0.00				-1.10	-3.89	0.00
MB (USA)	1.37	5.06	0.00	1.10	4.24	0.00				1.36	5.18	0.00
P/E (For)							0.01	2.74	0.01			
P/E (USA)							-0.01	-0.87	0.39			
P/CE (For)												
P/CE (USA)												
Dividend Yield (For)												
Dividend Yield (USA)												
Return (t-1)	0.00	-1.56	0.12									
Industrial Production (log)				3.47	4.72	0.00	2.49	4.79	0.00	2.01	0.41	0.68
Distance (log)	-1.23	-4.41	0.00	-1.04	-1.65	0.11	-0.96	-2.79	0.01	-1.05	-3.46	0.00
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.54	-6.80	0.00	-0.55	-7.63	0.00	-0.02	-4.63	0.00
Tax Rate				-0.81	-1.56	0.12	-0.71	-1.84	0.09	-0.91	-3.01	0.00
UK Legal Origin										0.02	0.34	0.73
French Legal Origin										-0.03	-0.52	0.60
German Legal Origin										0.02	0.23	0.81
Country		Fixed			Fixed			Fixed			Pooled OLS	
Year		No			No			No			No	
N		406			406			406			406	
R-squared		0.23			0.26			0.24			0.20	

Country fixed effects are included if the f-test for fixed effects rejected the null and the Hausman test for random effects rejected the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.5: Equity Flows and Stock Market Valuations (European Union): Regressions of equity flows as a percentage of initial position into host country on source and host countries market-to-book, price-to-earnings and controls. White heteroskedastic robust t-statistics are and p-values are reported.

Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (For)	-2.78	-11.56	0.00	-2.23	-9.74	0.00				-2.35	-9.94	0.00
MB (USA)	2.56	2.80	0.01	1.33	2.39	0.02				1.27	1.80	0.07
P/E (For)							0.29	8.17	0.00			
P/E (USA)							0.26	2.94	0.00			
Return (Foreign)				0.00	0.50	0.62	0.00	0.10	0.92	0.01	0.68	0.50
Return (USA)				-0.03	-2.09	0.04	-0.04	-3.07	0.00	-0.04	-3.00	0.00
Return (t-1)	-0.01	-1.53	0.13									
Industrial Production (log)				6.23	4.48	0.00	9.12	6.50	0.00	0.24	0.64	0.52
Distance (log)	-1.14	-1.85	0.07	-1.12	-1.23	0.22	-1.51	-2.42	0.01	-0.20	-0.98	0.33
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.33	-4.53	0.00	-0.36	-4.86	0.00	-0.30	-5.01	0.00
Tax Rate				-0.03	-1.04	0.30	0.02	0.55	0.58	-0.01	-0.64	0.52
UK Legal Origin										-0.05	-0.08	0.93
French Legal Origin										0.13	0.29	0.77
German Legal Origin										-0.22	-0.32	0.74
Country		Fixed			Fixed			Fixed			Pooled OLS	
Year		No			No			No			No	
N		290			290			290			290	
R-squared		0.23			0.27			0.26			0.21	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.6: Equity Flows and Stock Market Valuations (G-7): Regressions of equity flows as a percentage of initial position into host country on source and host countries market-to-book, price-to-earnings and controls. White heteroskedastic robust t-statistics are and p-values are reported.

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Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (For)	-1.18	-3.12	0.00	-0.88	-2.62	0.01				-0.94	-2.86	0.00
MB (USA)	2.02	4.21	0.00	2.90	2.91	0.00				2.32	2.22	0.03
P/E (For)							-0.016	-0.48	0.62			
P/E (USA)							0.27	2.34	0.02			
Return (Foreign)				0.00	0.52	0.60	-0.00	-0.28	0.77			
Return (USA)				-0.06	-3.44	0.00	-0.06	-3.48	0.00			
Return (t-1)	-0.01	-1.33	0.19									
Industrial Production (log)				0.94	1.45	0.15	2.33	3.49	0.00	8.14	3.20	0.00
Distance (log)	-1.16	-5.24	0.00	-0.47	-2.18	0.03	-1.17	-1.29	0.20	0.52	0.85	0.40
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.24	-3.52	0.00	-0.55	-5.80	0.00	-0.23	-3.21	0.00
Tax Rate				-0.10	-3.04	0.00	-0.06	-1.62	0.11	-0.09	-2.35	0.02
UK Legal Origin										1.77	1.31	0.19
French Legal Origin										-0.73	-0.82	0.42
German Legal Origin												
Country		Random			Random			Fixed			Pooled OLS	
Year		No			No			No			No	
N		190			190			190			190	
R-squared		0.27			0.30			0.28			0.22	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.6 reports the results of regressions when just the G-7 countries are included in the panel. In all models estimated, I find that equity valuation of source and host countries remain statistically significant, high returns in the US predict lower equity flows abroad, productivity of host nations appear to be strong determinants of equity flows consistent with Griffen et al (2004). Interest rate spreads increases reduce capital flows to host countries as well as higher taxes, which is consistent with the findings in the full sample. Legal origin, again, is not statistically significant, but the signs are consistent with previous literature.

Table 2.7 reports results for a sample of Asian countries. Results on the valuation ratios remain significant and indicate that equity flows increase as valuations decrease. The coefficient estimates on distance divided by GDP are significantly negative under all specifications and indicate consistent with logic that information asymmetries in Asia are a major determinant of equity flows. Industrial production does not have much explanatory power for the Asian region, but consistent with Calvo et al (1993), I proxy relative productivity for Asia with log of real exchange rate and find that as real exchange rates increase, equity flows are strongly positively influenced. This is likely due to the strong importance of reserves in Asia, of which real exchange rate is highly correlated. Unlike the other panels estimated, tax rates do not appear to explain equity flows into Asia; however, civil legal origin does have a negative influence on equity flows.

Table 2.7: Equity Flows and Stock Market Valuations (Asia): Regressions of equity flows as a percentage of initial position into host country on source and host countries market-to-book, price-to-earnings and controls. White heteroskedastic robust t-statistics are and p-values are reported.

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Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (For)	-1.64	-1.52	0.13	-1.68	-3.06	0.00	-1.62	-2.84	0.01			
MB (USA)	4.01	3.43	0.00	2.51	2.52	0.01	2.63	1.85	0.09			
P/E (For)										-0.06	-1.05	0.30
P/E (USA)										0.05	0.27	0.79
Return (Foreign)							0.00	0.11	0.91	-0.02	-1.47	0.14
Return (USA)							-0.05	-2.09	0.04	-0.05	-1.65	0.10
Return (t-1)	-0.02	-1.75	0.08									
Industrial Production (log)												
Distance (log)	-2.44	-3.11	0.00	-5.21	-4.34	0.00	-5.18	-4.25	0.00	-6.25	-4.30	0.00
Foreign Exchange (log real)				7.99	2.31	0.03	7.93	2.31	0.02	10.10	2.69	0.01
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.24	-1.64	0.10	-0.22	-1.50	0.14	-0.38	-2.17	0.03
Tax Rate				0.06	0.64	0.52	0.07	0.74	0.46	0.11	1.010	0.27
UK Legal Origin												
French Legal Origin				-7.45	-2.84	0.01	-7.38	-2.78	0.01	-7.08	-2.30	0.02
German Legal Origin												
Country		Fixed			Random			Random			Pooled OLS	
Year		No			No			No			No	
N		133			133			133			133	
R-squared		0.20			0.23			0.25			0.21	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

To summarize to this point, I have studied the association between country level stock valuations and equity flows in mostly developed countries. I document a strong new fact about equity flows: there is a very strong negative link between host country stock market valuations and equity flows. Indeed, the effect of host country valuations is almost as strong, in statistical terms, as any other determinants of equity flows that I study. This essay is the first, to my knowledge, to document the role of valuation in developed markets as a determinant of equity flows and indicates that large US portfolio allocation decisions are negatively related to high valuations in host countries.

6.3 Results with Fundamental and Residual Values

I now take a closer look at the strong negative effect of host countries valuations on equity flows. Stock market valuations pick up not only misvaluations but also fundamental determinants of investment. To explore further, I use future stock return as an instrument for the component of market-to-book or price-earnings that reflects mispricing, which is an approach to resolve the potential omitted variable bias. The idea behind this approach is that mispricing ex ante can be detected from the returns that correct the mispricing ex post. If future returns are negatively correlated with ex ante mispricing and otherwise uncorrelated with measurement error in market-to book or price earnings ratios, the fitted values from the first stage regression serve as a purer measurement of mispricing (Baker, Foley and Wrugler, 2007).

Table 2.8 reports the first and second stage results. The results of the first stage regression indicate consistent with Kathari and Shanken (1997) that high market-to-book ratios predict future returns negatively. The results of my second stage regressions suggest that equity flows are negatively related to non-fundamental components of stock valuations and positively related to fundamental components, when market-to-book ratios are used as a

proxy for valuation. Results are slightly different when price-to-earnings is used to proxy valuation. However, in both specifications equity flows are strongly related to the component of valuation that reflects non-fundamental components or mispricing. This indicates that the primary factor driving the negative relationship between equity flows and valuation was the component of valuation that is expected to reverse in the near future. In most regressions there is a positive relationship between the more fundamental differences in valuation.

Table 2.8: Equity Flows and Stock Market Valuations: Fundamental and Non-Fundamental Components (Full Sample): Regressions of Equity inflows as a percentage of initial stock into host country on host country market-to-book ratios, price earnings ratio, the US market-to-book ratio, US price earnings ratio and controls. I decompose the host country market-to-book and price-earnings ratio into a non-fundamental or mispricing component (Fitted MB or Fitted PE) and a fundamental component (residual MB or residual PE). Heteroskedasticy robust t-statistics and p-values are reported. The decomposition is based on a first stage regression of market to book on future returns in the first two models: Fitted MB=1.99-0.098 R_{t+1} (N=472, t-stat= -6.71, R^2 =0.087). In the third and fourth models the decomposition is based on a regression of price-to-earnings on future returns: Fitted PE=17.30-0.075 R_{t+1} (N=472, t-stat=5.67, R^2 =0.064). Heteroskedasticy robust t-statistics and p-values are reported.

Variable	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**
MB (Fitted)	-3.82	-7.47	0.00	-3.55	-7.30	0.00						
MB (Residual)	2.08	11.12	0.00	1.99	11.42	0.00						
MB (USA)	4.72	11.37	0.00	0.26	1.61	0.11						
P/E (Fitted)							-0.57	-7.78	0.00	-0.44	-6.16	0.00
PE (Residual)							-0.21	-7.70	0.00	-0.18	-7.13	0.00
PE (USA)							0.44	10.38	0.00	1.04	1.54	0.11
Industrial Production (log)				5.01	6.30	0.00				5.82	6.70	0.00
Distance (log)				-1.43	-1.97	0.04				-0.08	-0.16	0.88
Foreign Exchange (log real)												
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.37	-7.15	0.00				-0.42	-7.40	0.00
Tax Rate				-0.26	-2.40	0.02				-0.02	-0.86	0.39
Country		Fixed			Fixed			Fixed			Fixed	
Year		No			No			No			No	
N		493			493			493			493	
R-squared		0.19			0.27			0.17			0.21	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Valuations of US market remain significant and positively related to equity flows, indicating that US investors seek to diversify abroad when home market is relatively high. Various control variables are added to the basic specification, and results remain similar to the previous results when valuation ratios were not decomposed. I have included fixed effects when appropriate to help alleviate concerns that results reflect fixed country differences such as, for example, accounting rules. Another possibility is that country accounting systems change over time in a way that generates measurement errors and biases my inferences. Using future stock returns as an instrument for the component of market-to-book or price-earnings that reflects mispricing serves two purposes, first of decomposing the valuation effect and second, alleviating the concerns about measurement error.

Table 2.9 reports the results for the subset of countries, for which I have full data. Results indicate that equity flows are significantly influenced by the component of equity flows that reflect non-fundamental or mispricing. This indicates that equity flows to developed nations tend to decrease when market are viewed to be overvalued due to non-fundamental reasons. On the other hand, there is a strong positive relationship between the fundamental components of valuation. This relationship indicates that equity flows will increase if the fundamental characteristics of a country reflected in its valuation increase. Table 2.9 also reports that US valuation has a positive influence on equity flows consistent with my previous findings. Results for control variables are in line with earlier models.

Table 2.9: Equity Flows and Stock Market Valuations: Fundamental and Non-Fundamental Components (Balanced Panel): Regressions of Equity inflows as a percentage of initial stock into host country on host country market-to-book ratios, price earnings ratio, the US market-to-book ratio, US price earnings ratio and controls. I decompose the host country market-to-book and price-earnings ratio into a non-fundamental or mispricing component (Fitted MB or Fitted PE) and a fundamental component (residual MB or residual PE). Heteroskedasticy robust t-statistics and p-values are reported. The decomposition is based on a first stage regression of market to book on future returns in the first two models: Fitted MB=1.91-0.084 R_{t+1} (N=365, t-stat= -5.65, R^2 =0.076). In the third and fourth models the decomposition is based on a regression of price-to-earnings on future returns: Fitted PE=17.19-0.072 R_{t+1} (N=365, t-stat=4.77, R^2 =0.056). Heteroskedasticy robust t-statistics and p-values are reported.

Variable	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value	coef	t-stat	p-value
MB (Fitted)	-3.89	-6.33	0.00	-3.39	-5.70	0.00						
MB (Residual)	1.39	6.27	0.00	1.40	6.33	0.00						
MB (USA)	5.42	13.01	0.00	4.54	10.82	0.00						
P/E (Fitted)							-0.53	-7.08	0.00	-0.35	-4.74	0.00
PE (Residual)							0.15	5.13	0.00	0.10	3.61	0.00
PE (USA)							0.49	12.13	0.00	0.43	5.41	0.00
Industrial Production (log)				4.81	5.45	0.00				4.72	5.11	0.00
Distance (log)				-1.16	-1.35	0.17				-0.75	-1.51	0.13
CPI (log)												
Implied Change in Forex												
Interest Rate				-0.41	-8.13	0.00				-0.46	-8.44	0.00
Tax Rate				-0.54	-1.71	0.09				-0.42	-1.56	0.12
Country		Fixed			Fixed			Fixed			Fixed	
Year		No			No			No			No	
N		405			405			405			405	
R-squared		0.20			0.30			0.21			0.26	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.10 reports the results for the European Union nations and the findings are consistent with the logic that equity flows are negatively influenced by non-fundamental components of valuation ratios, but positively related to fundamental components of valuations. Results for control variable consistently indicate that high US interest rates keep equity at home and low tax rates attract additional investors. Table 2.11 reports the results for the G-7 nations. The results almost mirror the results for the European Union reported in Table 2.10.

Table 2.10: Equity Flows and Stock Market Valuations: Fundamental and Non-Fundamental Components (Europe): Regressions of Equity inflows as a percentage of initial stock into host country on host country market-to-book ratios, price earnings ratio, the US market-to-book ratio, US price earnings ratio and controls. I decompose the host country market-to-book and price-earnings ratio into a non-fundamental or mispricing component (Fitted MB or Fitted PE) and a fundamental component (residual MB or residual PE). Heteroskedasticy robust t-statistics and p-values are reported. The decomposition is based on a first stage regression of market to book on future returns in the first two models: Fitted MB=1.97-0.12 R_{t+1} (N=291, t-stat= -5.62, R^2 =0.09). In the third and fourth models the decomposition is based on a regression of price-to-earnings on future returns: Fitted PE=15.75-0.063 R_{t+1} (N=291, t-stat=-4.76, R^2 =0.067). Heteroskedasticy robust t-statistics and p-values are reported.

Variable	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**
MB (Fitted)	-4.67	-7.14	0.00	-4.12	-6.94	0.00						
MB (Residual)	2.78	12.83	0.00	2.35	12.07	0.00						
MB (USA)	3.00	5.68	0.00	0.44	0.61	0.54						
P/E (Fitted)							-0.72	-7.00	0.00	-0.54	-5.93	0.00
PE (Residual)							0.35	9.71	0.00	0.31	9.93	0.00
PE (USA)							0.31	5.79	0.00	0.11	1.44	0.15
Return (t-1)												
Industrial Production (log)				6.76	5.70	0.00				10.11	8.17	0.00
Distance (log)				-1.43	-1.47	0.15				-1.10	-1.19	0.19
Foreign Exchange (log real)												
Implied Change in Forex												
Interest Rate				-0.29	-5.07	0.00				-0.27	-4.39	0.00
Tax Rate				-0.04	-1.45	0.15				-0.01	-0.40	0.69
Country		Fixed			Fixed			Fixed			Fixed	
Year		No			No			No			No	
N		289			289			289			289	
R-squared		0.23			0.32			0.22			0.25	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.11: Equity Flows and Stock Market Valuations: Fundamental and Non-Fundamental Components (G-7): Regressions of Equity inflows as a percentage of initial stock into host country on host country market-to-book ratios, price earnings ratio, the US market-to-book ratio, US price earnings ratio and controls. I decompose the host country market-to-book and price-earnings ratio into a non-fundamental or mispricing component (Fitted MB or Fitted PE) and a fundamental component (residual MB or residual PE). Heteroskedasticy robust t-statistics and p-values are reported. The decomposition is based on a first stage regression of market to book on future returns in the first two models: Fitted MB=1.93-0.077 R_{t+1} (N=191, t-stat= -3.68, R^2 =0.065). In the third and fourth models the decomposition is based on a regression of price-to-earnings on future returns: Fitted PE=18.83-0.085 R_{t+1} (N=191, t-stat=-3.25, R^2 =0.052). Heteroskedasticy robust t-statistics and p-values are reported.

Variable	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**
MB (Fitted)	-4.33	-4.36	0.00	-3.10	-2.89	0.00						
MB (Residual)	1.15	3.78	0.00	0.87	2.63	0.01						
MB (USA)	5.83	9.89	0.00	1.94	1.92	0.06						
P/E (Fitted)							-0.43	-4.50	0.00	-0.29	-2.81	0.01
PE (Residual)							0.04	1.56	0.12	0.02	0.77	0.45
PE (USA)							0.57	10.38	0.00	0.13	1.28	0.20
Industrial Production (log)				5.20	2.66	0.01				9.67	3.88	0.00
Distance (log)				-0.32	-1.49	0.14				-0.80	-1.29	0.20
Foreign Exchange (log real)												
Implied Change in Forex												
Interest Rate				-0.21	-3.08	0.00				-0.35	-4.35	0.00
Tax Rate				-0.18	-2.16	0.03				-0.10	-2.69	0.01
UK Legal Origin										1.54	1.15	0.25
French Legal Origin										-1.43	-1.58	0.12
Country		Random			Random			Random			Pooled OLS	
Year		No			No			No			No	
N		190			190			190			190	
R-squared		0.21			0.28			0.17			0.20	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

Table 2.12 reports the results for the Asian region and, again, indicates that information asymmetries are a huge empirical determinant of equity flows into the region. The results for valuations influence on equity flows demonstrate a negative relationship between the non-fundamental or mispricing component of market-to-book or price-to-earnings ratios. Equity flows remain positively influenced by the fundamental component of market-to-book and price-to earnings, under most model specifications. In contrast to the other panels estimated, legal origin does affect equity flows, with British legal origin representing a positive influence on equity flows. The results on legal origin, however, are not conclusive because only one country with civil legal origin was included in my data.

Table 2.12: Equity Flows and Stock Market Valuations: Fundamental and Non-Fundamental Components (Asia): Regressions of Equity inflows as a percentage of initial stock into host country on host country market-to-book ratios, price earnings ratio, the US market-to-book ratio, US price earnings ratio and controls. I decompose the host country market-to-book and price-earnings ratio into a non-fundamental or mispricing component (Fitted MB or Fitted PE) and a fundamental component (residual MB or residual PE). Heteroskedasticy robust t-statistics and p-values are reported. The decomposition is based on a first stage regression of market to book on future returns in the first two models: Fitted MB=2.01-0.078 R_{t+1} (N=134, t-stat= -3.71, R^2 =0.086). In the third and fourth models the decomposition is based on a regression of price-to-earnings on future returns: Fitted PE=20.48-0.098 R_{t+1} (N=134, t-stat=-3.50, R^2 =0.076). Heteroskedasticy robust t-statistics and p-values are reported.

Variable	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**	**coef**	**t-stat**	**p-value**
MB (Fitted)	-4.12	-3.38	0.00	-3.36	-2.04	0.04						
MB (Residual)	0.56	1.36	0.18	1.41	2.60	0.01						
MB (USA)	6.17	8.86	0.00	4.02	7.22	0.00						
P/E (Fitted)							-0.37	-3.99	0.00	-0.32	-2.22	0.03
PE (Residual)							0.04	1.04	0.30	-0.03	-0.44	0.66
PE (USA)							0.56	8.50	0.00	0.26	1.33	0.18
Industrial Production (log)												
Distance (log)				-4.91	-4.74	0.00				-3.95	-2.46	0.02
Foreign Exchange (log real)				6.02	5.36	0.00				5.80	4.36	0.00
Implied Change in Forex												
Interest Rate				-0.20	-1.30	0.20				-0.20	-0.99	0.32
Tax Rate				-0.10	1.29	0.20				-0.10	-1.16	0.25
UK Legal Origin				9.34	4.55	0.00				7.96	3.24	0.00
Country		Fixed			Random			Fixed			Pooled OLS	
Year		No			No			No			No	
N		133			133			133			133	
R-squared		0.23			0.23			0.22			0.21	

Country fixed effects are included if the f-test for fixed effects rejects the null and the Hausman test for random effects also rejects the null.
Pooled OLS is estimated when time-invariant repressors are included.

7. Conclusion

The majority of theories of equity flows assume that the world capital markets are informationally efficient and integrated. However, various lines of empirical evidence suggest that country-level shocks to investor optimism or risk aversion, combined with information asymmetry, sometimes cause the same capital asset to sell for different prices in different locations. These observations suggest that valuation may be an important determinant of cross-border equity flows.

In this chapter, I discuss and empirically evaluate the effects of US and host country valuation as a determinant of equity flows from the US to mainly developed nations. To provide a large-sample test, I exploit country and year variation in stock market valuations, realized returns, and country controls. The results are consistent with the view that equity flows increase from the US to abroad when US valuations are high, indicating a sort of 'wealth effect' of equity flows. Additionally, host country valuations are strongly and consistently negatively related to flows. This indicates that US portfolio investors seek 'under valued' equity markets and increase flows to these markets as valuations decline.

A series of further tests indicated that an important component of host-country valuation effect likely reflects mispricing and not omitted variable bias. Equity flows are particularly negatively affected by the component of valuations that is likely to reflect non-fundamental or mispricing. On the other hand, equity flows are strongly positively affected the fundamental component of equity flows. I also document several findings consistent with literature, the negative role of information asymmetries (particularly in Asia) on equity flows, the positive influence of productivity on equity flows, the fact that as US interest rates are high the American investors stay at home, and the negative influence of taxes on equity investment abroad.

In conclusion, while my tests certainly do not find that other explanations of the determinants of equity flows are unimportant, they do appear to indicate that equity market valuations are an important piece of the puzzle in understanding the behavior of cross-border equity flows.

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Chapter 3

1. Conclusions

The consideration of the role of equity markets on cross-border trade in equities is the primary objective of this dissertation. Several new findings are documented in both essays. Essay one explores the dynamic relationship between the Chinese and Indian equity markets and the growing equity flows to these nations from US institutional investors. The analysis in this essay uncovers several important new findings. The first major finding is the relatively high returns in China and India tend to forecast future equity inflows, while this finding has been documented in several previous papers; I am the first to document this finding in China. More importantly, the decomposition in essay one points to the unique insight that US investors are responding to 'fundamental' information and not simply stock prices, which are likely noisy proxies for underlying value.

The fact that the majority of the variance in equity inflows is explained by shocks to fundamentals determinants of value in both markets, which has not been empirically documented in previous studies, but was recently modeled by Dvorak (2003). Additionally, the finding that the cumulative response to a dividend shock leads to approximately 120 million US dollars more in inflows than a comparative shock in prices in China and a 134 million US dollars more in inflows in India demonstrates that US investors are reacting more strongly to shocks in fundamentals than to shocks in prices in both markets.

The finding documented in chapter one, that foreign investors are behaving as informed investors is in contrast to much of the literature that assumes that domestic investors are better informed than foreign investors (see Brennan and Cao, 1997). These results are consistent with the recent empirical work of Albuquerque, Bauer, and Schneider (2006), and Seasholes (2004), though the methodology and countries in the sample are different. Taken together, the results of the first essay indicate that foreign institutional investors are making

purchasing decisions based on long-run fundamental determinants of value and not simply 'chasing returns' or responding to price signals. The results of the first essay suggest that many of the criticisms of portfolio equity investors may be unfounded.

The second essay considers the role of equity market valuation as an empirical determinant of equity flows. The majority of literature on equity flows assumes that world capital markets are informationally efficient and integrated. However, various lines of empirical evidence suggest that country-level shocks to investor optimism or risk aversion, combined with information asymmetry, sometimes cause the same capital asset to sell for different prices in different locations. These observations suggest that valuation may be an important determinant of cross-border equity flows. In essay two, I discuss and empirically evaluate the effects of US and host country valuation as a determinant of equity flows from the US to twenty developed nations. To provide a large-sample test, I exploit country-year variation in stock market valuations, realized returns, and country controls.

The results are consistent with the view that equity flows increase from the US to equity markets abroad when US valuations are high, indicating a sort of 'wealth effect' as a determinant of equity flows. Additionally, host country valuations are strongly and consistently negatively related to flows. This indicates that US portfolio investors seek 'under valued' equity markets and increase flows to these markets as valuations decline. A series of further tests indicated that an important component of the host-country valuation effect likely reflects mispricing and not omitted variable bias. Equity flows are particularly negatively affected by the component of valuations that reflects a non-fundamental or mispricing component. On the other hand, equity flows are strongly positively affected by the fundamental component of equity flows. This finding supports the finding in essay one that large US investors are acting rationally.

I also document several findings consistent with previous literature on the determinants of equity flows: 1) the negative role of information asymmetries (particularly in Asia) on equity flows, 2) the positive influence of productivity on equity flows, 3) the negative relationship between US interest rates and equity flows. In conclusion, while the results of essay two certainly do not find that other explanations of the determinants of equity flows are unimportant, the results do indicate that equity market valuations are an important piece of the puzzle in understanding the behavior of cross-border equity flows.

Overall, the relationships that this dissertation has uncovered are likely to strengthening in coming years. As information asymmetries decline, US investors will become more sophisticated in their portfolio allocation decisions abroad. I would expect to observe that proxies for valuation will play an even greater role in motivating and explaining equity flows in the future.

Appendix A: Largest Exchanges by Number of Transactions

Table A1: Largest Exchanges by Number of Transactions

Index	2001	2002	2003	2004
NASDAQ	1	1	1	1
NYSE	2	2	2	2
NSE	4	3	3	3
SHSE	3	5	4	4
BSE	8	7	5	5
Korea	6	4	7	6
Taiwan	7	6	6	7
SZSE	5	8	8	8
Germany	9	9	9	9
London	14	12	11	10

Source: http:/indiabudget.nic.in

Appendix B: Variable Definitions

Table B1: Variable Definitions

Variable	**Definition**
INFLOW	US purchases of Chinese/Indian equities
OUTFLOW	US sales of Chinese/Indian equities
NETFLOW	Inflows-Outflows
NIFLOWUS	Inflow divided by market capitalization in USD
NOFLOWUS	Outflow divided by market capitalization in USD
NNFLOWUS	Outflow divided by market capitalization in USD
EIFLOW	Expected inflows
UIFLOW	Unexpected inflows
FOREX	Exchange rate
DIV1	Log of dividend yield
INDEXUS, INDEXLC	Index level in USD and index level in local currency
LNIP	Log difference industrial production
RUSD, RLC	Return in USD and return in local currency
ERUSD	Indian or Chinese equity market return minus US equity market return in USD

Appendix C: Conintegration Results (China)

Table C1: Conintegration Results (China)

Table C1 presents the results for both the trance and maximum eigenvalue tests for Inflows in levels and index levels.

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.073698	11.68015	12.32090	0.0638
At most 1	0.001834	0.273461	4.129906	0.6615

Trace test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.073698	11.40669	11.22480	0.0464
At most 1	0.001834	0.273461	4.129906	0.6615

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Appendix D: Conintegration tests (India)

Table D1: Conintegration Results (India)

Table D1 presents the results for both the trance and maximum eigenvalue tests for inflows in levels and index levels

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.109669	19.39908	12.32090	0.0028
At most 1	0.014803	2.207182	4.129906	0.1621

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.109669	17.19190	11.22480	0.0040
At most 1	0.014803	2.207182	4.129906	0.1621

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Appendix E: Description of Valuation Ratios

Table E1: Description of Valuation Ratios from Kenneth French's Webpage

Variable	Definition
B/M	Book-to-Market. The book-to-market ratio used to form portfolios in year t is book equity for the fiscal year ending in calendar year t-1, divided by market equity at the end of t-1.
E/P	Earnings/Price. Earnings are total earnings before extraordinary items, from Compustat. The earnings/price ratio used to form portfolios in t is earnings for the fiscal year ending in calendar year t-1, divided by market equity at the end of t-1.
CE/P	Cashflow/Price. Cashflow is total earnings before extraordinary items, plus equity's share of depreciation, plus deferred taxes (if available), from Compustat. Equity's share is defined as market equity divided by assets minus book equity plus market equity. The cashflow/price ratio used to form portfolios in year t is the cashflow for the fiscal year ending in calendar year t-1, divided by market equity at the end of t-1.
Yld	Dividend Yield. The dividend yield used to form portfolios in year t is the total dividends paid from t-1 to t per dollar of equity in year t. The dividend yield is computed using the with and without dividend returns from CRSP, as described in Fama and French (1988)

Vita

Joseph J. French was born in Fort Wayne, Indiana, on January 30, 1975 the son of Rudy and Rose French. Shortly after birth, Joe's parents relocated to Emo, Ontario, Canada, where Joe spent his childhood. Joe completed his undergraduate degree in Finance from Wingate University in Wingate, North Carolina in 1997 and his Masters in Business Administration from Clemson University, in Clemson, South Carolina in 1999. After completing his MBA, Joe traveled to Thailand where he taught finance at Schiller-Stamford International University and Webster University for four years. Joe also spent a semester at Shanghai University of Finance and Economics teaching advanced corporate finance in both Shanghai and Shenzhen. Joe arrived in New Orleans in the summer of 2003, after he was awarded the Board of Regents Fellowship in Financial Economics. While at the University of New Orleans, Joe received the Toussaint Hocevar Outstanding Doctoral Candidate Award. Joe's primary research interests are International Finance, Corporate Finance and Developmental Economics.