AN EMPIRICAL INVESTIGATION OF THE BEHAVIOUR OF FOREIGN INVESTORS IN EMERGING MARKETS

IKIZLERLI, DENIZ

AN EMPIRICAL INVESTIGATION OF THE BEHAVIOUR OF FOREIGN INVESTORS IN EMERGING MARKETS

DENIZ IKIZLERLI

PhD THESIS

2010

UNIVERSITY OF DURHAM

An Empirical Investigation of the Behaviour of Foreign Investors in Emerging Markets

By
Deniz Ikizlerli

Supervisors
Professor Phil Holmes
Dr Keith Anderson

Submitted for the
Degree of Doctor of Philosophy (PhD) in Finance

Durham Business School
University of Durham

March 2010

Dedicated to

To my Mother

Author's Declaration

I declare that no part of the material contained in this thesis has been previously submitted, either in whole or in part, for a degree in this or in any other university.

Deniz Ikizlerli

Abstract

An Empirical Investigation of the Behaviour of Foreign Investors in Emerging Markets

Using monthly data of foreign flows on Istanbul Stock Exchange (ISE), the thesis finds that in contrast to most of the available theory and repeated previous findings on other markets, foreign investors act in a contrarian manner with respect to past local returns in ISE, however only in rising markets. The findings do not support the price pressure hypothesis; instead the price impact is permanent supporting the base-broadening and information hypotheses. The analysis on individual stocks suggests no evidence of informed trading, suggesting that, foreigners have no particular advantage in terms of domestic information in the ISE. Employing daily trading data from five emerging stock markets, namely the Jakarta Stock Exchange, Korea Stock Exchange (KOSPI), Stock Exchange of Thailand (SET), Taiwan Stock Exchange, and the Kosdaq Stock Market, this thesis documents that that in four out of five markets global risk appetite affects equity flows to emerging markets. Furthermore, foreigners' trading with respect to local return is found to be different across high and low risk appetite levels in Indonesia, Kosdaq and the Kospi markets. Their trading with respect to local return is also found to be different across high and low states of the economy in KOSPI and SET. Finally, using a daily dataset from the Stock Exchange of Thailand, this thesis investigates whether foreigners react differently on the announcement of macroeconomic news, compared to local investors. It also addresses some serious econometric issues that have affected other papers in this area. Under this improved model, many reactions turn out not to be significant, particularly since the 1997-8 crisis. However, on hearing inflation news, foreigners do react in the opposite way to local individual investors. They will therefore tend to reduce any locally-induced volatility.

Acknowledgement

I am deeply grateful to my principal supervisor, Professor Phil Holmes for his continuous support throughout my study. His detailed review, constructive criticism and expert guidance have been of great value in this thesis. I am also indebted to my second supervisor, Dr Keith Anderson, for his valuable advice and sincere help. Without their support and constant guidance I could not have completed this thesis.

In addition to my supervisors, I want to express my deep gratitude to my family especially to my mom for her unconditional support and great patience during my study. She was always there to listen when it was most required. I also want to thank my brothers, Sunay Ikizlerli and Bulent Ikizlerli, for their endless support since the start of my thesis.

Finally, I am forever indebted to my twin brother, Nehir ikizlerli, who has been with me at all times. He makes my life easier and without him, it would have been impossible for me to pursue a PhD degree in the UK.

I would like to finish this acknowledgement with an excellent quatrain poem by Yunus Emre in my own language.

İlim ilim bilmektir,
İlim kendin bilmektir
Sen kendini bilmezsin,
Ya nice okumaktır.

Deniz Ikizlerli
March 2010

Table of Contents

Chapter 1: Introduction 1
1.1 Background to the Research 2
1.2. Justification for Research 6
1.3. Aims and Summary of the Thesis 13
1.4. Structure of the Thesis 16
Chapter 2: Foreigners' Trading and Returns in Istanbul Stock Exchange 18
2.1 Introduction 19
2.2 Literature Review 21
2.2.1 Shortcomings of previous studies and motivation: 27
2.3 Data 29
2.4 Methodology: 35
2.5 Descriptive Statistics 39
2.6 Results 44
2.6.1 The response of net flows 46
2.6.1.1 The Relation of Foreigners' Trading to Past Local Returns: 46
2.6.1.2 Response of net flows to a shock in net flows: 57
2.6.1.3 Response of net flows to a shock in global returns: 58
2.6.1.4 Variance Decomposition: 61
2.6.2 The Impact of Foreigners' Trading on Domestic Equity Prices 63
2.6.3 Foreigners' Trading in Individual Stocks 67
2.7 Conclusion 72
Appendix A2 75
A2.1 75
A2.2 75
A2.3 76
A2.4: 83
Chapter 3: Global Risk Appetite and Foreigners' Trading 91
3.1 Introduction 92
3.2 Literature review 96
3.2.1 Shortcomings of previous studies and motivation: 103
3.3 Data: 105
3.4 Key changes in the five South-east Asian stock markets 110
3.4.1 Thailand: 110
3.4.2 Korea (Kospi and Kosdaq indices) 110
3.4.3 Indonesia 111

3.4.4 Taiwan....111
3.5 Methodology: 112
3.5.1 Reaction to lagged local return conditional on the state of the economy....117
3.5.1.1 Classification of economic states 118
3.5.2 Reaction to lagged local return conditional on the state of the global conditions122
3.7.2.1 Classification of states of the global risk appetite 123
3.6 Descriptive Statistics....125
3.7 Results 133
3.7.1 Impulse Response Analysis....138
3.7.2 The impact of broad market returns on foreigners' trading. 139
3.7.3 The impact of global risk appetite on foreigners' trading....143
3.7.4 The impact of local exchange rate on foreigners' trading. 147
3.7.5 The impact of local return on foreigners' trading. 150
3.7.6 The impact of local return on foreigners' trading at different global risk appetite levels. 153
3.7.7 The impact of local return on foreigners' trading at different states of the economy. 158
3.8 Conclusion....162
Chapter 4: How Do Different Players in the Stock Market React to Macroeconomic News? 167
4.1 Introduction 168
4.2 Theoretical background....174
4.2.1 Empirical literature on market reactions to macroeconomic news 175
4.2.2 Literature on trading behaviour of different types of investors 180
4.2. 3 Shortcomings of previous studies and motivation: 187
4.3 Data: 192
4.4 Methodology 198
4.4.1 Reaction to economic announcements....198
4.4.1.1 Preliminary analysis:....199
4.4.1.2 Seemingly unrelated regressions: 214
4.4.1.2.1 Preliminary analyses 215
4.4.2 Reaction to economic announcements conditional on the state of the economy 219
4.4.2.1 Classification of economic states....219
4.4.3 Reaction to economic announcements conditional on the state of the market .221
4.4.3.1 Classification of the states as Bull and Bear markets 222
4.4.4 Reaction to economic announcements before, during, and after the crisis period 223

4.5 Descriptive statistics 224
4.6 Empirical Results: 233
4.6.1 Response to macroeconomic announcements 233
4.6.2 Response to macroeconomic announcements conditional on the state of the economy. 236
4.6.3 Response to macroeconomic announcements conditional on the state of the market 242
4.6.4 Response to economic announcements across sub-periods. 247
4.6.5 Response distinction of investors to same economic announcements 252
4.7 Discussion: 256
4.8 Conclusion 257
Appendix A4: 264
A4.1 Converting Analysts' Expectations Frequency 264
A4.2 266
A4.2.1 SUR model 266
A4.2.2 Generalized least squares 267
Chapter 5: Concluding Remark 269
5.1 Motivations and contributions 270
5.2 Summary of the Results 275
5.3 Implications 282
5.3.1 Researchers: 282
5.3.2 Policymakers 283
5.3.3 Investors 284
5.4. Possible Future Research 285
Bibliography 287

List of Tables

Table 2.1: Unit root test for purchase……..…..32
Table 2.2: Unit root test for sale…….……..33
Table 2.3: Unit root test for net purchase…….33
Table 2.4: Number of stocks listed on ISE……..…34
Table 2.5 Summary statistics……..….39
Table 2.6 Summary statistics in the first period (1997-2002)…….….41
Table 2.7 Summary statistics in the second period (2003-2008)…….42
Table 2.8 Summary statistics of returns in Falling and Rising markets……...43
Table 2.9 Vector Autoregression of Flows and Returns……..…44
Table 2.10 Regression of monthly net flows on weekly returns……..53
Table 2.11: Decomposition of forecast error variance for the net flow……...62
Table 2.12 The price impact of the net purchases of foreign investors……64
Table 2.13: Net buy differences of foreigners…….….69
Table 2.14: Impulse responses in individual stock VAR's using relative net flows and abnormal returns…….……..71
Table 2.15 Regression of t-statistics on market capitalization……70
Table A2.1 VAR lag order selection criteria……...…….75
Table A2.2 VAR residual portmanteau tests for autocorrelation…….....76
Table 3.2: Correlations Between inflows into Different Markets…….……107
Table 3.3: VAR lag order selection criteria (01/06/2001-16/05/2008)……..115
Table 3.4: The correlations between VIX and S&P 500 returns……...….117
Table 3.5 Summary statistics of net flows / Market Capitalization by country…….125
Table 3.6 Summary statistics of Local Return by country…….126
Table 3.7 Summary statistics of Local Exchange rate by country…….....127
Table 3.8 Summary statistics of VIX…….128
Table 3.9 Summary statistics of S&P 500……..……129
Table 3.10 Summary statistics of returns in High and Low Global risk appetite levels…...131
Table 3.11 Summary statistics of returns in High and Low Local economic states……..132
Table 3.12 Vector Autoregression of Returns and Net Flows by Country……136
Table 4.1: Annual number of stocks listed in SET…….……196
Table 4.2: Macroeconomic Announcements (Actual Announcements)……..….201
Table 4.3 Correlations Between Investor Sentiment and Same Day Local Return……...203
Table 4.4 Heteroskedasticity test in the IV regression…….....……207

Table 4.5: Cumby-Huizinga autocorrelation test in IV……208
Table 4.6: Diagnostic tests for instrument relevance, instrument exogeneity and endogeneity……212
Table 4.7 Heteroskedasticity test: White (cross of all variables)……216
Table 4.8 Breusch-Godfrey LM test for autocorrelation……216
Table 4.9 Test for equality of variances between residuals……218
Table 4.10 Autocorrelation test in the system residuals……218
Table 4.11 Summary statistics for BSI (Buy-Sell imbalance) of different types of investors……225
Table 4.12 Summary statistics of series (Specification 6)……228
4.13 Summary Statistics of Macroeconomic Surprise Series Across Economic States……229
4.14 Summary statistics of macroeconomic surprise series across states of the market……230
Table 4.15 Summary statistics of Macroeconomic surprises across crisis periods……231
Table 4.16 Responses of different types of investors to macroeconomic announcements from February 1995 through May 2008……236
Table 4.17 Responses of different types of investors to macroeconomic announcements during high and low states of the economy……241
Table 4.18 Responses of different types of investors to macroeconomic announcements during bull and bear states of the market……246
Table 4.19 Responses of different types of investors to macroeconomic announcements across sub-periods……251
Table 4.20 Summary statistics of the response distinctions among investors around macroeconomic announcements……255
Table A4.1: Thailand consumer price index……265
Table A4.2: Summary statistics of monthly macroeconomic surprises……266

List of Figures

Figure 2.1: Monthly Net Purchases by Foreigners 34
Figure 2.2: Impulse Response of Net Inflow to a Shock in Domestic Return 47
Figure 2.3: Impulse Response of Net Inflows to a Shock in Domestic Return in different sub periods: 51
Figure 2.4: The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and Falling Markets 53
Figure 2.5: Differential Responses of Inflows and Outflows to a Shock in Local Returns 56
Figure 2.6: The Break-Down of Inflows and Outflows in Rising and Falling Markets 57
Figure 2.7: Impulse Response of Net flows to a Shock in Net Inflow: 59
Figure 2.8: Response of net flows to a shock in global return 60
Figure 2.9: The Differential Response of Net Flows to a Positive Shock in Global Return in Rising and Falling Global Markets 61
Figure 2.10: Impulse Response of Domestic Return to a Shock in Net Inflows 65
Figure A2.1: Impulse Response of Net Inflows to a Shock in Domestic Returns 77
Figure A2.2: The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and falling markets 78
Figure A2.3: Differential Responses of Inflows and Outflows to a Shock in Local Returns 79
Figure A2.4: The Break-Down of Inflows and Outflows in Rising and Falling Markets 80
Figure A2.5: Impulse Response of Net Flows to a Shock in Net Flows 81
FigureA2.6: Response of net flows to a shock in global returns 81
Figure A2.7: The Differential Response of Net Flows to a Positive Shock in Global Returns in Rising and Falling Global Markets 82
Figure A2.8: Impulse Response of Domestic Return to a Shock in Net Inflows 83
Figure A2.9: Impulse Response of Net Inflows to a Shock in Domestic Returns 84
Figure A2.10: The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and Falling Markets 85
Figure A2.11: Differential Responses of Inflows and Outflows to a Shock in Local Returns 86
Figure A2.12: The Break-Down of Inflows and Outflows in Rising and Falling Markets 87
Figure A2.13: Impulse Response of Net Flows to a Shock in Net Flows 88
Figure A2.14: Response of net flows to a shock in global returns 88
Figure A2.15: The Differential Response of Net Flows to a Positive Shock in Global Returns in Rising and Falling Global Markets 89
Figure A2.16: Impulse Response of Domestic Return to a Shock in Net Inflows 90
Figure 3.1: Natural log of industrial production, actual and bounds. 120
Figure 3.2 historical VIX index values (06/2001-05/2008) 124
Figure 3.3 VAR Impulse Responses of Net Inflows to a positive shock in U.S. Returns 142
Figure 3.4 VAR Impulse Responses of Net Inflows to a negative shock in VIX index 146

Figure 3.5: VAR Impulse Responses of Net Inflows to a positive shock in exchange rate .149
Figure 3.6: VAR Impulse Responses of Net Inflows to a positive shock in local return 152
Figure 3.7: VAR Impulse Responses of Net Inflows to a positive shock in local return at low and high periods of global risk Appetite. 156
Figure 3.8: VAR Impulse Responses of Net Inflows to a positive shock in local return at low and high economic states. 160
Figure 4.1: Natural log of Industrial production, actual and bounds (trend +0.062 and trend -0.0665) 220

Chapter 1: Introduction

1.1 Background to the Research

Capital flows to emerging economies demonstrated a fluctuating nature through the last four decades. In the beginning of this period, they first reached high levels during the 1970's but largely dropped due to a severe debt crisis in the early1980's. In the early 1990's international capital flows to developing countries began to increase again after those emerging countries liberalized their financial markets (Phylaktis, 2006). This process of financial liberalization covers banking sector reforms, foreign exchange reforms, bond markets and equity markets liberalization. [1]

One strand of literature turns its attention to equity market liberalization which is also the focus of this thesis, mainly because, equity market liberalization made it possible for international investors to invest in emerging markets where previously they could not invest (Stulz, 1999). This essentially arises as a result of the political decision taken by a country's government. In this context, in a fully liberalized equity market, foreign investors are allowed to buy local shares in that stock market and local investors can similarly buy foreign shares in other liberalized stock markets.

While it is widely documented that these emerging markets have initially benefitted from liberalization efforts, they also have experienced severe financial crises in their economies, which are associated with sudden reversals of international portfolio flows (for example; Mexico and Turkey in 1994, Southeast Asian countries in 1997, Russia in 1998, Brazil in 1999, and Argentina and Turkey in 2001). These crises of the 1990s revealed the

[1] This thesis covers five emerging countries' equity markets namely; Turkey, South Korea, Indonesia, Thailand and Taiwan. The official stock market liberalization has taken place in August 1999 for Turkey, in January 1992 for South Korea, in September 1989 for Indonesia, in December 1988 for Thailand and in January 1991 for Taiwan. However, since all these markets, but Turkey liberalized their stock markets gradually chronology of regulations on foreign investment is also given in a detailed way for these markets in the third chapter.

financial dependence of these emerging countries on international portfolio flows. Therefore, there is a growing body of research aimed at understanding characteristics and transmission mechanisms of these capital flows to provide necessary information for policy makers when attempting to stabilize their markets.

On this basis, a lot of efforts have already been conducted in this direction in various branches of finance literature. For example, one strand of literature gives particular mention to the joint dynamic relationship between equity flows and local equity returns due to the rapid rise of cross-border equity investments. The research in this literature mainly explores this relationship in three aspects: First, it investigates whether equity flows are determined by local past returns, in other words, whether international investors are feedback traders in local emerging markets. In this context, studies such as Brennan and Cao (1997) employing quarterly data; Stulz (1999), Bekaert, Harvey, and Lumsdaine (2002), Kim and Wei (2002), and Dahlquist and Robertsson (2004) employing monthly data; Karolyi (2002) employing weekly data; and Choe, Kho, and Stulz (1999), Froot, O'Connel, and Seasholes (2001), Griffin, Nardari, and Stulz (2004), and Richards (2005), employing daily data, find strong evidence of positive correlation between current foreign flows and lagged local equity returns which suggests that international investors follow momentum trading strategies.[2] The finding of positive feedback trading by foreigners seems to be a uniform result, with few exceptions, irrespective of the frequency of data used.

The second issue investigated in this relationship is the impact of these equity flows on local returns. All previous studies [for example, Clark and Berko (1997), Froot *et al*

[2] This is not the momentum in context of Jegadesh and Titman (1993). Foreign investors here focus on total market movements rather than individual stocks and use recent local market returns as information signals for expected return as they have an informational disadvantage in emerging markets.

(2001) and Richards (2005)] uniformly find that foreigners' net buying increases stock prices. The question then arises as to whether this effect is temporary or permanent. While a temporary price increase might be the reflection of a pure price pressure, a permanent one might be the reflection of risk sharing benefits of stock market liberalization, such as base-broadening [Bekaert and Harvey (1995 and 2000), Henry (2000), Kim and Singal (1997) and Dahlquist and Robertsson (2004)] or information revelation (see Froot and Ramodorai, 2001). Froot *et al* (2001), employing daily data, find some evidence of the price pressure hypothesis, while Clark and Berko (1997) and Dahlquist and Robertsson (2004), using monthly data, find no such evidence. Related to this issue, some studies such as Clark and Berko (1997), Dahlquist and Robertsson (2004), and Richards (2005) also provide estimates of the price impact of foreign purchases on local shares. For example, using monthly data of foreign purchases of Mexican stocks Clark and Berko (1997) find that unexpected foreign purchases that amount to 1 percent of market capitalization are associated with a price increase of about 13 percent. Dahlquist and Robertsson (2004), employing monthly data, document that net foreign inflows equivalent to 1% of total market capitalization are associated with a 10% price increase in Sweden market. Furthermore, Richards (2005), employing daily data from six Asia-Pacific emerging markets, documents a 38% price increase that is associated with net foreign purchases equivalent to1% of market capitalization.

While analyzing the dynamic relationship from these two aspects, some studies such as Griffin *et al* (2004) and Richards (2005) also consider to what extent the equity flows are determined by global factors, since foreign investors demand for local emerging market stocks might be affected after a shock in broad markets due to rebalancing their equity portfolios across markets (Kodres and Pritsker, 2002). Griffin *et al* (2004), employing daily

data from nine emerging markets, and Richards (2005), using daily data from 6 Pacific emerging markets, find that, besides local market returns, lagged returns in mature markets, in particular the S&P500, are useful in explaining equity flows towards emerging markets.

As a third issue, this strand of literature focuses on the predictive power of foreigners' trades, examining whether they contain any private or superior information. Studies such as Brennan and Cao (1997) and Griffin *et al* (2004), relating location to the issue of informedness in their models, assume that foreigners are at an informational disadvantage relative to locals in emerging markets. On the contrary, Bailey, Mao, and Sirodom (2007) provide evidence from Thailand and Singapore that foreign investors have superior information processing ability. Furthermore, Grinblatt and Keloharju (2000) find that foreign investors in Finland achieve superior performance over local investors, even after adjusting for momentum.

Apart from the above, this thesis is also related to a second main strand of literature that investigates the trading behaviour of different types of investors around different types of news releases. For example, Lee (1992) investigates the reactions of small traders and institutional traders around various types of earnings announcements. Hirshleifer, Myers, Myers, and Teoh (2008) examine the trading behaviour of individual investors in response to extreme surprises in quarterly earnings to see whether it is the source of post-earnings announcement drift (PEAD). Etter, Rees, and Lukawitz (1999) investigate the speed in processing of new information for the case of annual earnings announcements by individual and institutional investors. Yuan (2007) investigates the impact of market wide attention grabbing events on the trading behaviour of individual and institutional investors, and Schmitz (2007) analyze the reaction of individual investors to corporate news in the media.

There are many studies similar to those mentioned above related to this literature but two studies have diverged from all these studies by means of analyzing the impact of macroeconomic news on investors, which is also the focus of this thesis in its fourth chapter. The first one is the study by Nofsinger (2001) who examines the reaction of institutional and individual investors around macroeconomic news releases for NYSE stocks. The second one is the study by Errenburg, Kurov, and Lasser (2006) who analyze the effect of macroeconomic announcements on the trading behaviour of exchange locals and off-exchange traders in the S&P 500 index futures contracts. In the first study, both individual and institutional investors are found to increase their purchases to abnormally high levels during good news and individual investors are found to have significantly higher purchase rates relative to institutions. In the second study, local traders (off-exchange traders) are found to buy (sell) stocks after the good news and sell (buy) stocks after bad news and also local traders are found to react to macroeconomic news releases faster than off-exchange traders. It is clear from both studies that different types of investors behave differently in response to macroeconomic news.

1.2 Justification for Research

The above cited literatures summarize previous studies and research issues as a background for the research. Before moving to the contributions made in this thesis it would be useful to present its empirical chapters briefly. In the first empirical chapter the thesis investigates the trading behaviour of foreign investors with respect to local return employing structural VAR model on a monthly data for Istanbul stock market. In the second one, the thesis also mainly examines the effect of global risk appetite on the net purchases of foreign

investors using similar methodology on a daily data from five emerging Pacific markets namely Kospi, Kosdaq, Indonesia, Thailand and Taiwan. In the third empirical chapter, the thesis investigates the behaviour of three different groups of investors – local private investors, local institutions and foreigners- with respect to local macroeconomic announcements employing a different approach rather than VAR approach on a daily data from Thailand.

Based on this, the chapters of this thesis make the following contributions:

As mentioned above, studies in the first strand of literature (e.g. Clark and Berko (1997), Dahlquist and Robertsson (2004), Griffin *et al* (2004) and Richards, (2005)) have addressed the following questions: i) Do foreign investors follow momentum or positive feedback trading strategies? ii) What is the magnitude of the impact of foreign flows on domestic stock returns? Is the contemporaneous impact to be explained by price pressure hypothesis or by information? iii) Does foreigners' trading contain superior information?

With the exception of Slovenia included in Griffin *et al* (2004)[3], the EEMENA (Eastern Europe, Middle East, North Africa) region has been surprisingly neglected in this line of literature, even though it hosts those emerging economies that are most dependent on foreign capital inflows. An empirical characterization of the interaction between foreign flows and emerging stock market returns would not be general enough without including the emerging economies with large current account deficits in the EEMENA region. The Istanbul Stock Exchange (ISE) is the largest and deepest stock market in the EEMENA region which was ranked 7th among all world emerging markets in terms of total value of shares traded in 2007. Therefore, chapter (2) addresses the above questions for the Turkish stock market,

[3] The Slovenia market is so small that Griffin et al. (2004) mostly ignored it in reaching their main conclusions.

since it would be an interesting avenue to add to this literature.

As another contribution chapter 2 also incorporates methodological improvements compared to previous studies specifically regarding the third question addressed in previous studies that is whether foreigners' trading contains superior information, we set up a new, simple approach to test the predictive content of foreign flows in individual stocks. It employs the VAR methodology, for the first time in the literature, using returns and net flows defined in relative terms. Defining individual stock returns and flows relative to the market permits a better measurement of the cross-sectional predictive content, and the VAR methodology helps single out the predictive power of the surprise component of net foreign flows in individual stocks, while the net buy difference methodology widely used in the related literature does not distinguish between expected and surprise components. Thus, the approach employed in chapter 2 provides a more efficient procedure to detect informed trading by an investor group in individual stocks.

In addition, while analyzing the joint dynamic relationship of equity flows and local return, chapter 3, employing five Asia Pacific emerging markets, focuses on a different factor, which has not been studied before, as a potential push factor that can affect foreigners demand for stocks in emerging markets. As noted above in explaining the foreign equity flows to emerging markets some studies consider global factors as the potential push factor. For example, Bekaert *et al* (2002) consider the world interest rate as an exogeneous variable and Griffin *et al* (2004) and Richards (2005) employ broad market stock returns as potential determinants of capital equity flows.

However, in terms of global factors, it is rather interesting that no study in this line of

research has studied the effects of global risk appetite on equity flows to emerging markets. What is particularly interesting to note is that another strand of literature that investigates the factors that affect emerging market bond spreads gives considerable attention to this factor. However, it is worth pointing out that portfolios of international investors not only consist of emerging market bonds, but also emerging market stocks as well, and as the risk tolerance of an investor decreases he/she wants to shift his/her portfolio to a more conservative allocation. International investors might start with establishing a goal of some certain percent of foreign stocks in his/her portfolio. However, whatever the mix, if his/her appetite for risk increases or decreases the percentage of his/her portfolio devoted to foreign stocks can also be changed in order to adapt to his/her new investment plan. In this context, if the risk appetite of international investors is constantly changing then their portfolios should also be rebalanced constantly in order to meet their risk tolerance. The balance we are referring to here is the ratio of foreign stocks held by international investors in their total portfolios.

In view of this, from an investor perspective, this factor deserves particular consideration especially given the recent ongoing credit crisis or subprime panic started in the USA which gives rise to money outflows from almost every emerging stock markets. Therefore, chapter 3 provides the first evidence about the impact of global risk appetite on the behaviour of foreign investors in emerging markets.

Moreover, chapter 3 examines whether foreigners' trading strategies with respect to local returns vary with the changing global and local conditions. For example, in terms of global conditions, no study has investigated whether foreigners' trading strategies with respect to emerging market return has been different at the different global risk appetite levels. On this basis, chapter 3 looks at whether the trading strategy (with respect to local

return) followed by foreigners at times when the global risk appetite is high is similar to the trading strategy followed by foreigners at times when the global risk appetite is low. No previous study has tried to answer this question. However, the answer to this question is of great importance to policy makers, because, all previous studies uniformly documented that foreigners engage in positive feedback trading strategies with respect to local returns and positive feedback trading is also known to have the potential to push prices away from fundamentals. Therefore, if foreigners are found to pursue different trading strategies at different global risk appetite levels regulators can benefit from this information and introduce different measures at different times to stabilize the market.

Furthermore, apart from global conditions, chapter 3 also investigates the interaction between foreigners' trading and emerging stock market returns in terms of local conditions. In previous studies such Brennan and Cao (1997) and Griffin *et al* (2004) foreign investors are suggested to chase recent local market returns due to being informationally disadvantaged compared to local investors. In this respect, chapter (3) seeks to document whether foreigners chase recent local returns irrespective of the economic conditions in the emerging country. Specifically, chapter (3) examines whether the trading strategy with respect to local return followed by foreigners at times when the local economy is in the high growth period is similar to the trading strategy followed by foreigners at times when the economy is in the low growth period. It is useful to see whether foreign investors engage in different trading strategies with respect to local return at different points in the business cycle since the answer to this question is of great importance to academicians. If we find no difference in their trading strategies across different economic states, our finding can be regarded as strong evidence that supports a model of Brennan and Cao (1997) which suggests that foreign investors use recent returns as information signals as they have an informational disadvantage

in emerging markets. In other words, foreign investors can be suggested to use only recent returns as their only information signals about the expected return of the local market and that is why they are positive feedback traders irrespective of the local conditions. However, if we find differences in trading behaviours across states of the economy, foreign investors can be thought to use other information sources as information signals at different states of the market rather than chasing the past prices to form expectations about the expected return. Furthermore, the answer to this question should also be an issue of great concern to regulators in order to be successful at providing market stability when introducing measures.

In addition, the contributions of this thesis are also related with the second literature cited above which examines the trading patterns of investors around different types of news releases. Many studies in this strand of literature investigate the reaction of investors to similar type of news such as earnings announcements and corporate news, but two of them differ from those by analyzing the reaction of investors around macroeconomic announcements.

Both studies have analyzed the *differential* impact of macroeconomic news on different groups of investors. The first one, Nofsinger (2001), looked at the reaction of institutional and individual investors around macroeconomic news releases for NYSE stocks. However, his study aggregated all news announcements, and only looked at stocks over a three-month period starting from 1 November 1990 and ending in 31 January 1991. The second study is that of Erenburg, Kurov, and Lasser (2006). They looked at how macroeconomic announcements affect the trading behavior of exchange locals and off-exchange traders in S&P 500 index futures contracts. They found that local traders reacted more quickly to macroeconomic news releases than off-exchange traders, i.e. they bought

futures more quickly after good news and sold them more quickly after bad. However, both studies either have shortcomings in their methodologies or need to be extended in other ways. Chapter 4 differs from these two studies in important ways.

Firstly, Nofsinger (2001) uses a very short sample period (three months from November 1990 to January 1991) and a sample of only 144 NYSE stocks. He also uses a single dummy variable that aggregates information for 17 different macroeconomic types of news release. He is not therefore able to resolve which macroeconomic news releases have a significant effect on which types of investors. Furthermore, he decides whether the macroeconomic news is good or bad by calculating the adjusted returns. Because of this, he cannot determine whether a specific macro announcement is good or bad if it is released at the same time as other announcements. Chapter 4 uses forecast data from an international economic survey organization so that it can calculate surprises, and separate the effects of macroeconomic news that gets announced simultaneously.

Secondly, chapter 4 solves the endogeneity problem that affects both Nofsinger (2001) and Erenburg *et al* (2006). Previous studies of emerging markets, such as Griffin *et al* (2004) and Richards (2005), have found significant evidence of a correlation between net purchases (which can be considered as a proxy for investor sentiment) and contemporaneous local market returns. However, if the market return is influenced by the macroeconomic announcements, and macroeconomic announcements affect net purchases (investor sentiment) of investors, this apparent correlation could be spurious, due to picking up the correlation between net purchases (investor sentiment) and domestic return. Any model not taking this endogeneity problem into account is incomplete. Chapter 4 tests for this endogeneity in same-day returns to decide whether we need to use instrumental variables or

GMM estimation methods. It turns out that local return is exogeneous, and chapter 4 therefore includes it as a control variable in order to get unbiased estimates of the impact of macroeconomic news. Moreover, chapter 4 investigates the reaction of foreign investors to local macroeconomic news releases in emerging markets which has not been analyzed before in the literature.

Two further innovations in the fourth chapter should also be highlighted. Firstly, many studies have shown investors' net purchases to be affected by other independent variables, such as lagged market returns and lagged net purchases (Richards, 2005). Chapter 4 therefore includes these as control variables to get unbiased estimates of the effect of macroeconomic news. Secondly, many studies such as McQueen and Roley (1993) and Li and Hu (1998) have investigated the response of stock prices over different stages of the business cycle, since investors can consider the same type of news to be bad in some stages of the business cycle and good in others. Chapter 4 takes different states of the economy into consideration, to see whether the reactions of investors to macroeconomic news are different at different points of the business cycle. Chapter 4 also takes different states of the stock market into account. Investor reaction can be different in bull and bear market periods (see for example, Hardouvelis and Theodossiou, 2002). Thus, chapter 4 is extending the literature in this area in a number of important ways.

1.3 Aims and Summary of the Thesis

This thesis aims at contributing to the empirical literature by investigating the behaviour of foreign investors in emerging stock markets in two dimensions. As a first

dimension, it analyzes the interaction between foreigners' trading and stock returns in various aspects such as whether foreign investors pursue positive feedback trading strategies, what is the magnitude of the impact of foreign flows on domestic stock returns and whether their trading contains superior information. The first part of the thesis, addressing these questions for the Turkish stock market employing monthly data, finds that, in contrast to most of the available theory and similar previous findings for other markets, foreign investors act in a contrarian manner with respect to past local returns in the ISE, however only in rising markets. This rules out sentiment trading and naive momentum trading, although the same foreigners exhibit positive feedback trading with respect to global returns. The price pressure hypothesis is rejected. Although foreigners do not appear to have any local information advantage, this thesis documents evidence of predictive ability driven by push factors and uniquely accompanied by contrarian trading. Hence, the results of this thesis contradict the previous conclusions that foreigners are uninformed positive feedback traders. Rather, they are a heterogeneous group dominated by sophisticated investors, who can rationally adjust their trading style.

Later on, this thesis, employing daily data from five emerging markets, focuses on global risk appetite as a potential push factor for foreign equity flows to emerging markets and finds that, in four out of five markets, global risk appetite has a significant impact on foreigners' demand in emerging stock markets. Furthermore, this thesis also investigates how foreigners behave with respect to local return at different risk appetite levels. Regarding this issue the thesis finds different cumulative impulse responses for foreign inflows across high and low risk appetite levels in Indonesia, Kosdaq and Kospi markets. These findings are of interest to policymakers since foreigners are found to pursue different trading strategies at different global risk appetite levels. Regulators can benefit from this information and

introduce different measures at different times to stabilize their markets.

In a similar vein, this thesis also looks at the foreigners' trading with respect to local returns at different states of the local economy and finds that the cumulative impulse response of foreign equity flows to a shock in local returns are different across two states in KOSPI and Thailand markets. Thus, it is not likely to support the model of Brennan and Cao (1997) which suggests that foreign investors use recent returns as information signals about the expected return of the local market as they have an informational disadvantage in emerging markets. In contrast, our finding regarding these two markets suggests that foreigners do not follow positive feedback trading strategies irrespective of the local economic conditions.

Finally, as a second dimension, this thesis focuses on the reaction of three different investor groups- local private investors, local institutions and foreign investors - in terms of momentum or contrarian trading strategy around local macroeconomic news. Using daily trading data of three investor groups from Thailand stock market, this thesis finds that in many cases, particular group of investors does not appear to be following either a momentum or contrarian trading strategy to any significant degree. In particular, none of the three types of news releases investigated (local private investors, local institutions and foreigners), since the end of the 1997-8 crisis period have had a significant effect on any of the groups' trading behaviour, except that local institutions react in a contrarian manner to trade balance news. However, foreigners do show a momentum reaction to inflation news, whereas local private investors show a contrarian spirit. In this case foreigners will tend to reduce any volatility induced by the contrarian trading of the locals. This behavior is, however, concentrated in bear markets for both groups.

1.4 Structure of the Thesis

The structure of the remainder of this thesis is organized as follows: chapter 2 investigates the dynamic interaction between foreigners' trading and stock returns in the Istanbul stock exchange. The main questions of interest to this chapter are i) whether foreigners engage in feedback trading strategies with respect to local return in the Istanbul stock exchange ii) the magnitude of the impact of foreign flows on domestic stock returns iii) whether foreigners' trading contains superior information. While addressing the third questions above chapter 2 also sets up a new approach to test the predictive content of foreign flows in individual stocks.

Chapter 3 examines the impact of global risk appetite on equity flows to emerging markets which to our knowledge has not been done before. In analyzing the relationship the chapter employs daily data from five East Asia pacific emerging markets. Furthermore, chapter 3 also investigates whether foreigners' trading strategies with respect to local return change with different global and local conditions. In this respect, it looks at whether their trading strategies with respect to local return are different across high and low global risk appetite levels. In a similar vein, chapter 3 also takes different states of the local economy into consideration and examines whether the trading strategies of foreigners with respect to local return are different at different points in the business cycle.

Chapter 4 analyzes the trading behavior of foreigners in emerging markets in a different context. It looks at the reaction of investors around local macroeconomic news and tries to find whether foreigners react differently on the announcement of macroeconomic news, compared to local institutions or private investors. The chapter employs a dataset from

the Stock Exchange of Thailand. It also addresses some serious econometric issues that have affected other papers in this area. The chapter similarly investigates the reactions of investors at different time periods relating to the states of the economy, stock market and financial crisis.

Finally, the thesis ends with Concluding Remarks in which implications of the findings and potential areas for future research are discussed.

Chapter 2: Foreigners' Trading and Returns in Istanbul Stock Exchange

2.1 Introduction

Many emerging economies have been dependent on international portfolio capital inflows, sudden reversals of which have been associated with severe destabilizing effects. Hence, policy makers and researchers have been interested in understanding the nature of those flows and their impact on domestic financial markets. One strand of this literature studies the joint dynamics of foreign investment flows and equity returns. Recent studies in this line of research (e.g. Clark and Berko, 1997), Dahlquist and Robertsson (2004), Griffin *et al* (2004) and Richards, (2005)) have addressed the following questions: i) Do foreign investors pursue momentum or positive feedback trading strategies? ii) What is the magnitude of the impact of foreign flows on domestic stock returns? Is the contemporaneous impact to be explained by the price pressure hypothesis or by information? That is, is the impact temporary or permanent? iii) Does foreigners' trading contain superior information, i.e., predictive value?

With the exception of Slovenia included in Griffin *et al* (2004), the EEMENA (Eastern Europe, Middle East, North Africa) region has been surprisingly neglected in this line of literature, even though it hosts those emerging economies that are most dependent on foreign capital inflows.[4] An empirical characterization of the interaction between foreign flows and emerging stock market returns would not be general enough without including the emerging economies with large current account deficits in the EEMENA region. The Istanbul Stock Exchange (ISE), the largest and deepest stock market in the EEMENA region, would

[4] While Froot et al. (2001) cover a large number of host countries, their data is limited to only one particular custodian. Similarly, studies using data obtained from the source country (e.g. Bekaert et al., 2002) employing TIC data from US cover a large number of countries. However, such data may contain measurement errors as they do not include all foreign flows. As Pavabutr and Yan (2008) suggest, foreign investment flows data should be collected from destination.

therefore be an interesting avenue to add to this literature. The ISE was ranked 7th among all world emerging markets in terms of total value of shares traded in 2007. Moreover, Turkish markets possessed some interesting characteristics such as persistent high inflation, very high real interest rates, political turnovers, and volatility, particularly during the first half of our sample period. Finally, a dramatic improvement in political stability and macroeconomic performance in the second half also enables a comparison of foreign flows dynamics under different regimes.

As a second contribution, regarding the third question addressed in previous studies, that is whether foreigners' trading contains superior information, our study sets up a new, simple approach to test the predictive content of foreign flows in individual stocks. We employ the VAR methodology using returns and net flows defined in relative terms. individual stock returns and flows relative to the market, which to our knowledge has not been done before, permits a better measurement of cross-sectional predictive content, and the VAR methodology helps single out the predictive power of the surprise component of net foreign flows in individual stocks, while the net buy difference methodology widely used in related literature does not distinguish expected and surprise components. Thus, our approach provides a more efficient procedure to detect informed trading by an investor group in individual stocks.

In the next section, we provide a review of the literature addressing the three issues mentioned above, together with their theoretical background. Sections 2.3 and 2.4 present the data and descriptive statistics, respectively. In section 2.5 we outline the methodology employed in this study. Section 2.6 presents the results, and section 2.7 summarizes the main conclusion.

2.2 Literature Review

There are various strands in the economics and finance literature that investigate capital flows to emerging markets. One strand of literature studies the investment behaviour of international investors by analyzing the joint dynamics of equity flows and equity returns. The first question examined in these studies is whether equity flows are determined by past returns, and more specifically, whether international investors are feedback traders.

Brennan and Cao (1997) employing quarterly data and Stulz (1999), Bekaert *et al* (2002), Kim and Wei (2002), and Dahlquist and Robertsson (2004) employing monthly data, find strong evidence of positive correlation between current foreign flows and lagged local equity returns which suggests that international investors pursue momentum trading strategies. Karolyi (2002), who studies Japanese markets using weekly data, also finds evidence of momentum trading among foreign investors during and after the Asian financial crisis. Choe *et al* (1999), Froot *et al* (2001), Griffin *et al* (2004), and Richards (2005), using daily data, study the joint dynamics of capital flows and stock returns, and conclude that international investors are positive feedback traders. Similarly, Grinblatt and Keloharju (2000) find strong evidence of momentum trading by foreigners in individual stocks (i.e. buying past winners and selling past losers). As seen from the examples of existing research summarised above, irrespective of the frequency of data used, the results are unanimous, supporting the hypothesis that foreign traders follow a positive feedback strategy , with only very few exceptions.

The above results raise the question of why international investors are positive feedback traders. In this respect, many economists such as Griffin *et al* (2004) suggest that

the expectations of foreign investors regarding the local market returns are more extrapolative than local investors, because they are less informed. The model of Brennan and Cao (1997) predicts foreign investors will use recent returns as information signals, as they have an informational disadvantage in emerging markets. A more behavioural interpretation is that foreign traders' sentiment is affected by past returns. An alternative explanation examined by Bohn and Tesar (1996) and Bekaert *et al* (2002) is that international investors are "expected return chasers". Bohn and Tesar (1996) study an aggregate US portfolio with the international portfolio choice models, and find that foreign portfolio investment in the aggregate US portfolio is primarily driven by time-varying opportunities: US investors tend to enter the markets that have high expected returns and flee from markets that have low expected returns. However, Bekaert *et al* (2002), employing 20 emerging equity markets and using dividend yield as a proxy for expected returns in the local market, find no evidence of expected return chasing. The model of Griffin *et al* (2004) incorporates portfolio rebalancing effects, which suggest that global investors might increase their allocations to emerging markets following increases in their home markets. In contrast, Richards (2005) concludes that positive feedback trading observed in his sample is likely to be due to behavioural factors or foreigners extracting information from recent returns rather than portfolio rebalancing.

The second question addressed in these studies focuses on the impact of flows on returns. All studies (for example, Clark and Berko, 1997), Froot *et al,* 2001, Dahlquist and Robertsson, 2004, and Richards 2005) uniformly find that foreigners' net buying raises stock prices. Then, an issue of particular interest is whether the effect is temporary or permanent. If the price increase is temporary, it may reflect pure price pressure. If it is permanent, it may be a reflection of risk sharing benefits of stock market liberalization, i.e. base-broadening [see Bekaert and Harvey, 1995, 2000, Henry, 2000, Kim and Singal, 1997 and Dahlquist and

Robertsson 2004] or information revelation (Froot and Ramodorai, 2001). The latter encompasses a proposition that foreign net purchases incorporate fundamental prospects, making the effect of equity flows on returns permanent.

Studies employing daily data such as Froot *et al* (2001) focusing on 28 emerging markets, Edelen and Warner (2001) focusing on U.S. equity mutual funds, Froot and Ramadorai (2001), focusing on 25 emerging markets and Richards (2005) focusing on 6 emerging markets, find some evidence for the price pressure hypothesis. On the other hand, the findings of studies employing monthly data are mixed. Clark and Berko (1997) and Dahlquist and Robertson (2004) find no evidence of price pressure in their studies, while Bekaert *et al* (2002) report that only a very small portion of returns due to flow shocks are reversed subsequently.

Only a few studies provide estimates of the price impact of foreign purchases. Those we are aware of are Clark and Berko (1997), Dahlquist and Robertsson (2004), and Richards (2005). Using monthly data of foreign purchases of Mexican stocks from January 1989 to March 1996, Clark and Berko (1997) find that unexpected foreign purchases that amount to 1 percent of market capitalization are associated with a price increase of about 13 percent. Studying the investment behaviour and impact of foreign investors on the Swedish market subsequent to liberalization using monthly data, Dahlquist and Robertsson (2004) document that net foreign inflows equivalent to 1% of total market capitalization are associated with a 10% price increase. Finally, Richards (2005), employing daily data from six Asia-Pacific emerging markets, finds that net foreign purchases equivalent to 1% of market capitalization are associated with a median of a 38% cumulative price increase. In reporting price impact, several studies make a useful distinction between the expected and surprise components of

foreign flows. Most of the price impact comes from the surprise component (Richards, 2005). On daily data from Thailand, Pavabutr and Yan (2007) show that the expected component, which is associated with positive feedback trading, has an insignificant price impact.

In analyzing these two questions, it is necessary to consider to what extent the capital flows are determined by global factors in order to adequately describe the relationship between foreign flows and local returns. Foreign investors might affect emerging markets by responding to a shock in broad markets by rebalancing their equity portfolios across markets (Kodres and Pritsker, 2002). Thus, net inflows may be partly explained by the inclusion of broader global market returns. Richards (2005), focusing on six Pacific emerging markets using daily data, employs several broad markets indices such as MSCI-world, MSCI-emerging market, S&P500 and NASDAQ. He finds that, in addition to local market returns, lagged returns in mature markets, in particular in the S&P500, are useful in explaining equity flows into emerging markets. He further suggests that those *push* factors have a larger role than implied by previous work. Griffin *et al* (2004) also document similar evidence for the nine emerging markets, that is, lagged North American returns are useful in explaining the net inflows towards emerging markets.

Another related issue is whether net flows react differently to up and down market movements. Griffin *et al* (2004) investigate this issue and find that net flows are affected differently by positive and negative lagged local returns only in South Africa and Slovenia and the asymmetries are found to be of opposite sign. Similarly, they also look at whether positive shocks to lagged U.S return have stronger effect on subsequent net flows than negative U S shocks have on net flows and find no evidence except of Slovenia.

The third question analyzed is whether foreigners' trades contain private or superior information, or in other words, whether foreigners' trades have predictive power. Foreign flows generally come from professionally managed, institutional investors, who are likely to be informed traders. On the other hand, based on previous evidence that relates location to informedness, models such as Brennan and Cao (1997) and Griffin *et al* (2004) assume that foreigners have informational disadvantages compared to domestic investors. Yet, it is also plausible to believe that global institutional investors can invest in information sources, thanks to their size, global experience, talent and resources. For example, Barron and Ni (2008) find that "portfolio managers with larger portfolio size acquire information about the foreign asset". They may even have advantages in analyzing push factors, especially at times when domestic markets are highly influenced by global factors. Seasholes (2002) suggests that some foreigners have an information advantage.

Bailey *et al* (2007) examining Thailand and Singapore provide evidence that foreign investors have superior information processing ability. Furthermore, Grinblatt and Keloharju (2000) report superior performance of foreign investors over local investors in Finland even after adjusting for momentum.

The information content of foreigners' trading is particularly interesting when considered in combination with the findings of positive feedback trading by foreigners. For example, Griffin *et al* (2004) find that the one-day-ahead predictive ability of foreigners' net purchases is mainly due to past flows signalling future flows, and remain committed to their view that foreign investors do not possess an information advantage. Using monthly data from Sweden, Dahlquist and Robertsson (2004, p 630) conclude that "foreigners are uninformed feedback traders". Richard (2005), employing daily data from six pacific

emerging markets, finds that a substantial part of the price impact of inflows is completed the day after the inflow, and suggests that it would be difficult to economically exploit the apparent predictability using the information contained in foreigners' trading. The only paper to suggest significant predictive power of foreign flows is Froot *et al* (2001). However, their findings are disputed by Richards (2005) due to problems in the inferred dates of trades.

The analysis of the predictive power of foreigners' trades also focuses on stock selection performance. By looking at buy ratio differences of future winning vs. losing stocks, Grinblatt and Keloharju (2000) find that foreign investors exhibit the highest performance among investor groups in their detailed data on Finland. Dahlquist and Robertsson (2004), using a similar methodology, report no profitable stock selection ability on the part of foreigners in Sweden. Lin and Swanson (2003), using daily data from Taiwan, find that foreign investors exhibit superior performance in the short-term, but inferior performance in the longer term, and that short-term superior performance is attributable to price momentum of winner-portfolios.

As can be understood from the above literature the analysis of the predictive ability of foreigners' trading in individual stocks has traditionally been based on the buy ratio difference methodology, first employed by Grinblatt and Keloharju (2000). Such methodology, however, is not sufficiently informative. Many studies find a stronger predictive ability of surprise net buys, which cannot be singled out under the net buy difference methodology. Although the VAR methodology is much more informative, it is interesting that no study has employed the VAR in the analysis of predictive content of foreigners' trading in individual stocks.

2.2.1 Shortcomings of previous studies and motivation

Given the above literature this study now presents shortcomings of the previous studies and motivation with their stated hypotheses.

As is mentioned in the literature review, almost all studies, with few exceptions and irrespective of the frequency of data used, document positive feedback trading strategies by foreign investors in emerging markets. However, as mentioned previously the EEMENA (Eastern Europe, Middle East, North Africa) region, which is heavily dependent on foreign capital inflows, has been surprisingly neglected in this line of literature. This study therefore aims at contributing to this literature by providing evidence from The Istanbul Stock Exchange (ISE), the largest and deepest stock market in the EEMENA region, to see whether positive feedback trading of foreign investors in emerging markets is a widespread phenomenon. On this basis the first hypothesis can be stated as:

Hypothesis (1): Foreign investors are found to engage in positive feedback trading in the ISE.

Many studies on emerging markets, for example, Clark and Berko (1997), Froot *et al* (2001), Dahlquist and Robertsson (2004), and Richards (2005) documented significant correlation between net purchases of investors and contemporaneous local returns. They uniformly find that foreigners' net purchases raise stock prices in emerging markets. To this end, this study also tests whether this is the case for the ISE as well. Thus, related hypothesis can be stated as:

Hypothesis (2): Net purchases of foreign investors are found to impact equity prices.

After testing the impact of foreign net purchases on equity prices (conditional on the statistical significance of the impact) the question of interest to us is now whether this impact is temporary or permanent in the ISE. If the price increase is temporary, it may reflect pure price pressure. If it is permanent, it may be a reflection of risk sharing benefits of stock market liberalization, i.e. base-broadening, see Bekaert and Harvey (1995, 2000), Henry (2000), Kim and Singal (1997) and Dahlquist and Robertsson (2004), or information revelation (see Froot and Ramodorai, 2001). Our interest is focused on the latter to see whether foreigners have prospects about fundamental for the ISE which make the impact of equity flows on returns permanent.

On this basis, a related hypothesis can be stated as;

Hypothesis (3): If hypothesis 2 holds, then net purchases of foreign investors have long-lived (permanent) effect on prices.

If foreigners are found to have predictive ability for the market or in other words if they have fundamental prospects about the local stock market it should manifest itself in individual stocks as well. As noted above the analysis of whether foreigners are informed in individual stocks is tested by looking at buy ratio differences of future winning vs. losing stocks. However, many studies find a stronger predictive ability of surprise net buys, which cannot be singled out under the net buy difference methodology. This study employs the VAR methodology, using returns and net flows defined in relative terms, which is much more informative since it helps single out the predictive power of the surprise component of net foreign flows in individual stocks. As a result, by employing our VAR model, we test whether foreigners are informed in individual stocks.

In this respect, a related hypothesis can be stated as;

Hypothesis (4): Foreign investors are informed in individual stocks.

In a nutshell this study makes the following contributions:

- Provides evidence from a different region to see whether positive feedback trading of foreign investors in emerging markets is a widespread phenomenon
- Provides evidence from a different region about the magnitude of the price impact of foreigners' trading and tests whether this effect is permanent or temporary.
- Provides a new approach for testing the predictive content of foreign flows in individual stocks.

2.3 Data

On a monthly basis, Istanbul Stock Exchange (ISE) collects reports from all its members such as banks and brokerage houses that show stock market transactions realized on behalf of and on the account of foreign banks, foreign brokerage houses or foreign individuals. These data were obtained directly from the ISE, which include monthly purchases and sales by foreign investors for all firms listed.

Foreign flows data compiled at the destination market in this way enable a rigorous analysis of foreign investors' trading patterns, the impact of their trades on stock returns, and the information contained in their trades. ISE started to publish this kind of data in January 1997; hence our sample starts in January 1997 and goes through December 2008. We use "net purchase" and "net inflow" interchangeably as a measure of purchases minus sales by foreigners. We normalize a raw variable of net purchases by dividing by the contemporaneous market capitalization, following other studies such as Bekaert *et al* (2002), Dahlquist and Robertson (2004), Griffin *et al* (2004) and Richards (2005). Such

normalization is useful to determine how important the net demand is compared to the total supply of available shares (Griffin *et al*., 2004).

After dividing by the contemporaneous total market capitalization, purchases (inflows) and sales (outflows) are found to be trend stationary as shown in Table 2.1 and Table 2.2 respectively after employing unit root tests. We reject the null hypothesis of unit root in favour of the trend stationary alternative hypothesis using the ADF as can be seen in panel B of each table. In contrast, the null hypothesis of unit root is rejected for net purchases which can be seen in Table 2.3. Therefore, unlike net purchases, purchases and sales are replaced by their detrended series which are residuals from the regressions of purchases and sales on time.

The core of our analysis involves an examination of the joint dynamics of market-wide aggregated net flows and market returns. For the local market returns, we use the ISE all-share index which includes all companies listed on the ISE except investments trusts. Market returns are computed by taking the first difference of the log monthly closing values of the all-share index in local currency, adjusted for stocks splits and dividend payments.

There are currently 328 companies listed on the ISE. Our sample begins with 228 companies as of January 1997 and in the first four years it reached a number of 316 (December 2000). Due to the currency crisis experienced in late 2000 and early 2001, from that point onwards, the number of listed companies was observed to decrease and returned off to its previous level at the end of 2006 as shown in Table 2.4. Net purchases by foreigners as a percentage of total market capitalization throughout our sample period are shown in Figure 2.1. Except for 1999, in the first four years net purchases were negative. Following 2002,

they began to increase and reached 4.51 billion dollars in 2007. Foreigners' average share in trading volume climbed from around 6% in the early parts of our sample period to as high as 25% in the last two years.

We also use global returns variable to control for nondomestic information that might affect foreign investors. For example, they might invest more in emerging stock markets following increases in their home markets due to portfolio rebalancing effects (Griffin *et al*., 2004). Thus, net flows may be partly explained by the inclusion of monthly returns on broad markets. For the sake of generality, we use the MSCI World Index, composed by Morgan Stanley Capital International to measure the common performance of developed equity markets, as a proxy for global returns. It is an equity market index of 1500 world stocks which is consisted of 23 developed market country indices.[5]

[5] As of June 2007 developed market country indices included in the MSCI World Index are as follows: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Table 2.1: Unit root test for purchase

Panel A: unit root test of purchase with only constant
Null Hypothesis: purchase has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic based on SIC, MAXLAG=13)

		t-Statistic	prob*
Augmented Dickey-Fuller test statistic		-1.275	0.639
Test critical values:	1% level	-3.477	
	5% level	-2.882	
	10% level	-2.578	

Panel B: unit root test of PURCHASE with constant and linear trend
Null Hypothesis: PURCHASE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=13)

		t-Statistic	prob*
Augmented Dickey-Fuller test statistic		-8.167	0.00
Test critical values:	1% level	-4.023	
	5% level	-3.441	
	10% level	-3.145	

This table shows unit root test for purchases which is normalized by the contemporaneous market capitalization. ADF (Augmented Dickey-Fuller) test is employed as a unit root test. In Panel A, ADF test is estimated that includes only constant in the test regression. In Panel B, ADF test is estimated including constant and linear trend in the test regression. Automatic lag length selection is employed in both tests using a Schwarz Information Criterion with a maximum lag length of 13. * denotes associated one-sided *p*- value for the ADF test statistic.

Table 2.2: Unit root test for sale

Panel A: unit root test of sale with only constant
Null Hypothesis: sale has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=13)

		t-Statistic	prob*
Augmented Dickey-Fuller test statistic		-2.743	0.069
Test critical values:	1% level	-3.477	
	5% level	-2.882	
	10% level	-2.578	

Panel B: unit root test of SALE with constant and linear trend
Null Hypothesis: SALE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=13)

		t-Statistic	prob*
Augmented Dickey-Fuller test statistic		-8.529	0.00
Test critical values:	1% level	-4.023	
	5% level	-3.441	
	10% level	-3.145	

This table shows unit root test for sale which is normalized by the contemporaneous market capitalization. ADF (Augmented Dickey-Fuller) test is employed as a unit root test. In Panel A, ADF test is estimated that includes only constant in the test regression. In Panel B, ADF test is estimated including constant and linear trend in the test regression. Automatic lag length selection is employed in both tests using a Schwarz Information Criterion with a maximum lag length of 13. * denotes associated one-sided *p*- value for the ADF test statistic.

Table 2.3: Unit root test for net purchase

Null Hypothesis: net purchase has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=13)

		t-Statistic	prob*
Augmented Dickey-Fuller test statistic		-9.441	0.00
Test critical values:	1% level	-3.478	
	5% level	-2.882	
	10% level	-2.578	

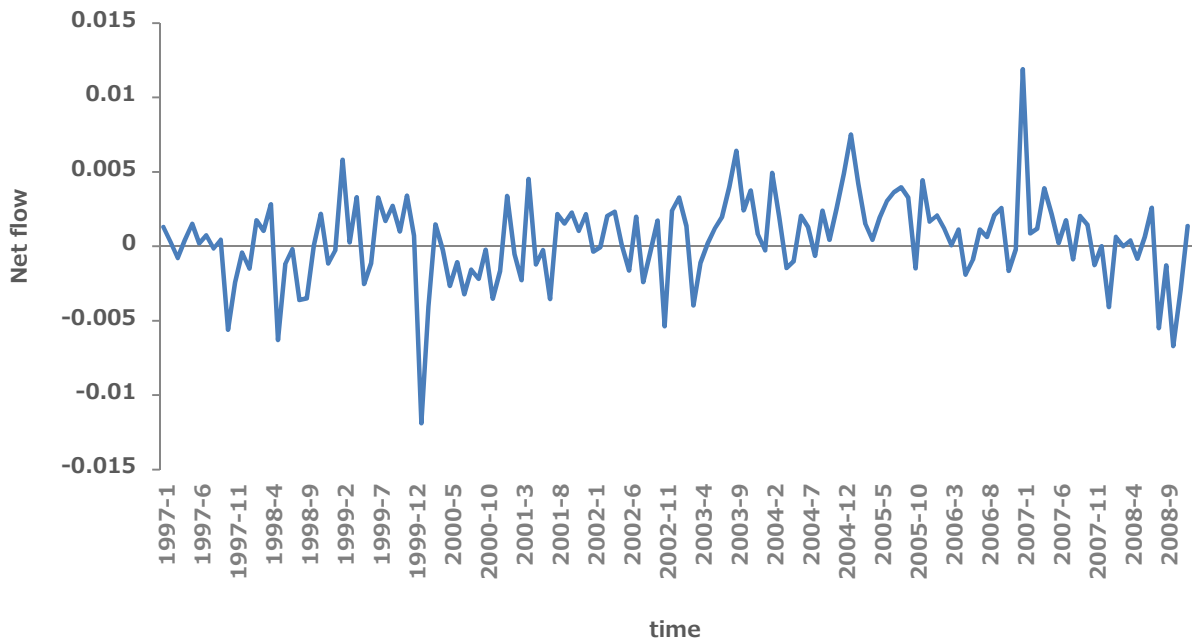
This table shows unit root test for net purchases which is normalized by the contemporaneous market capitalization. ADF (Augmented Dickey-Fuller) test is employed as a unit root test. ADF test is estimated that includes only constant in the test regression with automatic lag length selection based on Schwarz Information Criterion with a maximum lag length of 13. * denotes associated one-sided *p*- value for the ADF test statistic.

Table 2.4: Number of stocks listed on ISE

Year	number of companies
1996	228
1997	259
1998	278
1999	286
2000	316
2001	311
2002	289
2003	285
2004	297
2005	304
2006	316
2007	319
2008	317

This table shows the number of stocks listed on the Istanbul stock exchange (ISE) at the end of each year.

Figure 2.1: Monthly Net Purchases by Foreigners



This figure shows monthly net purchases by foreigners as a ratio of market capitalization. The x-axis shows the 144 months in our sample and the y-axis shows foreigners' net purchases in each month as a ratio of market capitalization

2.4 Methodology

We analyze our research questions by employing the Vector Autoregression (VAR) methodology, which enables us to study the dynamic relationship between flows and returns. In particular, this framework has the ability to separate temporary and permanent price effects induced by foreign investors. Since previous studies have found that broad market returns are a determinant of net inflows for a typical emerging country, we augment our bivariate- VAR model with the world market returns that are affected only by their own lags. This enables a more accurate characterization of the joint dynamic relationship between flows and domestic returns. Thus, we follow Cushman and Zha (1997) and Zha (1999) structural VAR (SVAR) models. The advantage of utilizing this specification instead of a conventional VAR is that none of the lags of equity flows and local returns affect the world returns, but contemporaneous values of them are affected by the instantaneous and lag values of world returns. Thus, world returns are treated as an exogenous variable. The identified VAR model of Cushman and Zha (1997) and Zha (1999) can be specified as:

$$A(L)w(t) = \varepsilon(t) \tag{1}$$

Where $A(L)$ is an n x n matrix polynomial in the lag operator L, $w(t)$ is the n x 1 observation vector, and $\varepsilon(t)$ is the n x 1 vector of structural disturbances. The model is shown in Equation 2:

$$w(t) = \begin{bmatrix} w_1(t) \\ w_2(t) \end{bmatrix} \qquad A(L) = \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ 0 & A_{22}(L) \end{bmatrix} \qquad \varepsilon(t) = \begin{bmatrix} \varepsilon_1(t) \\ \varepsilon_2(t) \end{bmatrix} \tag{2}$$

Where the assumptions are that $\varepsilon(t)$ is uncorrelated with past $w(t-k)$ for $k>0$, and the coefficient matrix of L^0, A_0, is non-singular. The block exogeneity is represented by $A_{21}(L)$, which is zero, and implies that second block $w_2(t)$ is exogenous to the first block both contemporaneously and for lagged values. As the standard inference procedure of the

Maximum Likelihood Estimation (MLE) of VAR model is not applicable to structural VAR (SVAR) with block exogeneity, we compute MLE and inference for the first block using the modified error bands of Sims and Zha (1999) with the standard Choleski normalization.

Vectors are defined as $w1$ = [net flow, local return]' and $w2$ = [MSCI-world return]. The lag order of SVAR is 1 as suggested by both Akaike and Hannan-Quinn information criteria (which can be seen in Appendix A2.1). Since residual portmanteau test for autocorrelation up to 12 lags shows no evidence of autocorrelation problem (as can be seen in the Appendix A2.2), we keep the lag order as suggested by these criteria. The system is estimated via seemingly unrelated regressions (SUR), since the right-hand side variables explaining global returns are different. Using actual trade by trade data the contemporaneous causality is assumed to run from net purchases to prices but not vice versa. As Richards (2005) states that this is a standard assumption starting with Hasbrouck (1991) in the empirical literature. Therefore, in the first block, following the same assumption in the literature, we place the net flows first in the order, which implies that net flows have contemporaneous effect on local returns but not vice versa, local returns can only have effects on equity flows with a lag. In other words, current returns can only affect future flows and returns.

Furthermore, since most of the price impact comes from the surprise component as is mentioned in studies such as Richards (2005) and Pavabutr and Yan (2007) we decompose net inflows into expected and surprise components to compare their effects on domestic returns. Similar to that of Richards (2005), expected flow is defined as the fitted value from the net flow equation in our three-variable SVAR model including only predetermined variables at the end of the previous month. Then, unexpected (surprise) flow is constructed as actual flow minus expected flow. Efficient markets hypothesis would suggest that stock

returns should react to the surprise component, not the expected component. In the final part of our analysis, we employ data on the 36 most active individual stocks, which have been included in the ISE-50 index for a sufficiently long time period and obviously, which are the most liquid ones. The analysis of the style and predictive ability of foreigners' trading in individual stocks has traditionally been based on the buy ratio difference methodology, first introduced by Grinblatt and Keloharju (2000). Such a methodology, however, is not sufficiently informative. Many studies find a stronger predictive ability of surprise net buys, which cannot be singled out under the net buy difference methodology. Although the VAR methodology is much more informative, surprisingly, we do not find any paper employing VAR in the analysis of the predictive content of foreigners' trading in individual stocks.[6] We set up a new, simple approach using relative returns and relative net flows. We employ "relative net flows" and "relative returns" rather than just net flows and returns since equity flows can be quite substantial at some times than at others. In a similar vein, some stock prices can increase/decrease substantially during the bull/bear market periods without heavy involvement of foreigners in both buying and selling waves. Given this, to obtain the unbiased result regarding the issue of whether foreigners are truly informed in individual stocks both net purchases of foreigners in these stocks and related returns should be removed from the market trend. Hence, in what follows, we first compute monthly abnormal returns, implied by a single-index model. Abnormal returns are defined as the residuals of the regression $R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$ where $R_{i,t}$ and $R_{m,t}$ are the log returns in month t of stock i and the ISE-all-share index, respectively. Then, for each month, we obtain the relative net buys for each stock as the residuals of the regression $NF_{i,t} = \lambda_{0,i} + \lambda_{1,i} NF_t + v_{i,t}$ where is $NF_{i,t}$ is foreigners' net purchases of stock i during month t and NF_t is foreigners' marketwide-

[6] Dahlquist and Robertsson (2004) employ stock returns and net flows in their VARX model to measure the price impact. However, their procedure may be prone to biases as cross-sectional dependencies are neglected.

aggregated net purchases during month t (both normalized by market capitalization).[7] In this way, we obtain a series of relative measures of net buys and returns for each stock ($v_{i,t}$ and $\varepsilon_{i,t}$, respectively). Then, we estimate a bivariate VAR model with these two endogenous variables. The exogenous variable (global returns) is not included in the system as it is already accounted for in computing relative returns. This VAR is run for each stock separately. We first implement the buy difference methodology, and then revert to our VAR model. A comparison of results under both methodologies enables us to assess whether failure to employ surprise net buys makes a significant difference. Our approach of modelling abnormal returns as a function of relative net flows permits a better measurement of cross-sectional predictive content. This may be used as an efficient procedure to detect informed trading in individual stocks: if the surprise component identified by this VAR model suggests some predictive ability, one may conclude that some foreigners may be trading using firm-specific private information. Thus, our procedure can distinguish between market-wide and firm-specific informed trading.

We also include the USD/TL exchange rate in our VAR anlaysis. The lagged exchange rate had a significant coefficient suggesting that exchange rate sometimes leads flows and stock market returns. However, since its impact on return-flow dynamics was negligible and the lead-lag relationship is outside the focus of this study, it is only included as a robustness check in appendix A2.4.

[7] Subtracting the cross-sectional average normalized net buy would be a simpler way of obtaining relative net flows. However, it would result in biases as the float rates are not uniform across stocks.

2.5 Descriptive Statistics

We also provide detail descriptive statistics for all the series used in our empirical analysis. As can be seen in the methodology section our baseline specification includes three main variables namely net inflows (net purchases) local returns and global returns. In a similar vein, we also examine the behaviour of inflows and outflows in addition to net inflows by employing them separately in place of net inflows in the VAR system.

Table 2.5 shows the summary statistics for the series.

Table 2.5 Summary statistics

	Inflows	Outflows	Net Inflows	Local Return	Global Return
Mean	-4.32E-18	-1.39E-18	0.000473	0.022935	0.000798
Maximum	0.014485	0.018231	0.011898	0.58354	0.08531
Minimum	-0.013954	-0.014125	-0.011882	-0.493004	-0.211279
Std. Dev.	0.005334	0.005596	0.002858	0.145508	0.0463
Skewness	0.274749	0.595516	-0.313565	0.215927	-1.21998
Kurtosis	2.983449	3.41893	6.280835	5.64497	5.801893
Jarque-Bera	1.813335	9.564365	66.94303	43.09418	82.82406
Probability	0.403868	0.008378	0	0	0
Observations	144	144	144	144	144

This table shows summary statistics of five series used in our empirical analysis namely inflows, outflows, net inflows, local return and global return.

When looking at the Table 2.5 at first glance we see that the means for inflows and outflows are both negative. The reason for the negative means can lie in employing detrended series in place of inflows and outflows which are residuals from the regressions of inflows and outflows on time. The mean return and standard deviation of global return are much smaller compared to the mean return and standard deviation of local return respectively. However, in terms of relation between risk and return, while the standard deviation is roughly six times higher than its mean for the local return it is 58 times higher than its mean for the

global return case. According to the risk-return trade-off, expected return for investing in global market indices is not high enough to justify its risk compared to the expected return investing in Istanbul stock market index.

When looking at skewness values, we see that the distributions of net flows and global return are negatively skewed (left tail heavier than the right tail) while the distributions of other series are positively skewed (right tail of the distribution is dominant) indicating that they are non-symmetric, since a distribution that is symmetrical should have a skewness value of zero or near zero.

In terms of kurtosis, a normal distribution has a kurtosis value of 3. If the kurtosis value exceeds 3, the distribution is peaked (leptokurtic) relative to the normal; if the kurtosis value is less than 3 then it indicates a flat (platykurtic) distribution relative to the normal. When looking at the Table 2.5 we see that apart from inflows and outflows other three series exhibit high level of kurtosis, which indicates that these series are leptokurtic. The leptokurtic series is characterised by very frequent medium or large changes than implied by the normal distribution.

When looking at the Jarque-Bera test statistics, which is used for testing whether the series is normally distributed, we reject the hypothesis of normal distribution for all series, except for inflows at the 1% level. However, this is not uncommon in asset returns especially for high frequency return data. Fama (1965) was among the first to document evidence that the stock returns are not normally distributed.[8]

[8] The distribution of security returns is assumed to have no effect on t-statistics in the empirical literature due to its asymptotic properties. Lehman (1986) shows that, asymptotically, sample t-statistics are valid regardless of the underlying distribution.

In addition, as will be seen in the following section, we conduct further robustness checks to investigate whether our inferences change. For example, we divide our sample into two parts, with December 2002 being the break point. The earlier part of our sample period is characterized by persistent macroeconomic and political instability and the later part showed a significant improvement in stability. Table 2.6 and Table 2.7 show summary statistics of the series used in the first and second period, respectively.

Table 2.6 Summary statistics in the first period (1997-2002)

	Net Inflows	Local Return	Global Return
Mean	-0.000276	0.036327	0.000223
Maximum	0.005801	0.58354	0.08531
Minimum	-0.011882	-0.493004	-0.144471
Std. Dev.	0.002764	0.180613	0.049477
Skewness	-1.104172	0.168379	-0.613888
Kurtosis	6.180843	4.444235	2.961972
Jarque-Bera	44.35885	6.506031	4.463775
Probability	0	0.038657	0.107326
Observations	71	71	71

This table shows summary statistics of three series used in our baseline specification namely net inflows, local return and global return.

When looking at the Table 2.6 and Table 2.7 we see that while the mean for inflows is negative in the first half it appears to be positive in the second half, which confirms a remarkable increase in foreign investment due to an improvement in stability in Turkey. Standard deviations of inflows and global return are almost same in both periods, whereas the standard deviation of local return is lower in the second half possibly reflecting positive relation between risk and return since local return also appears to be lower compared to first period.

Table 2.7 Summary statistics in the second period (2003-2008)

	Net Inflows	Local Return	Global Return
Mean	0.001201	0.009909	0.001356
Maximum	0.011898	0.236478	0.08286
Minimum	-0.0067	-0.25481	-0.211279
Std. Dev.	0.002776	0.099936	0.043324
Skewness	0.372042	-0.529817	-2.06692
Kurtosis	5.80991	3.403219	10.29489
Jarque-Bera	25.69981	3.909793	213.8415
Probability	0.000003	0.141579	0
Observations	73	73	73

This table shows summary statistics of three series used in our baseline specification namely net inflows, local return and global return.

In terms of skewness, while net inflows and global return are moderately negatively skewed in the first half we see more pronounced negative skewness for global return in the second half.

In terms of kurtosis, net inflows are leptokurtic in both periods. Local return is moderately leptokurtic in the first half, whereas it is not in the second period. While the kurtosis value of global return is near 3 in the first half it is considerably high (leptokurtic) in the second period with the value of over than 10.

When looking at the Jarque-Bera test statistics we reject the hypothesis of normal distribution for inflows in both periods at the 1% level. For local return, while we can reject the null of normality at the %5 level in the first period we cannot reject it even at the 10% level in the second half. However, the case is opposite for global return. That is, we cannot reject the null of normality in the first half, whereas it is strongly rejected in the second period.

Furthermore, as a robustness check, we also partition the data for up and down past local and global market returns by using dummy variables. Table 2.8 shows summary statistics of the returns data used in our analysis which are partitioned by the previous month's return.

Table 2.8 Summary statistics of returns in Falling and Rising markets

Down Local Markets	Up Local Markets	Down Global Markets	Up Global Markets
-0.042557	0.065492	-0.017001	0.017799
0	0.58354	0	0.08531
-0.493004	0	-0.211279	0
0.078353	0.097057	0.032580	0.021744
-2.919147	2.479285	-2.872492	1.133884
13.9866	10.85376	13.28743	3.37888
928.7469	517.6135	833.0158	31.71795
0	0	0	0
144	144	144	144

This table shows summary statistics of four return series used in our empirical analysis

Since we partition the data for negative and positive values the means and skewness values for the generated series are of the expected signs as can easily be seen from the Table 2.8. They are either negatively or positively skewed. When looking at the kurtosis values the case is different for up global markets compared to other three series. While these three series are pretty leptokurtic the up global markets is not. It has a kurtosis value near 3 which is very close to normal distribution. As a last, when looking at the Jarque-Bera test statistics we reject the hypothesis of normal distribution for all series at the 1% level showing that all series are not normally distributed.

Having provided the summary statistics and appropriate comment on each series used in our empirical analysis we now move to present the results.

2.6 Results

We mainly present all our results and test related hypotheses by analyzing impulse-response functions, as is the common treatment in this line of literature. However, before moving to impulse response analysis we also report VAR regression results in Table 2.9 which are typically reported for lag values.

Table 2.9 Vector Autoregression of Flows and Returns

	Flow Equation	**Return Equation**
intercept	0.000495	0.018953
p-value	(0.02)	(0.1)
netflows lag1	0.280054	5.169603
p-value	(0.00)	(0.17)
local return lag1	-0.00738	-0.07908
p-value	(0.00)	(0.33)
worldmsci lag1	0.016383	0.409138
p-value	(0.00)	(0.15)

This table shows results from three variable structural VAR for the period beginning in January 1997 and ending in December 2008.

When looking at the Table 2.9 we see that this month's net flows in ISE are strongly related to their previous month's value. For example, one percent positive movement in previous month foreign flows in ISE leads to a 0.28 percent increase in this month's flows. However, when looking at the relationship between current flows and past returns we come up with interesting findings. We find that while current flows are positively related to

previous month's global returns they are negatively related to previous month's local return. In other words, an increase in previous' months local return leads to a decrease in current foreign flows.

Table 2.9 also presents the return equation of the VAR which examines the relationship between current market returns and past foreign flows as well as lagged returns. When looking at the t-statistics we see that none of lag variables are statistically significant. Foreign flows are not significant predictors of current returns at lag 1. This result shows that there is no Granger bi-causality between the two variables. However, there may still be instantaneous granger causality between the two when there is strong contemporaneous correlation between net flows and local returns. Table 2.12, in section 2.6.2, shows this fairly strong contemporaneous correlation between net flows and local returns. What all this means is that increased net purchases of foreigners lead to a larger price increase, but this impact is only contemporaneous and transitory as it dies out rather quickly. This issue will also be analyzed in a more detailed way via impulse response functions in the following section.

Impulse response functions (IRF) show the dynamic behaviour of a variable due to a shock in another variable in the system. In all IRF graphs to follow, the black line in the middle represents a point estimation of impulse responses. Since it is not possible to know the coefficients of the VAR with certainty, computing standard errors for impulse responses is a common procedure in VAR analysis. Monte Carlo simulation procedure of Sims and Zha (1999) is used in computing confidence bands for impulse responses. A 90% confidence interval is constructed with 5000 replications, which is shown by the upper and lower blue lines. Statistical significance is implied when neither of the confidence bands crosses the x-

axis. If, to the contrary, the x-axis falls within the confidence bands then the null hypothesis that a shock has no effect cannot be rejected.

2.6.1 The response of net flows

2.6.1.1 The Relation of Foreigners' Trading to Past Local Returns

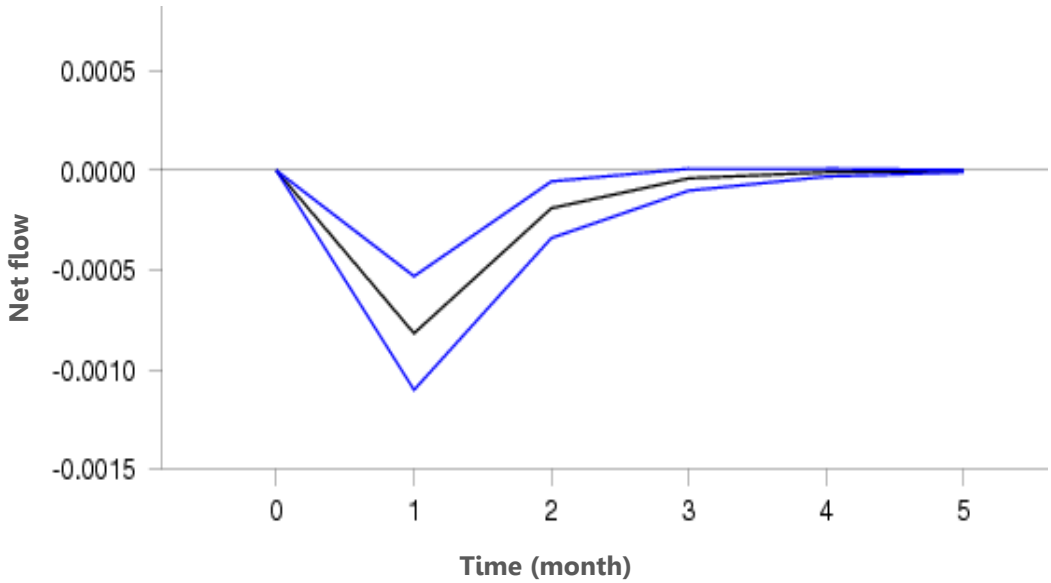
We test hypothesis one by studying the response of net purchases (normalized by the total market capitalization) to innovations in domestic returns. Responses of net purchases are calculated up to five months, and it can easily be seen in Figure 2 that the total effect is completed within five months. As stated previously, the common assumption is that flows have contemporaneous effect on domestic returns, but not vice versa, therefore domestic returns affect equity flows with a lag. This can be seen in the response of net inflows in period 0.

The cumulative response of net purchases to a one standard deviation innovation in domestic return is negative. Lag responses are negative and statistically significant up to the third period. The cumulative response corresponds to -0.1028% of the market capitalization. The bulk of the effect is observed in the first period with 81.5% of the total effect. For example, the estimate of –0.0838% for the period 1 in Figure 2 shows that a 10% (0.69 of monthly standard deviation) price increase of the local market is associated with a **decrease** in foreigners' net purchases by 0.0578% (0.000838*0.69) of the market capitalization in the subsequent month. Using the market capitalization at the midpoint of our sample period, this figure would be equivalent to about US$ 231 million.

This estimate can be compared with estimates of earlier papers. Dahlquist and Robertsson (2004), studying the Swedish market on a monthly basis, report a 0.043%

increase in the subsequent month's net inflows for a similar innovation (10%) in domestic returns. The response has the opposite sign with respect to our results. Although results of studies using monthly and daily data should not be directly compared to each other, we can also mention that Richards (2005) estimates the median cumulative impulse response for six Asia-Pacific markets to be about 0.0039%, again an opposite sign compared to our results.

Figure 2.2: Impulse Response of Net Inflow to a Shock in Domestic Return



This figure shows impulse response of net inflow to a shock in domestic Return. The vertical axis shows normalized net purchases (as a percentage of market capitalization per month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands. The scale corresponds to the normalized net purchases (as a ratio of the market capitalization) that would result from a one standard deviation innovation in domestic return. (Full-sample standard deviation of monthly returns is 14.5%.)

Regarding the hypothesis one, the intriguing key difference in our results is that monthly net purchases are found to be **negatively** affected by past monthly returns, which suggests that foreign investors exhibit negative feedback trading in the ISE. This finding from a different region sheds new light on the issue of whether foreign investors' pursuing positive feedback trading strategies is a general phenomenon.

We are not aware of many studies that have documented significant evidence of negative feedback trading by foreign investors.[9] For example, Stulz (1999), Bekaert *et al* (2002), Kim and Wei (2002), and Dahlquist and Robertsson (2004), employing monthly data, find strong evidence of positive correlation between current foreign flows and lagged local equity returns.[10] Furthermore, Karolyi (2002) who studies Japanese markets using weekly data also finds evidence consistent with momentum trading among foreign investors during and after the Asian financial crisis. Choe *et al* (1999), Froot *et al* (2001), Griffin *et al* (2004),[11] and Richards (2005),[12] using daily data, also conclude that international investors are positive feedback traders in these emerging markets.

Our finding is also in striking contrast to most of the available theory. The models of Brennan and Cao (1997) and Griffin *et al* (2004) both predict high domestic returns to be associated with positive net flows. The intuition is that foreign investors are less informed (this is also a reason for them to exhibit home bias), hence their expectations are more extrapolative. Brennan and Cao further explain that public news causes larger shifts, which are correlated with current returns, in foreigners' expectations. Their model allows for the possibility of contrarian trading by foreigners only where foreigners have no information

[9] One exception may be Swanson and Lin (2003) who, using monthly data from 1988 to 2002, report a negative relation between net flows and past returns for 4 out of the 8 Asian countries they study. However, that study suffers from several methodological drawbacks such as using only US flows, not employing VAR methodology, not controlling for global returns, and first-differencing flows rather than normalizing them by market capitalization.

[10] Clark and Berko (1997), using monthly data on Mexico from 1989 to 1996, fails to find any relation between flows and past domestic returns. However, this study does not employ VAR methodology, and the specific test does not control for global returns.

[11] The results of Griffin et al. (2004) on Slovenia suggest significant negative feedback trading. While Griffin et al. (2004) questioned the legitimacy of reporting results on Slovenia due to the small size (add partial restrictions as another concern), we find this result interesting as Slovenia is another EEMENA country with current account deficit.

[12] Richards' (2005) results on KSE (Korea) suggest negative feedback trading with respect to domestic return, but not statistically significant at the 10% level. Richards interprets his overall results as evidence of positive feedback trading. Furthermore, our own analysis using daily data from 2001 to 2009 and the same methodology as Richards' suggests significant positive feedback trading in the KSE. Hence, Richards' finding on KSE was sample-specific and confined to his short (1999-2002) sample period, and Korea is not an exception to positive feedback trading.

disadvantage to begin with, but then domestic investors receive a more precise signal. However, this is not consistent with our findings, presented later, which suggest that foreigners' surprise trades contain some predictive ability. The only theory consistent with our finding is that of Hau and Rey (2004) who suggest that foreigners take portfolio rebalancing action following increases of host-market equity prices to bring their portfolio back into proper relationship (previously stated weight targets). While foreign investors are trying to bring the portfolio weights into a proper relationship, their trading can appear as if they pursue contrarian strategy. Note, however, that Hau and Rey's theory relies on managing exchange rate exposure and applies to large host markets rather than emerging markets. Moreover, it is silent on the predictive power of net flows. Another possible explanation for the negative feedback trading may be foreign investors' perceptions on valuations. In an environment where fundamentals are very volatile, informed trading by sophisticated traders taking advantage of fluctuations associated with extreme sentiment may seem like contrarian trading. We favour this explanation, which would also be supported by the high standard deviation of monthly local returns as well as by additional findings presented below. Moreover, in the light of findings of positive feedback trading with respect to domestic returns in other markets, portfolio rebalancing does not seem to be the universal explanation. It must be that foreign investors are able to rationally adjust their trading style according to specific factors of the country in question. Specifically, the instability of fundamentals or extreme sentiment trading by domestic investors in Turkey (or perhaps both) may have rationally led foreigners to pursue contrarian behaviour.

To investigate this possibility further, we divide our sample into two parts, with December 2002 being the break point. The earlier part of our sample period, shown in Panel A in figure 2.3, is characterized by persistent macroeconomic and political instability,

whereas the later part, shown in Panel B in figure 2.3, showed a significant improvement in stability. Results suggest that the finding of negative feedback trading is robust (even though it is not significant after the first subsequent period for the 2003-2008 sample period) in both subsamples. Further, the negative relation between net flows and past returns is stronger in the 1997-2002 period as compared to 2003-2008. Given that the standard deviation of monthly returns fell from 18.2% in the pre-2003 period to 9.6% in the post-2003 period, the decrease in foreigners' tendency to negative-feedback trade suggests that foreigners may rationally be adapting their trading style to the changing degree of stability of the fundamentals.

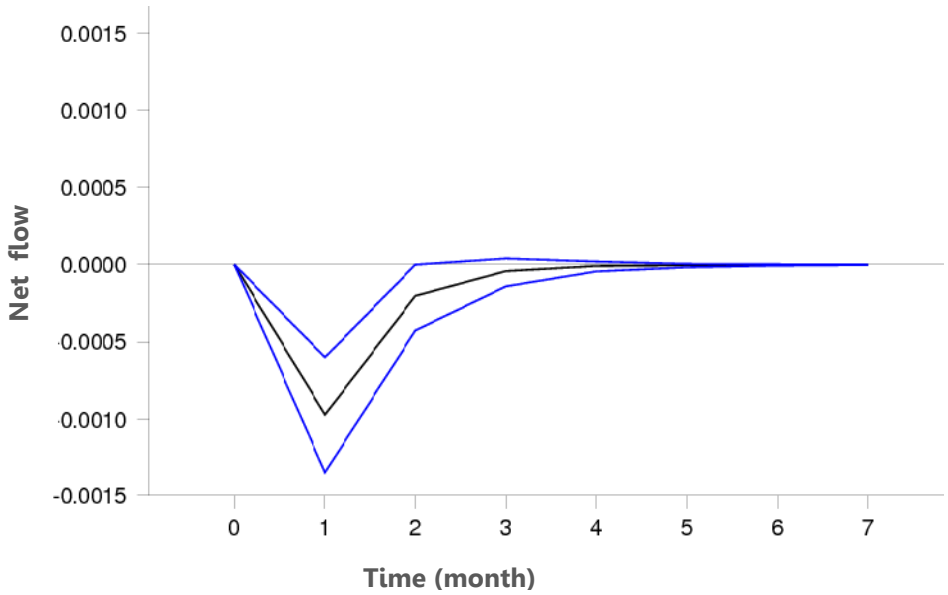
We conduct further robustness checks to investigate our finding that seems to suggest contrarian trading by foreigners. Previous studies except Griffin *et al* (2004) ignore potential asymmetries in foreigners' trading in up and down markets. However, one may argue that if, for some reason, foreign investors react differently to market's up movements compared to down-, then ignoring asymmetries might produce biased coefficients. Therefore, we partition the data for up and down past market returns by using a dummy variable, and re-run our impulse-response analysis.

We find that while return shocks in rising markets significantly decrease subsequent foreign net purchases (as shown in Panel A, Figure 2.4), shocks in falling markets are found to have no significant effect on foreign investors' net trading (Panel B). The observed asymmetry is robust to subsample variation. This observed significant asymmetry warns against the sensitivity of our results to the sign of past local market return. However, our finding is again surprising given that most of the existing theories on positive feedback

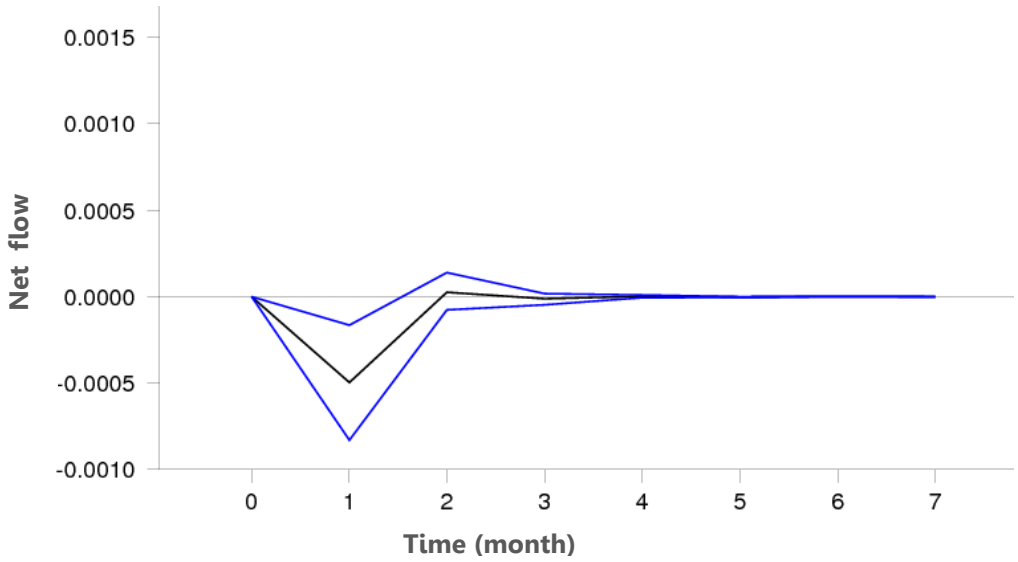
trading would predict a positive relation between lagged returns and foreign inflows, particularly in rising markets.

Figure 2.3 Impulse Response of Net Inflows to a Shock in Domestic Return in different sub periods:

Panel A: Response of net flows to a shock in domestic returns in the first period (1997-2002)



Panel B: Response of net flows to a shock in domestic returns in the second period (2003-2008)



This figure shows impulse responses of net inflows to a shock in domestic return in different sub periods. Panel A and Panel B show the response of net flows to a shock in domestic returns in the first (1997-2002) and second period (2003-2008) respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Further, behavioural theories predict more positive feedback trading when the market is rising where sentiment traders may dominate than when the market is falling where fundamentals prevail. Models based on less-informedness of foreigners (Brennan and Cao, 1997; Griffin *et al* 2004) predict symmetric positive-feedback-trading by foreigners. Hence, our evidence of contrarian trading only in rising markets contradicts with the view that foreigners are uninformed and, strictly, that they are more prone to sentiment.

Our interpretation of the asymmetry is as follows: Foreigners take advantage of excessive bullish sentiment among local traders by selling to them after price increases, while market falls are generally triggered by bad news symmetrically perceived by two types of traders rather than by sentiment (we present our anecdotal observations in the final section).[13]

One possibility is that foreign investors may pursue positive feedback trading over horizons shorter than the frequency of data in our study, and then become contrarian over longer horizons exceeding a month. To investigate this possibility, we follow the suggestion of Warther (1995), which was also implemented by Clark and Berko (1997), and regress monthly net flows on returns during the last 2 weeks of the month (W2) and those during the period covering the first two weeks of the current month and last week of the previous month (W1). Positive feedback trading requires the coefficient of W1 to be greater than the coefficient of W2. However, results reported in Table 2.10 show just the opposite: The coefficient of W2 is more than double that of W1. Furthermore, only the coefficient of W2 is statistically significant. Thus, there is no evidence of positive feedback trading at the weekly horizon, either. Our result is similar to that of Clark and Berko (1997) on Mexico. The only possibility for positive feedback trading remains at the daily and intraday horizons.

[13] Our inference is symmetrically consistent with the findings from Asia that foreigners acted as liquidity providers during the crisis in 1997, when sentiment among domestic investors was extremely bearish (see Choe et al., 1999).

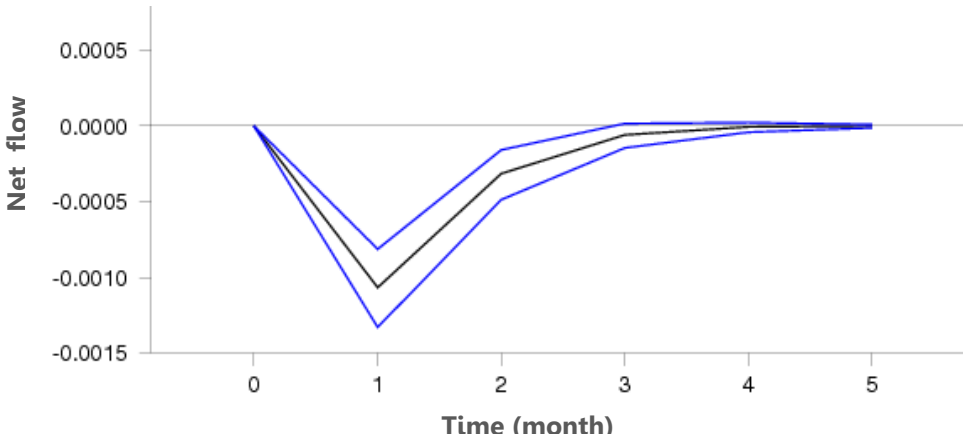
Table 2.10 Regression of monthly net flows on weekly returns

Variable	Coefficient	t- statistic
Constant	0.0003	0.91
W1	0.0044	1.48
W2	0.0111	5.80

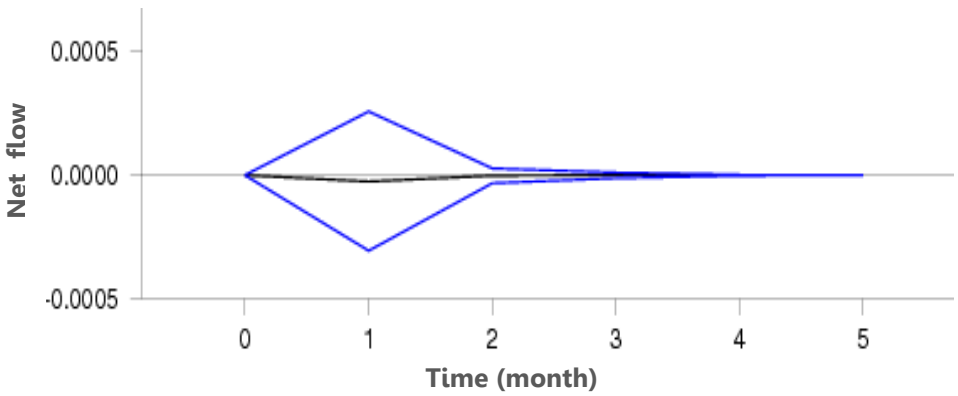
This table shows the regression of monthly net flows on weekly returns. W1 denotes the period covering the first two weeks of the current month and last week of the previous month. (W2) denotes the period during the last 2 weeks of the month. The t-values are corrected for heteroskedasticity and autocorrelation with Newey-West procedure.

Figure 2.4 The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and Falling Markets

Panel A Response of net flows to a shock in domestic returns in rising markets



Panel B Response of net flows to a shock in domestic returns in falling markets



This figure shows the differential response of net inflows to a shock in domestic returns in rising and falling markets. Panel A and Panel B show the response of net flows to a shock in domestic returns in rising and falling markets respectively.The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Additionally, as returns relevant to foreign investors are foreign currency denominated returns, a robustness check with US$ returns is also warranted. Using US$ domestic returns, which can be found in appendix A2.5, we also obtained qualitatively the same results.

A complementary step is to relate inflows and outflows separately to past returns. Hence, we repeat the same VAR impulse response analysis using inflows and outflows normalized by market capitalization, instead of net flows. The resulting impulse response functions are portrayed in Figure 2.5. Interestingly, both inflows and outflows respond positively (the former insignificantly) to past return shocks, unlike net flows which respond negatively. However, as the positive response of outflows is much stronger than inflows, the net flows exhibit negative correlation with past returns.[14]

The only study that employs inflows and outflows separately in the VAR framework is Dahlquist and Robertsson (2004). They find that inflows positively respond to returns, while outflows do not significantly vary. Hence, both buying and selling behaviour of foreigners in Sweden differ from that in Turkey. The difference is consistent with the view that foreigners are able to adjust their trading style rationally according to the stability of fundamentals. In our case, where the behaviour of net flows suggests negative feedback trading, the positive response of inflows to past returns suggests that some positive feedback buyers coexist with informed (or, using more accurate terminology, rational) profit takers. In other studies where positive feedback trading was reported, a corresponding insight remains to be specified. Given the result in figure 2.5, a further decomposition of inflows and

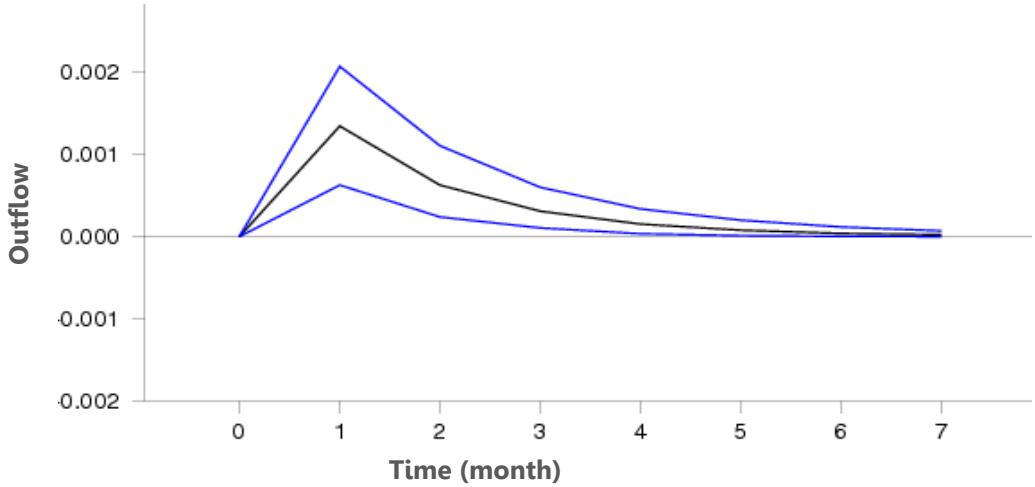
[14] Another study that relates inflows and outflows separately to past returns is Swanson and Lin (2003). Despite the methodological imperfections mentioned earlier, they obtain the same findings as we do, thus the discovery of this pattern should be credited them.

outflows in rising and falling markets is warranted. Figure 2.6 shows the VAR impulse-response results on data partitioned by the previous month's return.

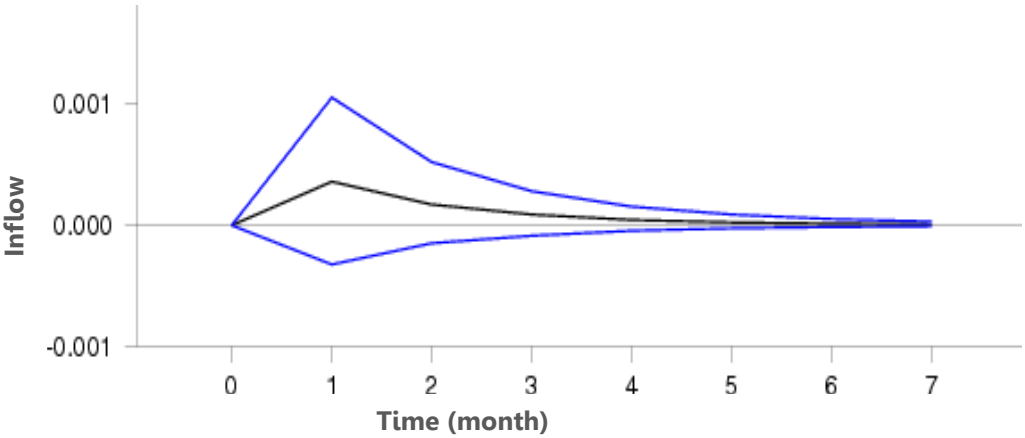
Panel A suggests that inflows do not respond to the magnitude of positive local returns, while panel C shows that outflows significantly increase with the magnitude of positive returns. Panel B implies more (less) inflows following smaller (larger) price decreases. Panel D similarly implies more (less) outflows following smaller (larger) price decreases. That is, foreigners tend to buy and sell less following large negative returns, which is fairly consistent with well-known findings on price-volume relationship (i.e.; volume tends to shrink following sharp falls). The responses to positive returns, however, suggest that foreigners, while increasing their sales, do not increase their purchases with positive returns.

Figure 2.5 Differential Responses of Inflows and Outflows to a Shock in Local Returns

Panel A: Response of outflows to a shock in local returns



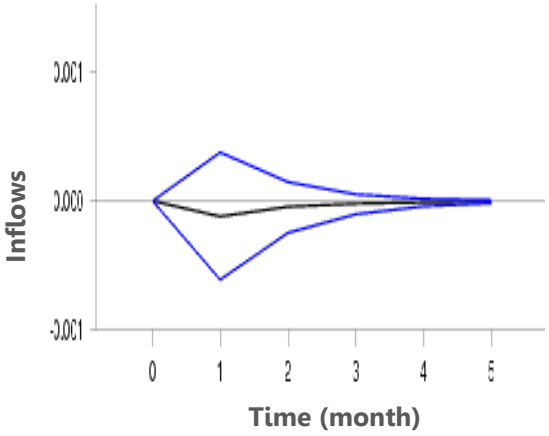
Panel B: Response of inflows to a shock in local returns



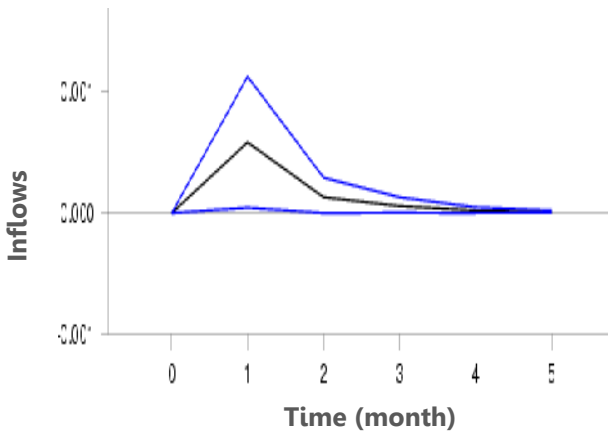
This figure shows differential Responses of Inflows and Outflows to a Shock in Local Returns. The vertical axis shows normalized sales and purchases (as a percentage of market capitalization in each month) in Panel A and Panel B respectively. The horizontal axis shows time scale which is expressed in months. Black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands

Figure 2.6: The Break-Down of Inflows and Outflows in Rising and Falling Markets

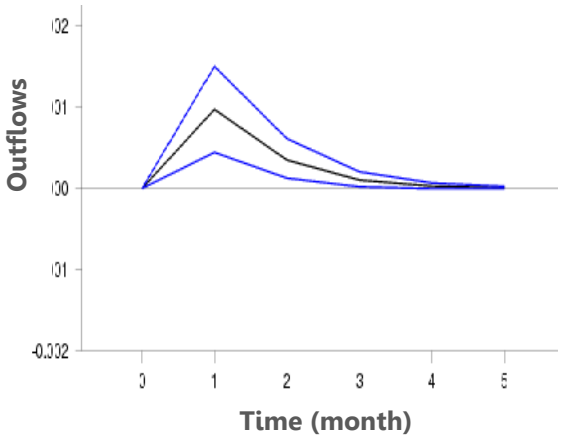
A. The Response of Inflows in Rising Markets



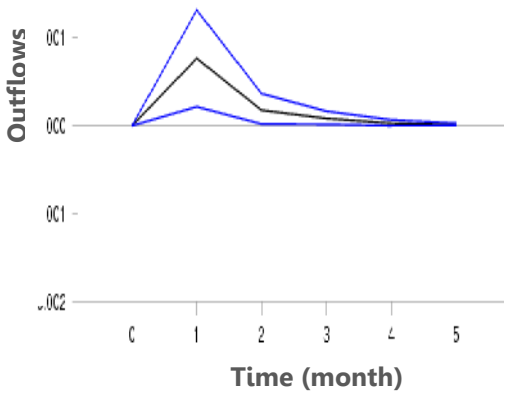
B. The Response of Inflows in Falling Markets



C. The Response of Outflows in Rising Markets



D. The response of Outflows in Falling Markets



This figure shows the Break-Down of Inflows and Outflows in Rising and Falling Markets. The vertical axis shows normalized purchases (as a percentage of market capitalization in each month) in Panel A and Panel B and shows normalized sales in Panel C and Panel D. The horizontal axis shows time scale in all panels which is expressed in months. In all panels, the black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

2.6.1.2 Responses of net flows to a shock in net flows

All studies in this line of research have included past flows as a main determinant of current flows. Furthermore, studies such as Froot *et al* (2001), Griffin *et al* (2004) and Richards (2005) also reported high persistency in equity flows to emerging markets. Therefore, we also show the graph of the impulse responses function of net flows to a shock

in net flows in figure 2.7, which is estimated from the VAR model described previously, to better understand the dynamic nature of equity flows. The figure shows that the cumulative response of net flows to a one standard deviation innovation in net flows is positive. All lag responses are positive, however statistically significant only for the first period. A 1% shock in net flows (equivalent to 3.51 standard deviations) corresponds to a cumulative response of 0.95%. 76% of the total effect is observed in the first period. Since the sign of the lag responses do not change, we find persistence in net flows. However, the persistence we observe in ISE is short-lived compared to Dahlquist and Robertsson (2004) who report high persistence in equity flows in Sweden.[15] One explanation of the difference may be the instability of fundamentals in Turkey. Another possibility is that, in some other markets, persistence could be overestimated due to liberalization effects. Turkey liberalized its equity market in August 1989 and our data set starts in January 1997. Therefore, our analysis is not blurred by the initial impact of liberalization (i.e. one-time portfolio rebalancing by international investors) as documented in Bekaert *et al* (2002) and Dahlquist and Robertsson (2004).

2.6.1.3 Responses of net flows to a shock in global returns

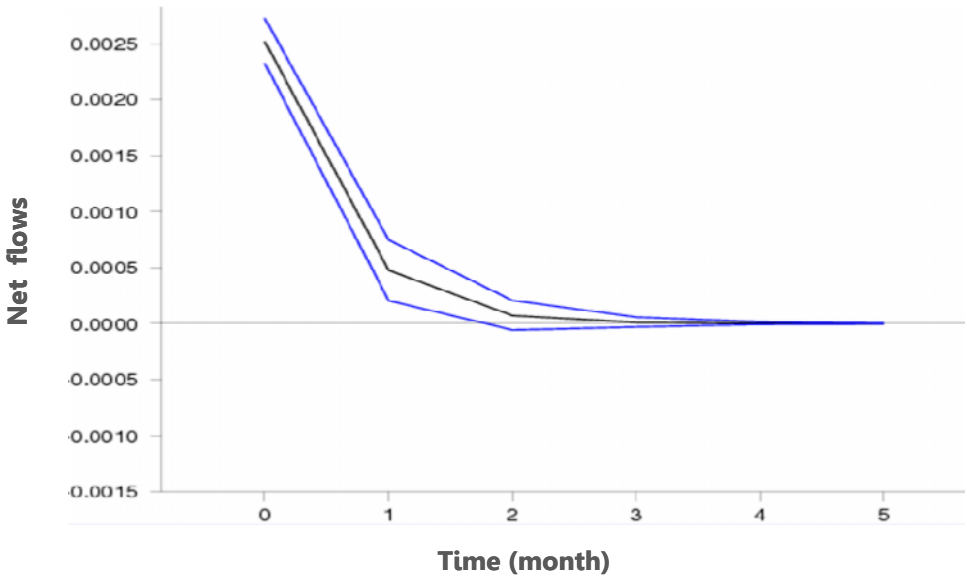
We also look at the responses of net flows to a shock in global return due to two reasons. First, as mentioned in Griffin *et al* (2004) foreign investors might invest more in emerging stocks following increases in their home markets due to portfolio rebalancing effects. Second, foreigners might extract information from global returns about prospects for emerging markets (Richards, 2005). Now when we move to the responses of net flows which are shown in figure 2.8 we see that the response at the first and second lags are significantly

[15] Froot et al. (2001) and Richards (2005) also report high persistence, however as they use daily data, their findings are not directly comparable to ours.

positive (marginally so at the second lag), and insignificant thereafter. Thus, foreigners' responses to global returns are strikingly different from that to domestic returns. Specifically, they do exhibit positive feedback trading with respect to global returns. Our result is consistent with Richards (2005). Positive feedback trading with respect to global returns may be consistent with portfolio rebalancing or a belief in spill-over effects from the global economy.

The evidence that foreigners respond in different ways to past domestic and global returns, at the same time in the same market, is noteworthy. Specific characteristics of the Turkish economy, mentioned previously, may have led foreigners to suspect the sustainability of positive domestic returns and thus to respond to domestic factors differently.

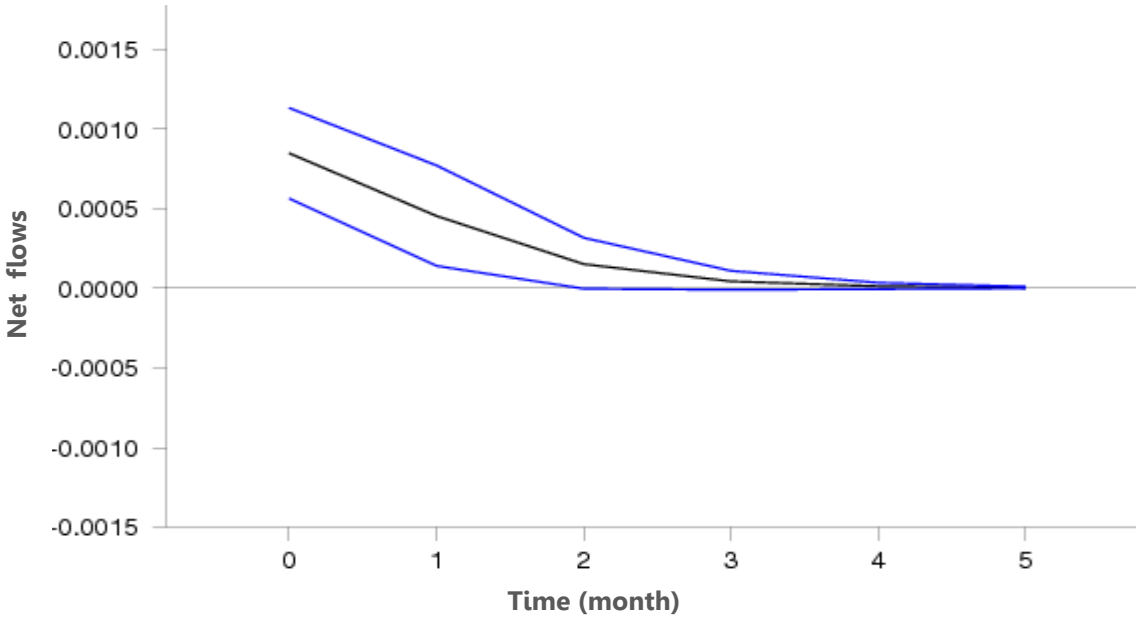
Figure 2.7: Impulse Response of Net flows to a Shock in Net Inflow



This figure shows the impulse response of net inflow to a shock in net inflow. The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation. Note that the number at period 0 is just the standard deviation of net flows.

A partitioning in rising and falling global markets portrayed in Figure 2.9 below suggests another interesting asymmetry. The responses to positive global returns (significantly positive in the contemporaneous period) becomes negative at lags 2 and 3 in rising global markets. However, it remains significantly positive at lags 1 and 2, in the case of falling global markets. This suggests positive feedback trading in falling markets, but not in rising markets (in contrast, some profit taking tendency). This is a new finding which is not consistent with behavioural (sentiment) theories that predict more positive feedback trading following price increases.

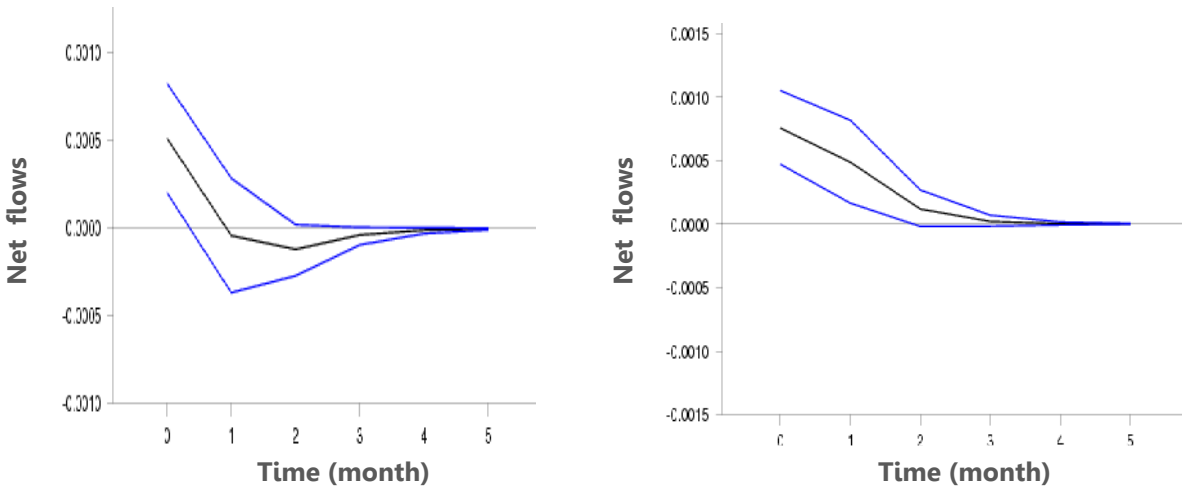
Figure 2.8: Response of net flows to a shock in global return



This figure shows response of net flows to a shock in global return The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation.

Figure 2.9 The Differential Response of Net Flows to a Positive Shock in Global Return in Rising and Falling Global Markets

Panel A: Impulse Responses in Rising Global Markets Panel B: Impulses Response in Falling Global Markets



This figure shows responses of net flows to a positive shock in global return in rising and in falling global markets. Panel A and Panel B show Impulse Responses of net flows in Rising and falling Global Markets respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

2.6.1.4 Variance Decomposition

The system dynamics can also be traced with a decomposition of forecast error variance for the net inflows into its own, domestic and global return shocks in the VAR model. Results in Table 2.10 suggest that at the one month horizon 7.6% of the forecast error variance can be traced to innovations in global return. At the two month horizon, the proportion that can be traced to domestic returns is 8.35%, while the proportion traced to global returns decreases only slightly. At the three months horizon, the proportion due to shocks in local returns increases to 8.74%. The proportions remain fairly stable thereafter. Our results with this method indicate that local returns account for a slightly larger proportion of the forecast error variance in net flows than global returns do. We are aware of only two studies reporting variance decomposition results: Karolyi's (2002) results on Japan are not

comparable to ours as he does not include global returns. Richards (2005), using daily data, finds that, as the median value for six Pacific markets, domestic (US) returns account for 3.3% (6.1%) of the variance in net inflows. In 3 cases (Indonesia, Philippines and Thailand) domestic returns are more important, while in Taiwan and Korea (KSE) US returns are dramatically more important. In our sample, the portion of the variance accounted for by domestic returns is higher compared to the median of 6 Asia-Pacific markets.

Apart from this, regression analysis suggests that 33.4% of the total variation in net flows can be accounted for by these 3 variables, and 26.7% of it can be predicted using variables known at the end of the previous period. Hence, a nontrivial portion of variation in net foreign flows is predictable using past local and global returns and past flows.

Table 2.11: Decomposition of forecast error variance for the net flow

Forecast Horizon	Std Error	Global Return	Net Flow	Local Return
1	0.00258	7.60	92.4	0.00
2	0.00277	7.52	84.13	8.34
3	0.00278	7.48	83.78	8.74
4	0.00278	7.48	83.77	8.75
5	0.00278	7.48	83.77	8.75
6	0.00278	7.48	83.77	8.75
7	0.00278	7.48	83.77	8.75
8	0.00278	7.48	83.77	8.75
9	0.00278	7.48	83.77	8.75
10	0.00278	7.48	83.77	8.75

The table provides the decomposition of forecast error variance in net flows due to shocks in each of the variables in the system. Forecast horizon refers to the number of months. Forecast horizon 1 corresponds to the contemporaneous month. The second column in the table shows the standard error of the forecast for net inflows. The remaining three columns show the percentage of the variance of the error made in forecasting net flows due to a specific shock (i.e. error term in global return, net flow, and local market return equations, respectively) at a given horizon. Numbers in each row add up to 100%. The figure for local returns at forecast horizon 1 is 0 by ordering assumption.

2.6.2 The Impact of Foreigners' Trading on Domestic Equity Prices

In this section we test whether foreigners' net purchases increase equity prices. Conditional on the statistical significance, we provide an estimate of the magnitude of price impact of foreigners' net purchases, and also find out whether this price impact is temporary or permanent. The analysis starts with a simple bivariate regression of domestic returns on net inflows (seen in the first panel in Table 2.11) showing fairly strong contemporaneous correlation between net flows and local returns, with a t-statistic of 5.27. However, as net flows are significantly positively related to global returns (t=5.00, R^2=12.7%, univariate regression of net flows on global returns not reported in the table), most of this contemporaneous relationship is due to the positive relation between net flows and global returns. When our exogenous variable, global returns, is included, the R^2 of the return equation increases substantially from 16.4 to 32.9% percent (second panel in Table 2.11). The significance of the coefficient on net flows decreases only slightly, which shows that net purchases still remain a significant determinant of local returns.

We also decompose the net inflows into expected and unexpected components, following other papers such as Richards (2005), to compare their effects on local returns. The third panel shows regression of domestic returns on a constant, unexpected flows, expected flows, and the exogenous control variable. While the coefficient on unexpected net flows is found to be significant the expected net flows is not. This is consistent with Warther's (1995) argument and Richards' (2005) results in five of six Pacific emerging markets.

Table 2.12 The price impact of the net purchases of foreign investors

Regression of domestic returns on a constant and net flows (with t statistics in parantheses)		
Coefficient on net flows:	20.64	R^2 = 16.4%
	(3.63)	
Regression of domestic returns on a constant, net flows, and control variable (MSCI world index returns)		
Coefficient on net flows:	12.82	R^2 = 32.9%
	(2.38)	R^2 with only MSCI-world return = 27.3%
Coefficient on MSCI-world return:	1.36	
	(4.7)	
Regression of domestic returns on a constant, unexpected flow,expected flow, and control variable (MSCI world index returns)		
Coefficient on unexpected flows:	12.45	R^2 = 34.5%
	(3.18)	
Coefficient on expected flows:	13.06	
	(1.59)	
Coefficient on MSCI-world return:	1.35	
	(6.06)	
Number of Observations:	143	

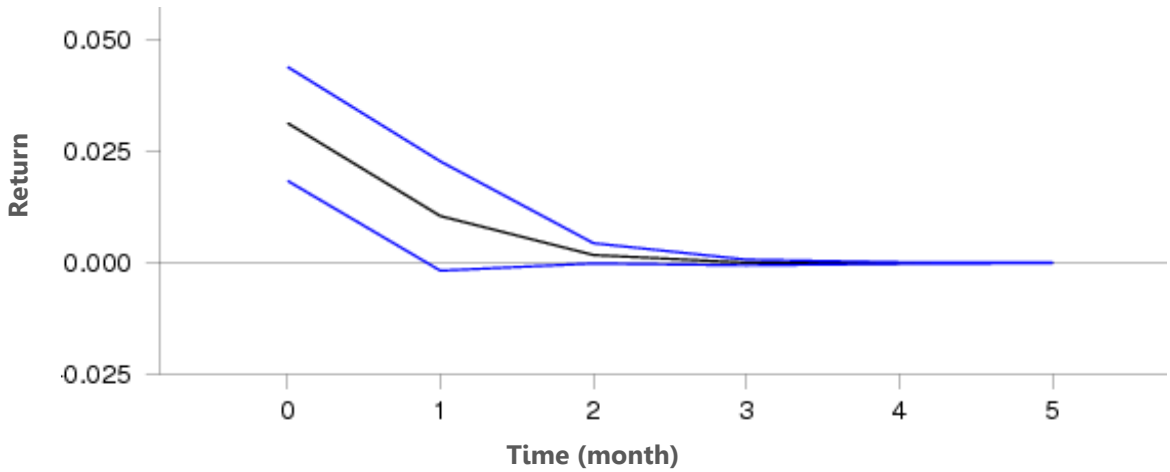
The first panel shows the results of regression of monthly returns in ISE on only a constant and net inflows. The regression in the second panel includes the control variable, broad market returns. The regression in the third panel decomposes net inflows into expected and unexpected flows, with expected flows defined as the fitted value from the bivariate-VAR described previously, including only those variables pre-determined at the end of the previous domestic trading month. t-statistics are shown in parentheses. Domestic return is defined as the returns of the ISE all-share-index.

In testing the hypothesis two the relevant impulse response function is the response of domestic returns to innovations in net flows, which is estimated from the SVAR model described previously and illustrated in Figure 2.10. Estimation is based on the same identification assumptions as before.

The contemporaneous and lag responses and the cumulative impact are positive. Regarding the hypothesis two, foreigners' net purchases are found to increase equity prices since instantaneous and lag responses up to the second lag are statistically significant. The

impulse response function suggests that innovations to net inflows equivalent to 1% of market capitalization (equivalent to 3.50 standard deviations) would be associated, on average, with a cumulative boost to equity prices of about 14.89% (0.0425*3.50).

Figure 2.10: Impulse Response of Domestic Return to a Shock in Net Inflows



This graph shows a point estimation of impulse response functions with 90% confidence bands derived from a Monte Carlo simulation. The vertical axis shows domestic return in percentage, and the horizontal axis shows time in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the error bands.

Our finding can be compared with those of Clark and Berko (1997), Dahlquist and Robertsson (2004), and Richards (2005). In Mexico, Clark and Berko (1997) document that an unexpected shock to net inflows equivalent to 1% of total market capitalization increases returns by about 8%. [16] In Sweden, Dahlquist and Robertsson (2004) find an estimate of 10% return response to a similar innovation in net inflows. For the six countries in the Pacific region, Richards (2005) using daily data finds a median estimate of 38% return impact to a similar innovation in net inflows, which is substantially larger. Our estimate of 14.89 % is

[16] Based on univariate regression of returns on total net flows, Clark and Berko (1997), who do not employ VAR, report a figure of 6%. The equivalent figure in Richards (2005) based on univariate regression would be 21%. When control variables are added, the coefficient on total unexpected flows is 8% in Clark and Berko (1997), which is the comparable one. Both papers confirm that omitted variables would be a problem in simple bivariate regressions of returns on flows. Our figure based on univariate regression is 16.4%.

higher than that of those two using monthly data (which should not be directly compared with Richards (2005) who employs daily data).[17]

Having documented the statistical significance of the price impact we now test, hypothesis three, whether net inflows have a long-lived (permanent) effect on prices or a temporary effect consistent with the price pressure hypothesis. The price pressure hypothesis suggests a negative relation between the current inflows and subsequent returns which implies that net inflows exert temporary contemporaneous pressure on equity prices, and subsequent returns exhibit reversals as prices return to their fundamental values. The alternative is that the contemporaneous effect is not reversed over time, consistent with the information hypothesis and/or the base broadening hypothesis. To display the response of returns to a shock in net flows more precisely, we present impulse responses calculated up to nine months in Table 2.12. The price effect dies out quite quickly as the largest effect is observed in the instantaneous period with a positive sign (72% of the total effect). The total effect is completed within eight months but it can easily be seen that practically the bulk of the impact is completed within three months. There are no significant negative lags; in other words, prices are not observed to return to their previous levels. Therefore, regarding the hypothesis three, we find no evidence to support the price pressure hypothesis. On the contrary, our findings support a permanent effect of net flows on stock prices, which can represent a decrease in the cost of capital as suggested by Bekaert *et al* (2002) and Dahlquist and Robertsson (2004). Given the evidence presented in the next section, our results are consistent with both the base-broadening and information hypotheses.

[17] Richards (2005) discusses the reasonableness of his much larger estimates in detail (p.24-25). However, a major source of difference could be the frequency of analysis, and it is interesting to note that Richards did not mention this. It may be that net flows exhibit negative serial correlation at some lags within a month, so that price impacts during the month may cancel out to produce a lower estimate of the contemporaneous price impact with monthly data.

Table 2.12: Response of domestic return to a shock in net flows

Period	Domestic return
0	0.03053513
1	0.01029874
2	0.00158145
3	0.00015314
4	0.00000549
5	-0.00000135
6	-0.00000036
7	-0.00000005
8	-0.00000000

First column shows periods in months. Second column shows the point estimates of the impulse response coefficients of domestic return portrayed in Figure 2.10. The immediate response of domestic return is seen in period 0. As previously mentioned, a common assumption is that flows have contemporaneous effect on domestic returns but not vice versa.

2.6.3 Foreigners' Trading in Individual Stocks

The results presented in Table 2.12 and Figure 2.10 also imply statistical evidence of predictive ability of a modest degree, as shocks to foreigners' net purchases are followed by positive returns in the two subsequent periods at borderline levels of significance. This suggests that net inflows reveal or contain information about future equity prices. However, if foreigners have private domestic information, it should manifest itself in the stock selection ability in addition to market-wide timing. Hence, a useful complement of our analysis would be an assessment of relative performance of stocks which foreigners have most bought or sold. For this purpose, we use monthly data of net purchases by foreigners in individual stocks. We include 36 most active (in terms of trading volume) stocks in our analysis.

First, we implement a version of the buy difference methodology, introduced by Grinblatt and Keloharju (2000) and also implemented by Dahlquist and Robertsson (2004), which involves computing foreigners' net buy differences in winning vs. losing stocks for

each month. Specifically, for each month, we subtract foreigners' net buys in the 5 most losing stocks from their net buys in the 5 most gaining stocks, which gives the "net buy difference" for the particular month. A positive net buy difference implies that foreigners bought winners more than losers. In this way, we calculate foreigners' net buy difference, in past, current and future months, of the top and bottom performers. Positive buy differences in previous months imply superior stock selection ability, while positive buy differences in future months imply positive feedback trading.

The results can be seen in Table 2.13. The significantly positive buy difference in month 0 confirms the contemporaneous price impact on an individual stock basis. However, regarding the hypothesis four, the absence of significantly positive buy differences at lags -5 to -1 (at leads 1 to 3) implies no stock selection ability (no positive feedback trading). In particular, the negative buy differences at months from -1 through -4 suggest that foreigners were not able to forecast future months' extreme performers. The positive number in month 1 suggests some small degree of momentum trading, however the negative numbers in months 2 and 3 are consistent with our previous market-wide finding of contrarian trading. It is also interesting to note that evidence of contrarian trading has weakened in the post-2003 subsample, as was the case with the market-wide results.

These results can be compared to those of Dahlquist and Robertsson (2004), who obtain significant positive figures in contemporaneous and previous month's return, which suggests momentum trading in cross-sectional sense, and numbers close to zero in preceding months which is consistent with no evidence of informed trading. Our results suggest poorer performance; the tendency of momentum trading in month 1 is much weaker; and our finding of contrarian trading in months 2 and 3 is again unique.

Table 2.13: Net buy differences of foreigners

	Full Sample		1997-2002	2003-2008
Lead/Lag	Avg.Net Buy Diff	t-value	Avg Net Buy Diff	Avg Net Buy Diff
-5	0.0028	0.83	0.0096	-0.0029
-4	-0.0027	-0.77	-0.0067	0.0007
-3	-0.0048	-1.59	-0.0021	-0.0071
-2	-0.0010	-0.29	0.0023	-0.0038
-1	-0.0051	-1.42	-0.0060	-0.0042
0	0.0590	12.58***	0.0488	0.0683
1	0.0039	1.01	0.0025	0.0053
2	-0.0070	-1.82	-0.0106	-0.0037
3	-0.0031	-0.81	-0.0072	0.0008

Stocks are ranked in terms of their return in month 0, and top and bottom 15% quintiles are identified. The numbers represent the difference of foreigners' net buys in the top quintile minus net buys in the bottom quintile in each of the months from -5 through +3, averaged over the sample period. The t-value corresponds to the test of the null hypothesis that the mean of the net buy difference is 0. The two columns on the right show sub-sample results. *,**,*** denote significance at the 10%, 5% and 1% level respectively.

Then, we revert to our VAR model using relative net flows and relative (abnormal) returns. As mentioned before the buy ratio difference methodology is not sufficiently informative. Many studies find a stronger predictive ability of surprise net buys, which cannot be singled out under the net buy difference methodology. On this basis, our VAR approach is much more informative. Therefore, a comparison of results under both methodologies enables us to assess whether failure to employ surprise net buys makes a significant difference. The estimation results of this VAR model are presented in Table 2.14 which shows impulse responses of returns to past net flows. The first column shows 36 most active stocks (in terms of trading volume) in the ISE. Other two columns show the impulse response coefficients of related stock returns for the first and second lags. The results in Panel A suggest little evidence of predictive ability on the part of foreigners, as there are very few significantly positive coefficients. In only 6 out of 35 stocks foreigners net purchases are found to predict next month returns. Thus, the inference on predictive ability under VAR

methodology is not much different from that under the net buy difference methodology. In other words, the surprise component does not have significantly different predictive content.

In addition, Table 2.15 Shows that predictive performance does not vary with the size of the firm, as t-values reported in Table 2.15 are not significantly correlated with market capitalization. Overall, regarding the hypothesis four, results in this section suggest that foreigners do not have private information concerning individual stocks in the ISE.

Table 2.15 Regression of t-statistics on market capitalization

Variable	Coefficient	t- statistic
Constant	0.923	6.7
Market cap	-0.009	-0.7

This table shows regression of t-statistics on market capitalization for 36 firms.

Table 2.14: Impulse responses in individual stock VAR's using relative net flows and abnormal returns

	LAG1			LAG2		
STOCKS	Coefficient	st error	t-stat	Coefficient	st error	t-stat
AEFES	-0.00803	0.01340	-0.60	0.00176	0.00651	0.27
AKBNK	-0.00533	0.01653	-0.32	0.00160	0.00157	1.02
AKGRT	-0.00362	0.01804	-0.20	0.00033	0.00118	0.28
ALARK	-0.01634	0.01805	-0.91	-0.00057	0.00259	-0.22
ARCLK	-0.03188	0.01819	-1.75*	0.00446	0.00513	0.87
ANSGR	-0.02470	0.01783	-1.39	0.00315	0.00382	0.82
AYGAZ	0.00009	0.01565	0.01	0.00006	0.00103	0.06
BAGFS	-0.03985	0.01823	-2.19**	-0.00168	0.00509	-0.33
DOHOL	0.03668	0.02134	1.72*	0.00749	0.00606	1.24
DYHOL	0.04573	0.02311	1.98**	0.00448	0.00676	0.66
ECILC	-0.00300	0.01946	-0.15	-0.00011	0.00152	-0.07
ENKAI	-0.02135	0.01642	-1.30	0.00053	0.00275	0.19
EREGL	-0.00994	0.01731	-0.57	-0.00204	0.00330	-0.62
GARAN	-0.00205	0.01936	-0.11	-0.00049	0.00241	-0.20
GUBRF	-0.00869	0.02326	-0.37	0.00015	0.00128	0.12
HURGZ	-0.00320	0.02215	-0.14	0.00064	0.00188	0.34
IHLAS	0.02778	0.02205	1.26	0.00509	0.00518	0.98
ISCTR	0.01955	0.01834	1.07	-0.00123	0.00278	-0.44
KCHOL	-0.02353	0.01777	-1.32	0.00386	0.00430	0.90
KRDMD	-0.01310	0.02659	-0.49	-0.00754	0.00993	-0.76
MIGRS	-0.00007	0.01304	-0.01	0.00009	0.00065	0.14
NTHOL	0.03746	0.02333	1.61	0.01219	0.00878	1.39
PETKM	0.01155	0.01862	0.62	0.00297	0.00410	0.72
PTOFS	-0.01346	0.01925	-0.70	0.00280	0.00486	0.58
SAHOL	-0.00383	0.01713	-0.22	0.00057	0.00291	0.19
SISE	-0.01492	0.01752	-0.85	-0.00325	0.00406	-0.80
SKBNK	0.01044	0.02174	0.48	0.00230	0.00456	0.50
TCELL	0.04491	0.02070	2.17**	-0.00861	0.00786	-1.10
THYAO	0.00875	0.01880	0.47	-0.00169	0.00373	-0.45
TOASO	-0.00713	0.01898	-0.38	-0.00077	0.00238	-0.32
TRKCM	0.01527	0.01589	0.96	0.00367	0.00460	0.80
TSKB	-0.04163	0.02001	-2.08**	-0.00033	0.00557	-0.06
TUPRS	-0.01422	0.01674	-0.85	0.00183	0.00252	0.73
ULKER	0.01908	0.01941	0.98	0.00499	0.00739	0.68
VESTL	-0.00850	0.01685	-0.50	0.00102	0.00154	0.66
YKBNK	0.00924	0.02094	0.44	-0.00001	0.00159	-0.01

This table shows impulse responses of returns to past net flows. The first column shows 36 most active stocks (in terms of trading volume) in the ISE. Other two columns show the impulse response coefficients of related stock returns for the first and second lags.

2.7 Conclusion

The previous empirical work on the joint dynamics of foreign flows and stock market returns surprisingly neglects the EEMENA region where economies most dependent on foreign investment inflows are located. Therefore, the results of this study on the ISE, the largest market in the EEMENA region, are likely to make a key contribution to whether the findings of extant studies can be generalized into an empirical characterization of the interaction between foreign investors' trading and emerging stock market returns. Extant empirical evidence in this field has so far suggested that foreign investors are positive feedback traders, which has been used as a justification for the argument that foreign portfolio flows may destabilize local markets. Our findings suggest that foreigners are negative feedback (contrarian) traders in the ISE. This is in stark contrast with previous empirical results and most of the existing theories that previously seemed consistent with empirical evidence.

The finding of negative feedback trading is robust to sub-sample variation, though we observe a moderation in the degree of contrarian behaviour post 2003. As stability in economic and financial conditions has significantly improved since 2003 in Turkey, our interpretation is that extremely volatile economic conditions dictated negative feedback trading especially before 2003, and that foreigners as a group are sufficiently sophisticated to alter their style in line with the changing degree of stability in fundamentals. The same foreigners over the same sample period exhibit positive feedback trading with respect to past global returns, which, unlike domestic returns, exhibit persistence. Hence, foreign investors

seem to be able to rationally adjust their trading style rather than naively pursuing a specific feedback trading strategy.

Our intriguing finding motivated us to perform a full exploration: Contrarian trading is asymmetrically driven by up-markets only. Our interpretation of this new finding is that foreign investors take advantage of extreme bullish sentiment among domestic investors. This interpretation is also supported by the fact that the post-2003 period, when the tendency of negative feedback trading by foreigners moderated, is characterized by less participation by domestic individual investors. Both inflows and outflows respond positively to past local returns, while net flows respond negatively, because outflows increase much more than inflows do following positive returns. This suggests that the group of foreigners may include some positive feedback buyers, while the majority acts as contrarian profit takers.

We estimate the price impact of foreign net flows as higher than that for Mexico and Sweden at a monthly frequency. We confirm that the impact of surprise flows is more significant than that of expected flows. We find no evidence that prices return to their previous levels. Therefore, our findings do not support the price pressure hypothesis, instead the price impact is permanent which supports the base-broadening and information hypotheses. We find statistically borderline-significant evidence of the predictive ability of net foreign flows. However, the analysis on individual stocks suggests no evidence of informed trading. Hence, foreigners seem to have no particular advantage in domestic information, yet their advantage in analyzing push factors and their sophistication lend them predictive ability with respect to local market returns.

Our anecdotal observations around significant information events are particularly consistent with sophisticated timing. For example, in 1999, significant foreign inflows preceded the IMF agreement and the launch of EU full membership process in December, after which domestic investors became extremely optimistic and foreigners heavily sold into this exaggerated bullish sentiment in early 2000. This was, of course, followed by the banking crisis in November 2000.

In sum, we show that previous findings that foreign investors are positive feedback traders may not necessarily be a general phenomenon. Rather, they can rationally adopt a contrarian style if market conditions justify it. By doing so, they may curb extreme sentiment fluctuations among domestic investors. This raises serious doubts about the previously widespread stereo-typing of foreigners as uninformed positive feedback traders and the justifiability of policies to restrict their trading (including the so-called "smart restrictions").

The comprehensive exploration presented in this study challenges some previously well established findings towards a general characterization of foreign investors' trading behaviour. Since this study is so far the only major analysis of this type from the EEMENA region which, in contrast to many Asian markets or Sweden, is highly dependent on foreign inflows, several intriguing questions arise: Is foreigners' negative feedback trading confined to Turkey or common to all high external deficit economies in the EEMENA region? That is, is it driven by unique characteristics of Turkey such as a high degree of instability and local investors being excessively vulnerable to bullish sentiment, or solely by large external deficits? Answers to these questions in order to reach a generalized theory of the interaction between foreigners' trading and returns in emerging markets and more appropriate policy

guidelines with regard to regulation of foreign portfolio flows ("hot money") are left to future studies on more EEMENA emerging markets.

Appendix A2

A2.1 VAR lag order selection

Below is the table that shows suggested lag lengths by various information criteria.

Table A2.1 VAR lag order selection criteria

Lag	LOGL	LR	FPE	SIC	HQ
0	684.8784	NA	1.49E-07	-9.999496*	-10.02492
1	694.0535	17.9454*	1.38E-07*	-9.989935	-10.06622*
2	694.4465	0.756976	1.46E-07	-9.851223	-9.978358
3	698.3142	7.337409	1.46E-07	-9.763613	-9.941601
4	699.3123	1.864035	1.53E-07	-9.6338	-9.862642
5	700.8925	2.904742	1.58E-07	-9.512548	-9.792244
6	701.8778	1.782206	1.66E-07	-9.382548	-9.713097
7	703.5343	2.94761	1.71E-07	-9.262418	-9.643821
8	704.9146	2.415609	1.78E-07	-9.138228	-9.570484

This table shows the VAR lag order suggested by information criteria. LOGL and LR denote loglikelihood and sequential modified likelihood ratio test respectively. FPE denote final prediction error. AIC and HQ denote Akaike information criteria and Hannan-Quinn information criteria respectively. * indicates lag order selection criterion.

A2.2 VAR residual portmanteau tests for autocorrelation

Below is the portmanteau test applied to VAR residuals up to 12 lags to see whether there is evidence of autocorrelation.

Table A2.2 VAR residual portmanteau tests for autocorrelation

Null Hypothesis: no residual autocorrelations up to lag h
Sample: 1997M01 2008M12
Included observations: 123

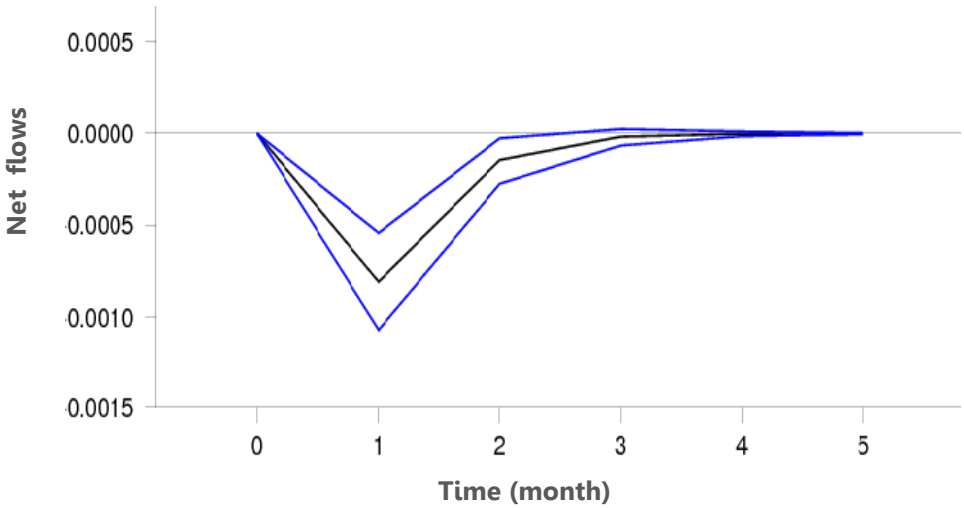
Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	1.562003	NA*	1.574806	NA*	NA*
2	5.526481	0.2374	5.604813	0.2307	4
3	9.862218	0.2748	10.04894	0.2616	8
4	13.71104	0.3195	14.02714	0.299	12
5	17.44128	0.3576	17.91544	0.3289	16
6	19.38651	0.4968	19.96043	0.4604	20
7	22.88708	0.5265	23.67224	0.4805	24
8	25.87039	0.5802	26.86308	0.5257	28
9	28.49214	0.6448	29.69181	0.5839	32
10	35.69824	0.4828	37.53562	0.3986	36
11	41.85135	0.3904	44.29305	0.2954	40
12	43.77115	0.4814	46.4204	0.3729	44

This table shows the multivariate Box-Pierce/Ljung-Box *Q*-statistics for residual autocorrelation up to the lag 12. df denotes degrees of freedom for (approximate) chi-square distribution. * implies that the test is valid only for lags larger than the VAR lag order. The null hypothesis of no residual autocorrelations up to lag 12 is tested for the sample that includes 123 observations beginning in January 1997 and ending in December 2008.

A2.3 Robustness checks by including local exchange rate

In this section, we perform robustness checks by including local exchange rate in our SVAR analysis to see whether our inferences change. As can easily be seen from Figure A2.1 to Figure A2.8 that results are qualitatively similar to our previous results obtained from three variable VAR model in other words adding local exchange rate to our SVAR system has negligible impact on the relation between all kind of flows and local return. Thus, our findings in this study are also robust to including additional exogenous variable.

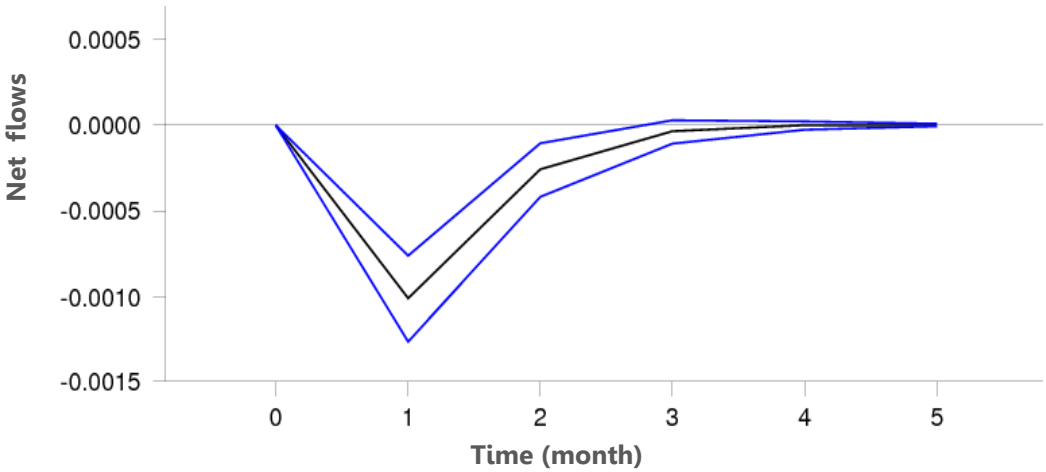
Figure A2.1 Impulse Response of Net Inflows to a Shock in Domestic Returns



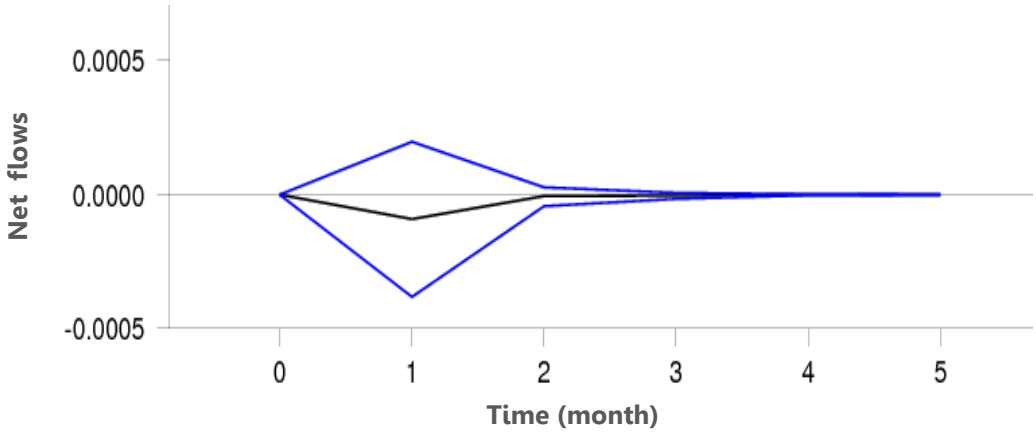
The vertical axis shows normalized net purchases (as a percentage of market capitalization per month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands. The scale corresponds to the normalized net purchases (as a ratio of the market capitalization) that would result from a one standard deviation innovation in domestic return. (Full-sample standard deviation of monthly returns is 14.5%.)

Figure A2.2 The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and falling markets

A: Response of net flows to a shock in domestic returns in rising markets



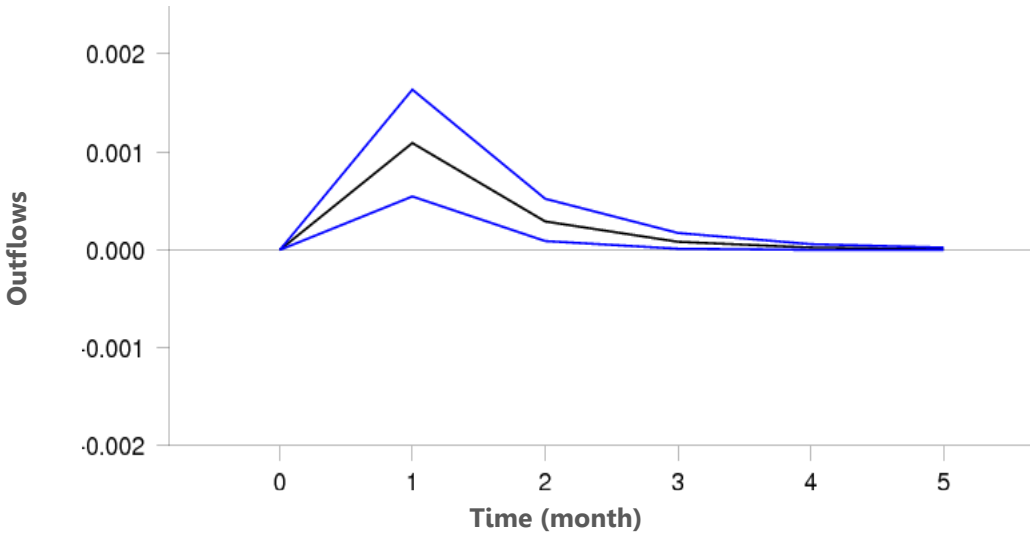
B: Response of net flows to a shock in domestic returns in falling markets



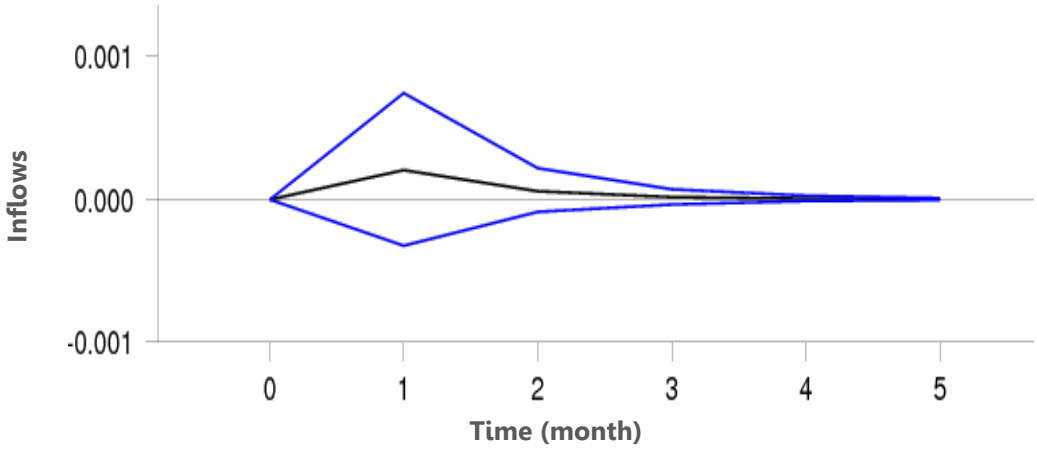
This figure shows impulse response of net inflows to a shock in domestic return in different sub periods. Panel A and Panel B show the response of net flows to a shock in domestic returns in the first (1997-2002) and second period (2003-2008) respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.3 Differential Responses of Inflows and Outflows to a Shock in Local Returns

A: Response of outflows to a shock in local returns



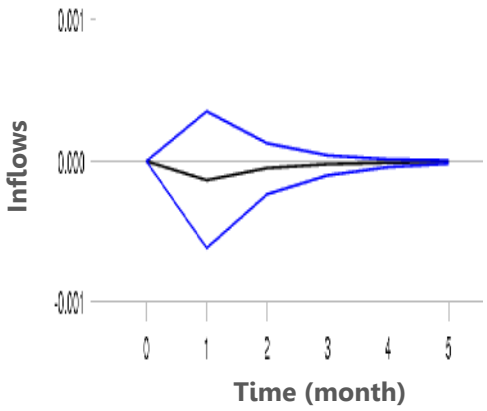
B: Response of inflows to a shock in local returns



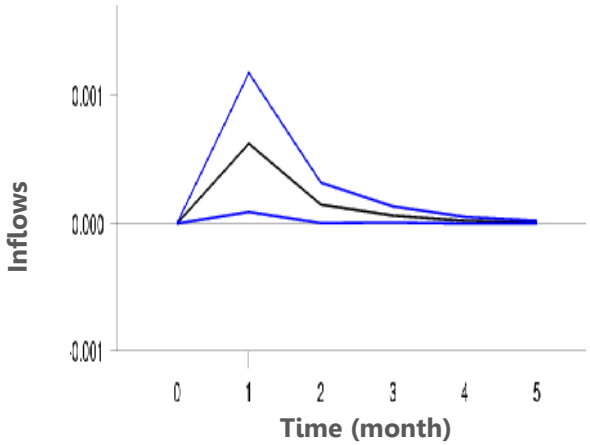
This figure shows differential Responses of Inflows and Outflows to a Shock in Local Returns. The vertical axis shows normalized sales and purchases (as a percentage of market capitalization in each month) in Panel A and Panel B respectively. The horizontal axis shows time scale which is expressed in months. Black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands

Figure A2.4 The Break-Down of Inflows and Outflows in Rising and Falling Markets

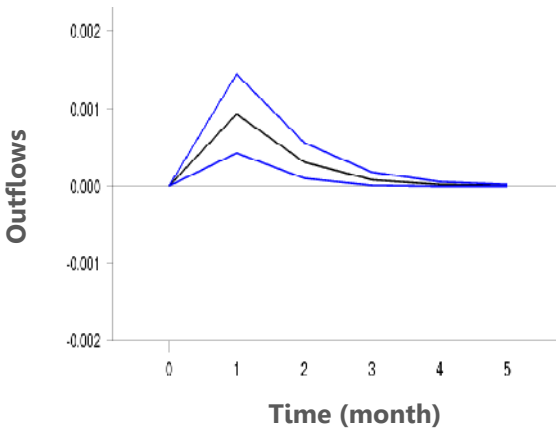
A. The Response of Inflows in Rising Markets



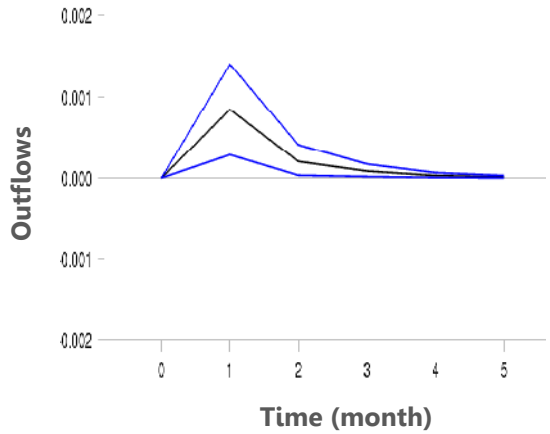
B. The Response of Inflows in Falling Markets



C. The Response of Outflows in Rising Markets

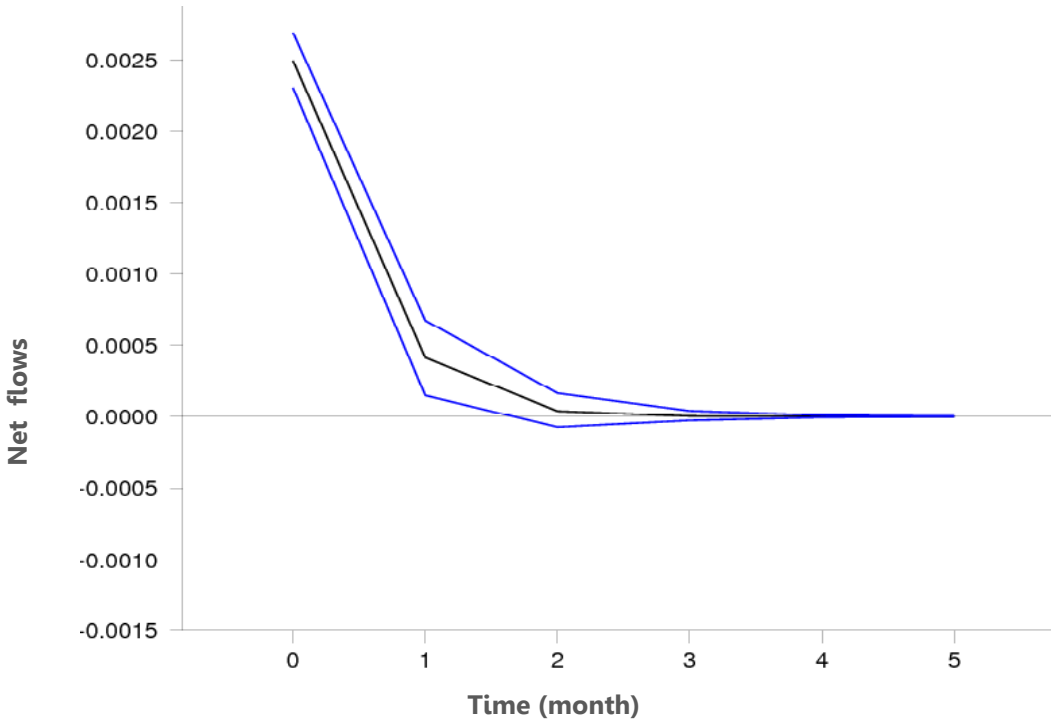


D. The response of Outflows in Falling Markets



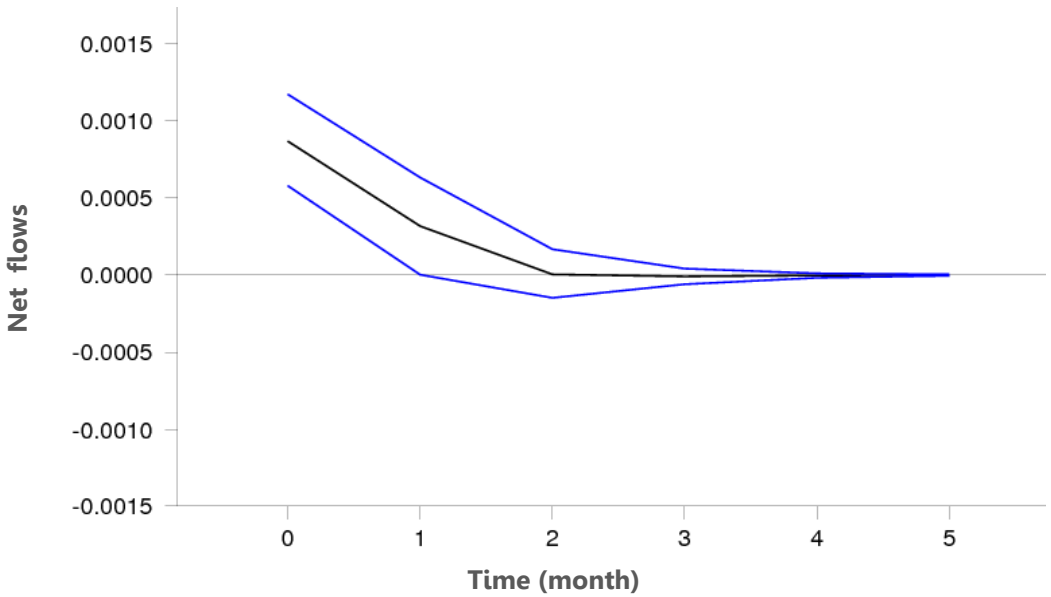
This figure shows the Break-Down of Inflows and Outflows in Rising and Falling Markets. The vertical axis shows normalized purchases (as a percentage of market capitalization in each month) in Panel A and Panel B and shows normalized sales in Panel C and Panel D. The horizontal axis shows time scale in all panels which is expressed in months. In all panels, the black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.5 Impulse Response of Net Flows to a Shock in Net Flows



This figure shows impulse response of net flows to a shock in net flows. The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation. Note that the number at period 0 is just the standard deviation of net flows.

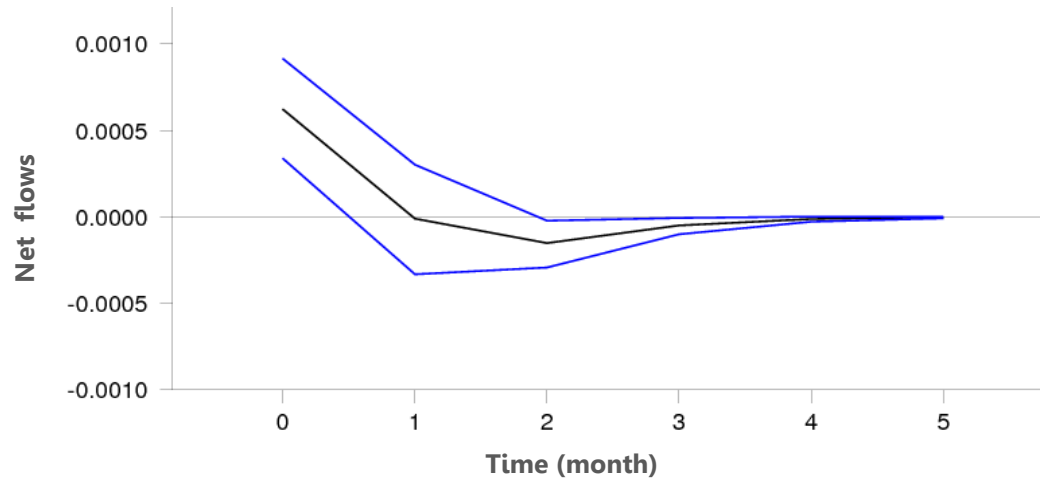
FigureA2.6 Response of net flows to a shock in global returns



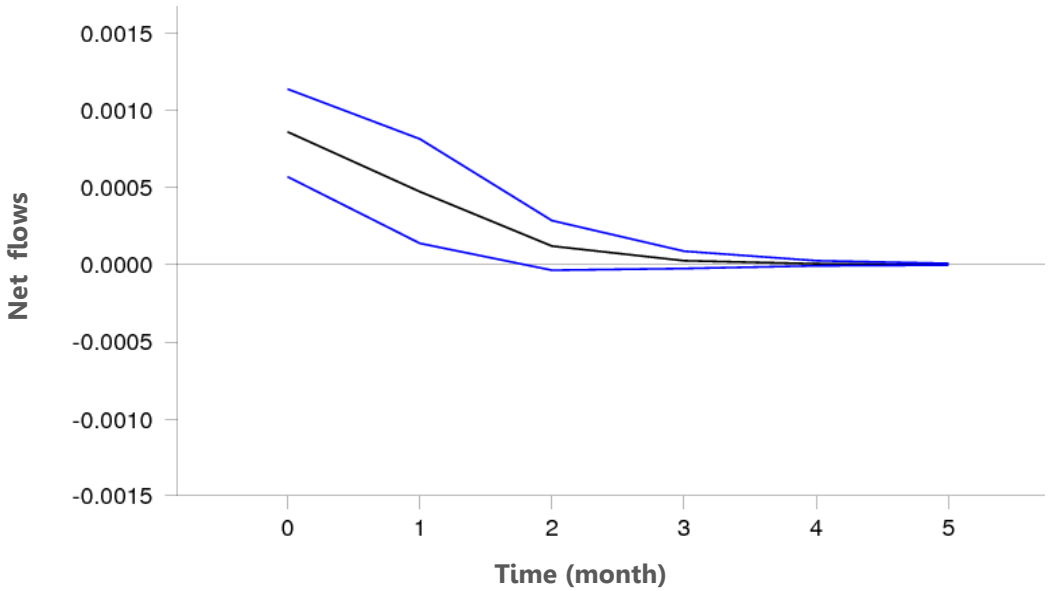
This figure shows response of net flows to a shock in global return The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation.

Figure A2.7 The Differential Response of Net Flows to a Positive Shock in Global Returns in Rising and Falling Global Markets

Panel A: Impulse Response in Rising Global Markets

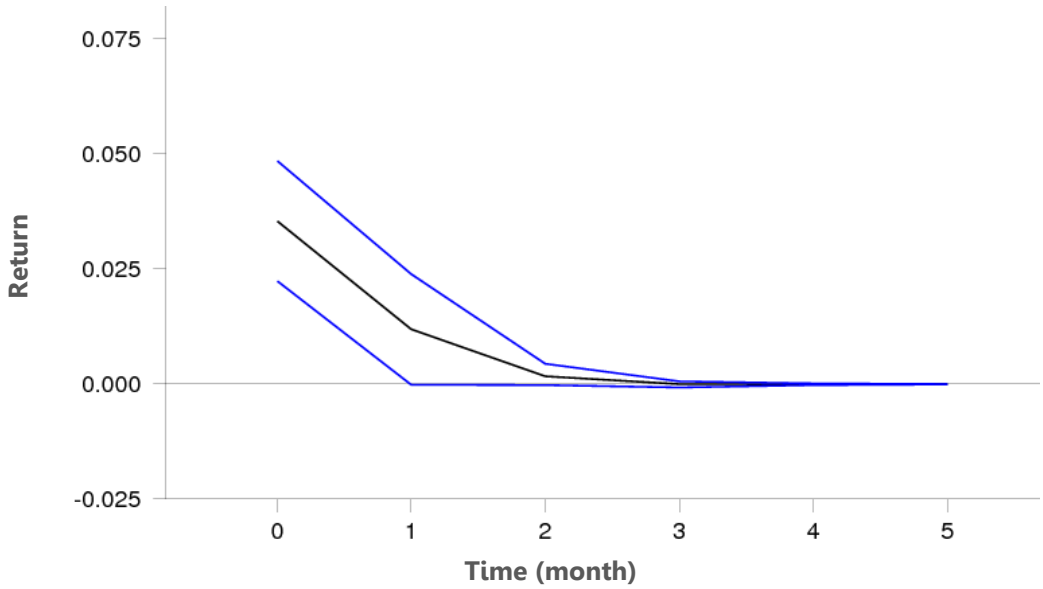


Panel B: Impulse Response in Falling Global Markets



This figure shows responses of net flows to a positive shock in global return in rising and in falling global markets. Panel A and Panel B show Impulse Responses of net flows in Rising and falling Global Markets respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.8 Impulse Response of Domestic Return to a Shock in Net Inflows

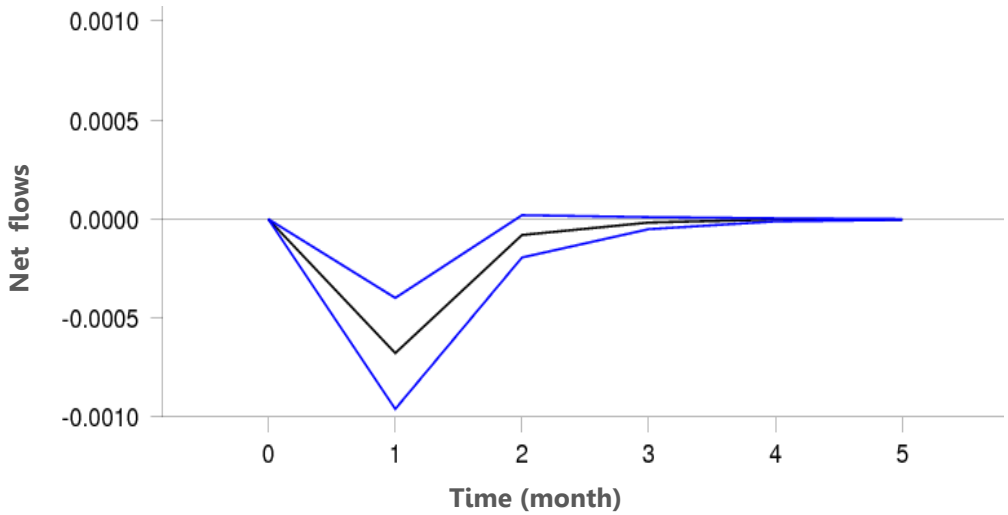


This graph shows a point estimation of impulse response functions with 90% confidence bands derived from a Monte Carlo simulation. The vertical axis shows domestic return in percentage, and the horizontal axis shows time in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the error bands.

A2.4 Robustness check by employing US dollar

As a complementary robustness check we performed our analyses employing US$ returns in place of local currency denominated return since dollar return may be more relevant to foreign investors. In a similar vein, as can be seen from graph A2.9 to graph A2.16 we obtained qualitatively the same results. The resulting impulse response functions are similar.

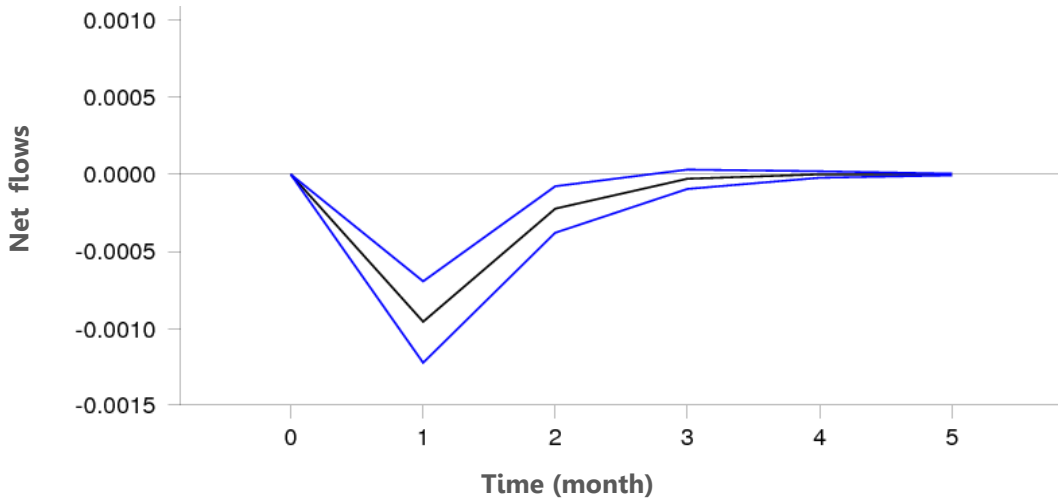
Figure A2.9 Impulse Response of Net Inflows to a Shock in Domestic Returns



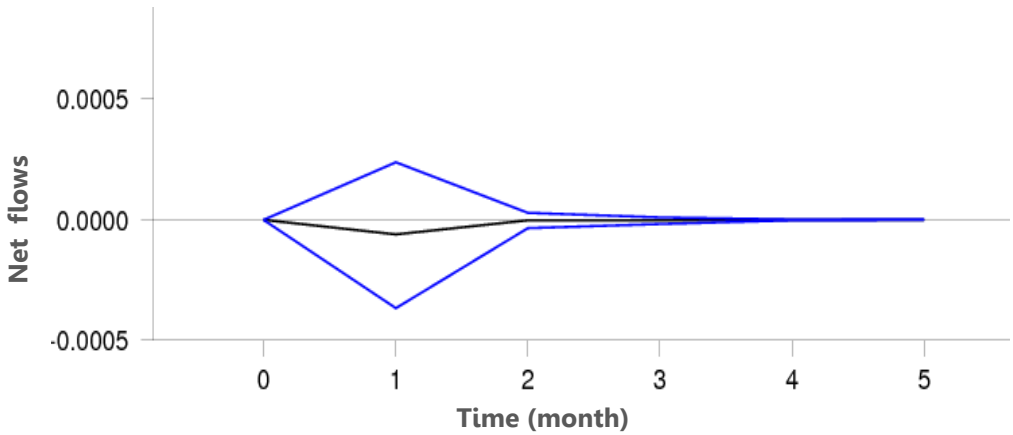
The vertical axis shows normalized net purchases (as a percentage of market capitalization per month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands. The scale corresponds to the normalized net purchases (as a ratio of the market capitalization) that would result from a one standard deviation innovation in domestic return. (Full-sample standard deviation of monthly returns is 14.5%.)

Figure A2.10 The Differential Response of Net Inflows to a Shock in Domestic Returns in Rising and Falling Markets

A: Response of net flows to a shock in domestic returns in rising markets



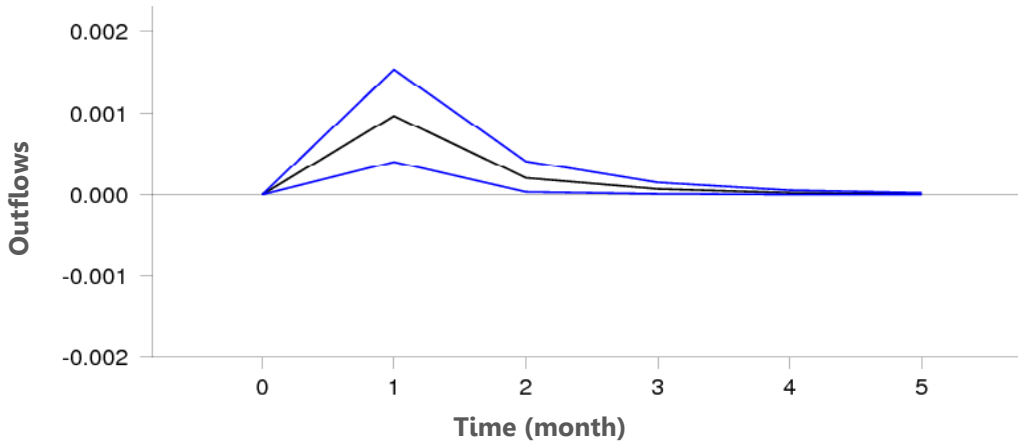
B: Response of net flows to a shock in domestic returns in falling markets



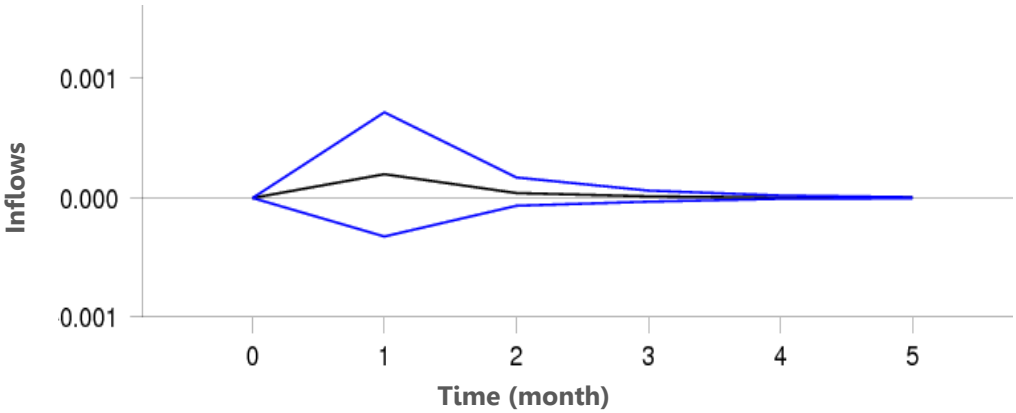
This figure shows impulse response of net inflows to a shock in domestic return in different sub periods. Panel A and Panel B show the response of net flows to a shock in domestic returns in the first (1997-2002) and second period (2003-2008) respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.11 Differential Responses of Inflows and Outflows to a Shock in Local Returns

A: Response of outflows to a shock in local returns



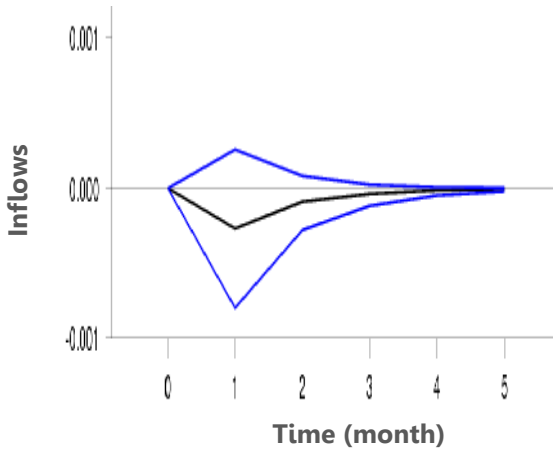
B: Response of inflows to a shock in local returns



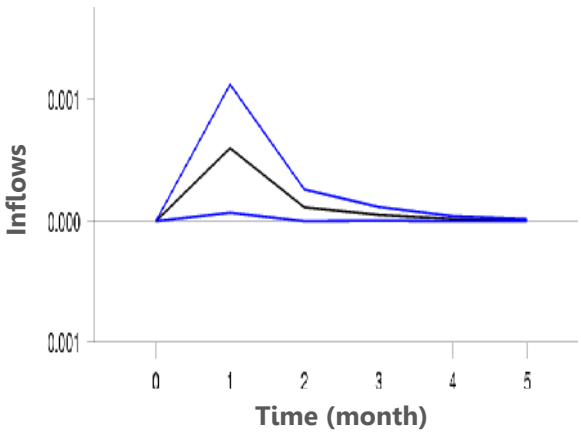
This figure shows differential Responses of Inflows and Outflows to a Shock in Local Returns. The vertical axis shows normalized sales and purchases (as a percentage of market capitalization in each month) in Panel A and Panel B respectively. The horizontal axis shows time scale which is expressed in months. Black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error band

Figure A2.12 The Break-Down of Inflows and Outflows in Rising and Falling Markets

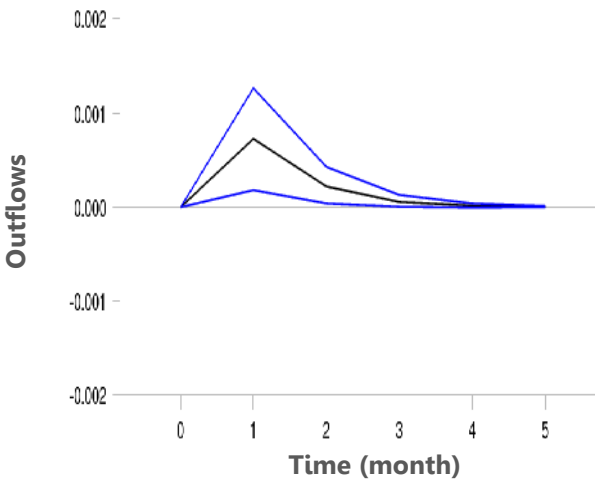
A. The Response of Inflows in Rising Markets



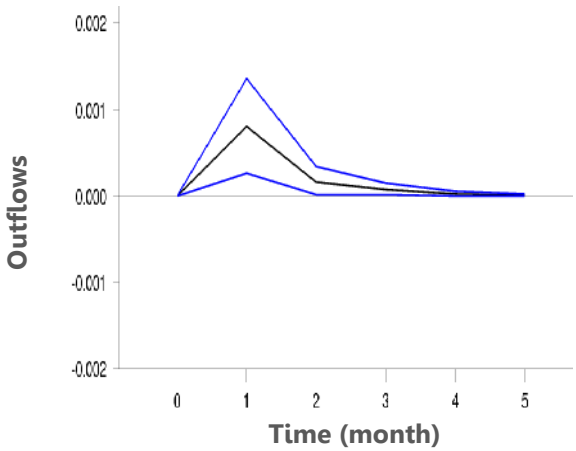
B. The Response of Inflows in Falling Markets



C. The Response of Outflows in Rising Markets

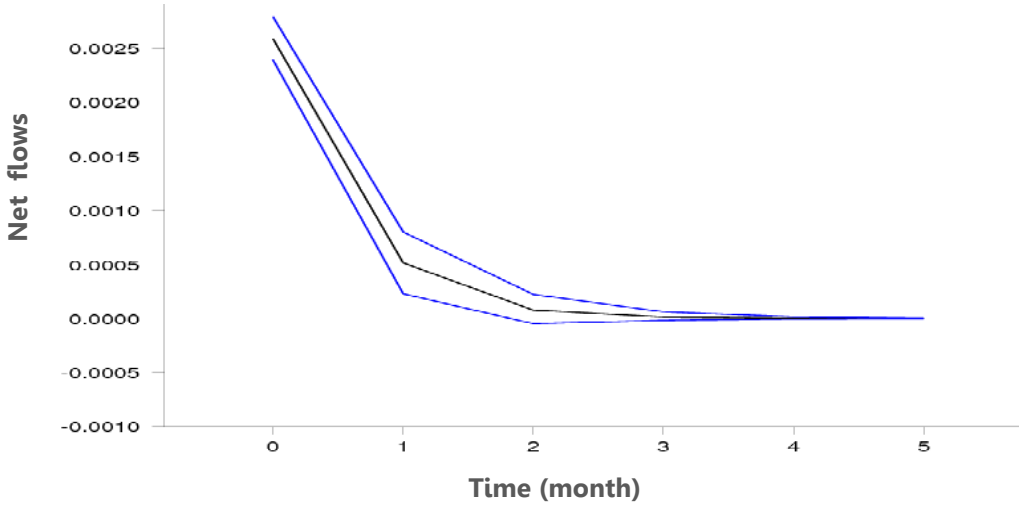


D. The response of Outflows in Falling Markets



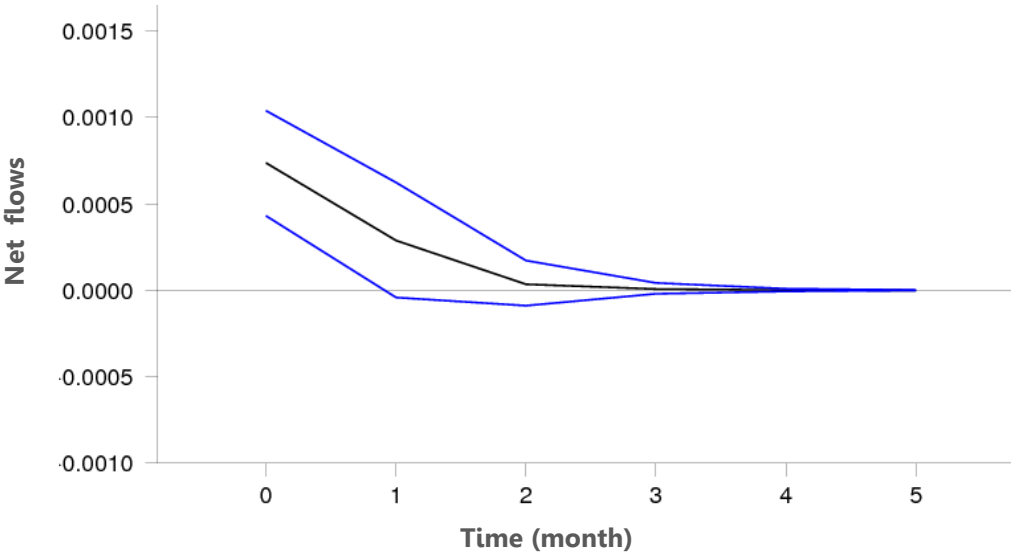
This figure shows the Break-Down of Inflows and Outflows in Rising and Falling Markets. The vertical axis shows normalized purchases (as a percentage of market capitalization in each month) in Panel A and Panel B and shows normalized sales in Panel C and Panel D. The horizontal axis shows time scale in all panels which is expressed in months. In all panels, the black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.13 Impulse Response of Net Flows to a Shock in Net Flows



The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation. Note that the number at period 0 is just the standard deviation of net flows.

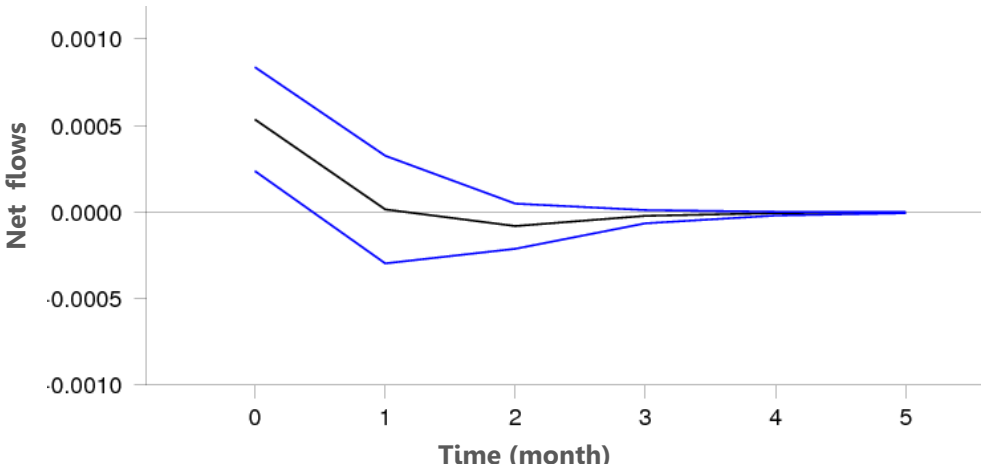
Figure A2.14 Response of net flows to a shock in global returns



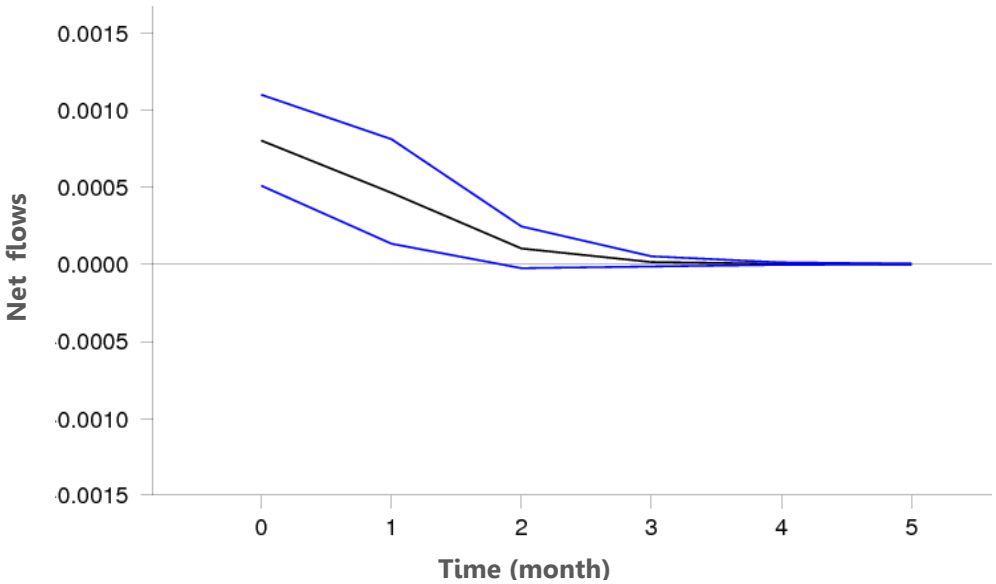
This figure shows response of net flows to a shock in global return The vertical axis shows normalized net purchases (as a percentage of market capitalization). The horizontal axis shows time scale in months. The impulse-response is shown with 90% confidence intervals derived from a Monte Carlo simulation.

Figure A2.15 The Differential Response of Net Flows to a Positive Shock in Global Returns in Rising and Falling Global Markets

A: Impulse Response in Rising Global Markets

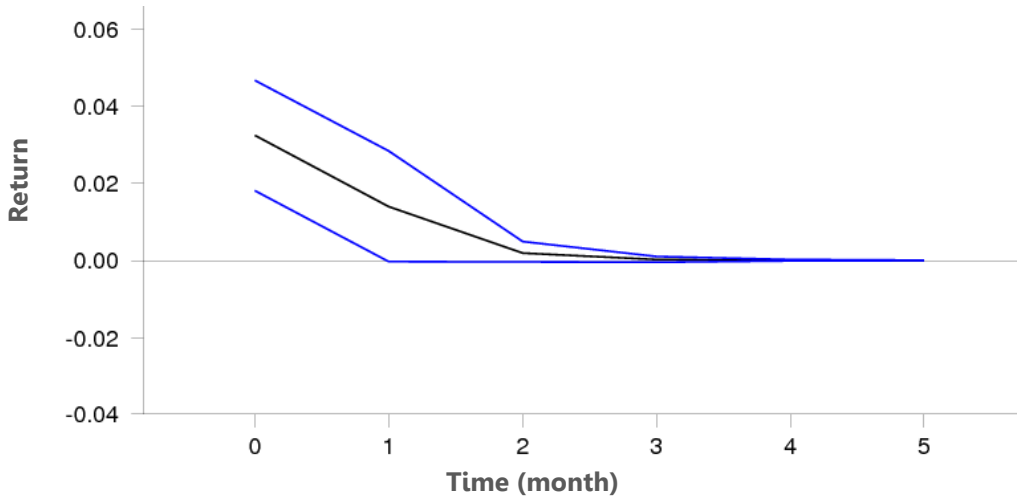


B: Impulse Response in Falling Global Markets



This figure shows responses of net flows to a positive shock in global return in rising and in falling global markets. Panel A and Panel B show Impulse Responses of net flows in Rising and falling Global Markets respectively. The vertical axis shows normalized net purchases (as a percentage of market capitalization in each month). The horizontal axis shows time scale which is expressed in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands.

Figure A2.16 Impulse Response of Domestic Return to a Shock in Net Inflows



This graph shows a point estimation of impulse response functions with 90% confidence bands derived from a Monte Carlo simulation. The vertical axis shows domestic return in percentage, and the horizontal axis shows time in months. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the error bands.

Chapter 3: Global Risk Appetite and Foreigners' Trading

3.1 Introduction

Many emerging countries have experienced severe financial crises in their economies due to sudden reversals of capital inflows. Hence, the question of what determines these capital flows to emerging countries has received widespread attention in the economics and finance literature. One important strand of literature focuses on equity flows and tries to determine key drivers motivating these equity flows to emerging markets. The literature tries to answer this question by investigating the joint dynamic relationship between equity flows and local returns. The studies in this literature, mainly investigate this relationship in two ways. First, they investigate whether equity flows are determined by local past returns, that is, whether international investors are feedback traders. Second, they focus on the impact of equity flows on local returns. While analyzing the dynamic relationship from these two aspects, some studies such as Bekaert *et al* (2002), Griffin *et al* (2004), and Richards (2005) also consider some global factors as global determinants of international capital flows, since what is documented in many studies with regard to financial crises is that they tend to cluster. Therefore, the spill-over of sovereign financial crises is not generally accepted to be fully explained by domestic fundamentals alone.

On this basis, in terms of global factors, Bekaert, Harvey, and Lumsdaine (2002) consider the world interest rate as an exogeneous variable and Griffin *et al* (2004) and Richards (2005) employ broad market stock returns as potential determinants of capital equity flows. However, in terms of global factors, it is rather interesting to note that no study in this line of research has studied the effects of global risk appetite on equity flows to emerging markets. One possible explanation about the reason for the lack of the empirical studies may be sourced from the belief that funds could not be shifted so quickly internationally on a daily basis to reflect variations in the risk appetite level.

Here, what is particularly interesting to note is that another strand of literature that investigates the factors that affect emerging market bond spreads (mostly on a daily basis) gives considerable attention to this factor. However, it is worth pointing out that portfolios of international investors not only consist of emerging market bonds, but also emerging market stocks as well and as the risk tolerance of an investor decreases he/she wants to shift his/her portfolio to a more conservative allocation. International investors might start with establishing a goal of some certain percent of foreign stocks in his/her portfolio. However, whatever the mix, if his/her appetite for risk increases or decreases, the percentage of his/her portfolio devoted to foreign stocks can also be changed in order to adapt to his/her new investment plan. In this context, if the risk appetite of international investors is constantly changing then their portfolios should also be balanced constantly in order to meet their risk tolerance. The balance we are referring to here is the ratio of foreign stocks held by international investors in their total portfolios. Given the above, from an investor perspective, this factor deserves particular consideration especially given the recent ongoing credit crisis or subprime panic started in the USA which causes reversal of capital flows from almost every emerging stock market. Therefore, this study is the first to provide evidence about the impact of global risk appetite on the behaviour of foreign investors in emerging markets.

As a second point, our study also diverges from all previous studies by providing a comprehensive exploration of the return-flow dynamics. The interaction between foreigners' trading and emerging stock market returns has not been analyzed so far while taking the changing global and local conditions into consideration. In other words we are not aware of any study that has examined whether foreigners' trading strategies with respect to local return vary with changing global and local conditions. For example, in terms of global conditions,

no study has investigated whether foreigners' trading strategies with respect to emerging market returns has been different at different global risk appetite levels. On this basis, our study looks at whether the trading strategy (with respect to local return) followed by foreigners at times when the global risk appetite is high is similar to the trading strategy followed by foreigners at times when the global risk appetite is low. No previous study has tried to answer this question so far in this line of research. However, the answer to this question is of great importance to policy makers, because, all previous studies uniformly documented that foreigners engage in positive feedback trading strategies with respect to local returns, and positive feedback trading is also known to have the potential to push prices away from fundamentals. Therefore, if foreigners are found to pursue different trading strategies at different global risk appetite levels regulators can benefit from this information and introduce different measures at different times to stabilize the market.

As a third point, apart from global conditions, this study also investigates the interaction between foreigners' trading and emerging stock market returns in terms of local conditions. In previous studies, such as Brennan and Cao (1997) and Griffin *et al* (2004), foreign investors are suggested to chase recent local market returns due to being informationally disadvantaged compared to local investors. In this respect, our study seeks to document whether foreigners chase recent local returns irrespective of the economic conditions in the emerging country. On this basis, we analyze whether the trading strategy with respect to local return followed by foreigners at times when the local economy is in a high growth period is similar to the trading strategy followed by foreigners at times when the economy is in a low growth period. It is useful to see whether foreign investors engage in different trading strategies with respect to local return at different points in the business cycle, since the answer to this question is of great importance to academicians. If we find no

difference in their trading strategies across different economic states, our finding can be regarded as strong evidence that supports a model of Brennan and Cao (1997) which suggests that foreign investors use recent returns as information signals, as they have an informational disadvantage in emerging markets. In other words, foreign investors may use only recent returns as information signals about the expected return of the local market and that is why they are positive feedback traders irrespective of the local conditions. However, if we find differences in trading behaviours across states of the economy, foreign investors can be thought to use other information sources as information signals at different states of the market rather than chasing the past prices to form expectations about the expected return. It is here important to note that this thesis, in chapter two, documents different behavioural pattern for foreign investors in up and down markets in the ISE which shows that foreigners chasing past returns may not be a general phenomenon. On this basis, the answer to this question should also be an issue of great concern to regulators in order to be successful at stabilizing market when introducing measures.

We try to answer the above questions by employing daily trading data from five emerging stock markets. The markets we analyze are as follows: the Jakarta Stock Exchange, the Korea Stock Exchange, the Stock Exchange of Thailand, the Taiwan Stock Exchange, and the Kosdaq Stock Market.

The rest of the chapter is organized as follows: in section 3.2 we provide a review of the literature addressing the issues mentioned above, together with their theoretical backgrounds, and we state our hypotheses regarding our research questions. Section 3.3 describes the data. Section 3.4 and 3.5 presents descriptive statistics and also key changes in the five South-east Asian stock markets respectively. Section 3.6 outlines the methodology

employed in this study. Section 3.7 presents results, and section 3.8 summarizes main conclusion.

3.2 Literature review

In the early 1990s, many developing countries began to liberalize their stock markets. The restrictions on foreign ownership were relaxed, which usually went hand in hand with sound macroeconomic and trade reforms. Following these liberalization processes many emerging countries suffered from financial crises due to sudden capital outflows from their markets. Therefore, foreigners' trades are mainly viewed to have a strong influence on equity prices, and their trading has been closely watched by local market participants. One line of research studies the joint dynamic relationship between foreign equity flows and local returns. Early studies in this literature mainly explore whether the trading of foreign investors is affected by past local returns, because, many academics argue that the trades of foreign investors are usually influenced by past returns, that is, they buy when prices have risen and sell when they have fallen. Such behaviour is known as positive feedback trading, and it has also been shown by theoretical models that investors who pursue positive feedback strategies can have a destabilizing impact on stock markets. It is therefore of crucial importance to understand how they trade and their impact on equity prices.

In a similar vein, Clark and Berco (1997), one of the earliest studies in this literature, test whether current equity flows are caused by past returns in emerging markets, in other words, whether foreigners pursue any trading strategy in the Mexican stock market. The study uses monthly data from January 1989 to March 1996 and finds no evidence that foreigners chase recent prices. Similarly, Choe, Kho, and Stulz (1999) investigate the trades

of foreign investors in the Korea stock market for the pre-crisis and during the crisis periods to see whether they destabilize the stock market. They use daily data beginning on December 2, 1996 and ending on December 27, 1997. In the pre-crisis period, the study finds that foreign investors tend to follow herding and momentum trading strategy. However, during the crisis period, the study finds no evidence of herding and positive feedback trading by foreign investors. Surprisingly, foreign investors are found to sell more in a booming market relative to bear market periods. This does not accord with the general view that foreigners flee from emerging equity markets which are crashing. Similar to the study of Choe, Kho, and Stulz (1999), Kim and Wei (2002) explore the behaviour of foreign investors in terms of feedback and herding trading in the Korean stock market. The study, analyzing three different groups of foreign investors, finds no statistical evidence of momentum or contrarian strategies for any group of foreign investors. However, Kim and Wei (2002) find evidence of herding behaviour for each type of foreign investor. Furthermore, they find that foreign individuals tend to herd more than foreign institutions.

Similarly, Grinblatt and Keloharju (2000), analyzing stock investments in the Finnish stock market from December 1994 through December 1996, document significant evidence of momentum trading by foreigners. Another recent study is provided by Dahlquist and Robertson (2004) who study the investment behaviour of foreign investors in the Swedish market subsequent to the liberalization period. The study, analyzing the period 1993–1998 on a monthly basis, documents that foreigners tend to pursue a momentum trading investment style in the Swedish market.

The same issues were also analyzed using larger data sets. For example, Brennan and Cao (1997), employing quarterly data between the first quarter of 1989 and last quarter of

1994, investigate net purchases of US investors in 16 emerging markets and find strong evidence of positive correlation between current net purchases of US investors and lagged local equity returns. This suggests that US investors pursue momentum trading strategies in these emerging markets. Another study by Froot, O'Connell, and Seasholes (2001), which uses the largest data set in this literature, investigates international equity flows into and out of 28 emerging countries. The study uses daily data that begins on August 1, 1994 and goes through December 31, 1998 provided by State Street Bank & Trust, a custodian bank. It finds very strong evidence that foreign investors follow momentum trading strategies.

In addition, Borensztein and Gelos (2003) contribute to this literature by using a novel database provided from eMergingPortfolio.com that covers, on a monthly basis, about 80 percent of equity funds worldwide with a focus on emerging markets for the period January 1996 to December 2000. It is the first study on a global scale that aims to document the behaviour of mutual funds. The study is interested in whether there is evidence of herding among these emerging market mutual funds during turbulent and during tranquil times and whether these funds systematically pursue positive feedback or momentum strategies. Borensztein and Gelos (2003) find some evidence of herding behaviour among mutual funds, which is statistically significant, but smaller than expected. They also find some evidence that emerging market mutual funds tend to pursue positive feedback trading. In sum, herding and momentum trading seems to be an observed fact among emerging market funds.

While analyzing the dynamic relationship from these two points of view, some studies also consider some global and local factors as determinants of international capital flows. The earliest study in that respect is undertaken by Chuhan, Claessens, and Mamingi (1998) who examine the factors that motivate US equity and bond flows to nine Latin American and nine

Asian countries. The study uses monthly data beginning in January 1988 and ending in September 1992. They attempt to understand to what extent the capital inflows are determined by global factors and to what extent by country-specific factors. The two key global variables employed in the study are US interest rates and US industrial production. The study also includes the country's credit rating, the secondary market price of a country's debt, the price-earnings ratio, and the domestic stock market return as explanatory variables for country specific factors. The study finds that both global and country-specific factors have significant value in explaining these capital inflows. The empirical results suggest that the slowdown in the US economy and drop in US interest rates have almost a similar significant effect as country-specific factors in explaining the flows to the Latin American countries. However, for the Asian countries it appears that country-specific factors have nearly three to four times more significant effects compared to global factors in explaining these flows. Chuhan *et al* (1998) also find evidence that bond and equity flows have different sensitivities towards explanatory variables. Equity flows appear to be more sensitive relative to bond flows to US industrial activity and US interest rates. As expected, equity flows are also found to be more sensitive than are bond flows to a country's price-earnings ratio and the return on domestic stock markets.

Given the results above, a point worth mentioning here is that the study by Chuhan *et al* (1998) employs a panel regression approach rather than the VAR approach, which is not common in this literature due to the endogenous relationship between foreign equity flow and local market returns. A critical point here to note is that following this study no subsequent work, which investigates the effects of global factors on equity flows, has employed the same approach in this literature which implicitly calls their findings into question For example, later on, Bekaert, Harvey, and Lumsdaine (2002) examine the behaviour of US equity flows

to 20 emerging markets using a vector-autoregressive (VAR) framework as a main tool, as in Froot *et al* (2001), but include two additional variables besides their bivariate VAR model for portfolio flows and local asset returns. As a first variable Bekaert *et al* (2002) add a world interest rate that has been thought to have a significant effect on capital flows. As a second variable, they add local dividend yields as a measure for the cost of capital, since it is believed to capture permanent price effects better than average returns. Bekaert *et al* (2002) find that a shock to world interest rate has no contemporaneous effect on net equity flows. However, after one period, small increases generally appear in net equity flows subsequent to a negative shock. In addition, the hypothesis that capital flows are driven by changes in expected returns or past returns, in other words whether foreign investors are "return chasers" or "momentum traders" is examined and they find evidence of momentum trading rather than return chasing.

Another study by Karolyi (2002) investigates whether foreign trading activity in Japan worsened the impact of the Asian crisis on Japanese markets, or whether it just reflected typical momentum trading behaviour. The data come from weekly reports that include the yen value of aggregate purchases and sales of Japanese stocks by foreigners. In terms of local factors, besides local returns, the study considers currency returns and employs a tri-variate vector auto-regression (VAR) model to test the joint dynamics of foreign portfolio flows and equity market and currency returns. The study finds consistent evidence of momentum trading among foreign investors during and after the Asian financial crisis. Fluctuations in the yen/dollar returns and Nikkei index are both found to have a significant impact on foreign net purchases. Karolyi (2002) finds no evidence that foreign net purchases have a significant impact on stock prices. The study concludes that foreign trading activity did not destabilize the markets during the Asian financial crisis.

Even though the study by Froot *et al* (2001) was the most comprehensive one that has been done so far, since their data set captures only custodian clients from State Street and only uses bivariate VAR between equity flows and local returns, Griffin, Nardari, and Stulz (2004) attempt to document whether their results can be valid for foreign investors in general when including mature market returns. Their sample consists of precise daily data of all foreign investors in nine emerging markets that begin from January 1996 for Korea, Indonesia, and South Africa, 1997 for Taiwan and Thailand, 1998 for India, Sri Lanka, and Slovenia, and 1999 for the Philippines. The daily analysis for all countries ends on February 23, 2001 except for Slovenia which ends on January 31, 2001. Griffin *et al* (2004) find that in addition to local market returns, lagged returns in mature markets such as the USA are helpful in explaining equity flows into emerging countries. Even though local market returns are found to have an economically significant effect on flows, equity flows are found to be more responsive to past US returns compared to local returns. The results are also robust after controlling for exchange rate effects. On the other hand, the study finds very limited evidence that foreign investors follow past local and international returns when testing the prediction of their model at the weekly frequency.

Another study by Richards (2005), which is very close in design to the paper by Griffin *et al* (2004), documents the similar evidence. It uses daily data over 1999-2002 of all foreign investors' net purchases in six Asian equity markets. The five markets (namely the Jakarta Stock Exchange, the Korea Stock Exchange, the Philippine Stock Exchange, the Stock Exchange of Thailand, and the Taiwan Stock Exchange) that were also studied by Griffin *et al* (2004)) are studied in this paper in addition to the Kosdaq Stock Market. The foreign returns are found to have more significant explanatory power than local returns on

equity flows and the study considers possible explanations for these findings similar to those of Griffin *et al* (2004). Richards (2005) suggests that it is not likely to be due to microstructure effects or portfolio rebalancing effects of which the latter are implicitly modeled in Griffin *et al* (2004) study. Instead, he suggests that broad market shocks are of central importance to foreign investors while revising their expectations for emerging markets. He supports his suggestion with a consistent finding about the returns relationship between US technology stocks and the technology-oriented Korean and Taiwanese markets. He finds that the returns on US technology stocks have more explanatory power on inflows into these two markets, which can be viewed as news about fundamentals. He suggests that it may also be due to behavioural reasons rather than extracting rational information.

Finally, after having summarized all the relevant studies in the literature, in terms of global factors, it is interesting to note that no study in this line of research has studied the effects of global risk appetite on equity flows to emerging markets. However, one strand of literature that investigates the factors that affect emerging market bond spreads, gives considerable attention to this factor. For example, McGuire and Schrijvers (2003), employing 25 emerging country bond data, examine whether there are common forces that affect movements in emerging market bond spreads. The study applies principal factor analysis to investigate the common sources of variation in bond spreads and finds one single significant factor that drives most of the variation in bond spread changes. The study also documents a high correlation between this common factor and changes in investors' appetite for risk and concludes that changes in investors' attitudes towards risk play an important role in explaining the common variation in emerging market bond spreads.

Rozada and Yeyati (2008) examine the variability in emerging market bond spreads to see whether exogenous factors explain a substantial part of this variability. The study, employing bond data from 33 emerging markets, finds that global factors such as investors' appetite for risk (proxied by high yield corporate bonds), global liquidity (proxied by the yield of US Treasury notes, 10 year constant maturity) and contagion (such as the Russian default) explain a large portion of the variability in these emerging market bond spreads.

Ciarlone, Piselli, and Trebeschi (2008) analyze to what extent changes in emerging market bond spreads can be attributed to specific factors, rather than to global factors. The study employs factor analysis and finds a single common factor that can explain a large part of the correlation between emerging market bond spreads. This single common factor is also found to be sensitive towards the movements in the degree of investors risk aversion and volatility in financial markets.

Finally, Herrero and Ortiz (2005) investigate whether global risk aversion has significant explanatory power in explaining Latin American bond spreads, after accounting for the effect of its main determinants such as US economic growth and the US long term interest rates. The study finds significant evidence that global risk aversion is positively related to Latin American bond spreads and its impacts on bond spreads is found to vary across countries and through time.

3.2.1 Shortcomings of previous studies and motivation

Given the above literature review, this study presents shortcomings of previous studies and its motivations with their stated hypotheses.

It is clear from the above review that no study has investigated the effects of global risk appetite on equity flows to emerging markets, whereas it is of central importance in the literature that investigates the factors that affect emerging market bond spreads. This is a very interesting point as portfolios of international investors not only consist of emerging market bonds but also emerging market stocks. Therefore, this factor should also attract the attention of professionals and practitioners especially given the recent ongoing global credit crisis started in the USA which led to a sudden stop or reversal of capital inflows in almost every emerging stock market. In view of this, we test whether global risk appetite has a significant effect on equity flows to emerging markets. Thus, our first hypothesis can be stated as below:

Hypothesis (1): global risk appetite has a significant effect on the trading behaviour of foreign investors in emerging markets.

Previous studies have not investigated the dynamic relationship between the foreigners' trades and local returns while taking into account global risk appetite. If foreigners' trades are thought to be affected by the global risk conditions then it is possible that they follow different trading strategies at different global risk appetite levels. Then, a natural question to ask of our foreigners' trading data is whether there is any evidence of foreigners following different trading strategy in any of the high and low risk appetite periods when compared with the whole period.

On this basis, our second hypothesis can be stated as:

Hypothesis (2): the trading strategies that foreigners follow in high and low global risk appetite levels are different from each other.

In a similar vein, it is clear from the literature review that previous studies have not provided any evidence about how foreigners behave with respect to local returns at different points in the local business cycle. It is possible that their trading strategies can differ across high and low growth periods if they use other sources as information signals rather than chasing past prices, because investors are found to consider the same type of news to be bad in some stages of the business cycle and good in others (see eg., McQueen and Roley, 1993; Li and Hu, 1998). If they differed it would be highly relevant for regulators while introducing measures to enhance the stability of the stock market. In order to examine this issue our third hypothesis can be stated as:

Hypothesis (3): The trading strategies that foreigners follow in high and low states of the local economy are different from each other.

In a nutshell, our study makes the following contributions:

- We provide the first evidence about the effect of global risk appetite on the net purchases of foreign investors in emerging stock markets.
- We provide the first evidence about whether foreigners engage in different trading strategies with respect to local returns at high and low global risk appetite levels.
- We provide the first evidence about whether foreigners follow different trading strategies with respect to local returns at different states of the economy.

3.3 Data

We investigate the trading behaviour of foreign investors in five emerging markets. The markets are the Jakarta Stock Exchange (JSE), the Korea Stock Exchange (KOSPI), the

Stock Exchange of Thailand (SET), the Taiwan Stock Exchange (TSE), and the Kosdaq Stock Market. All markets except for the Kosdaq are main boards. Kosdaq is the second board in South Korea, but its market capitalization is much higher than many main boards in emerging markets. Richard (2005) also analyzes the same five boards. In order to investigate trading behaviour of foreign investors in more detail there is clearly a need for actual trading data. Our study uses daily purchases and sales values for foreign investors in these five stock markets. Daily purchases and sales values for foreign investors are obtained from the related exchanges and from CEIC (data company), a secondary provider. The available data begin in January 1995 for Thailand and Indonesia, 1999 for Kosdaq, 2000 for Taiwan and 2001 for the KOSPI index. The end date for daily analysis is May 15, 2008 for all markets. However, we prefer the observation period to be the same across all markets in order to make the analysis homogeneous. Therefore, our observation period starts in June 2001 for all markets. Daily net purchases of investors (f_t) are expressed in terms of percent of the previous day's market capitalization.

$$f_t = 100 \times \frac{(buy_t - sell_t)}{(marketcapitalization)_{t-1}} \qquad (1)$$

Daily market capitalization data for each market are obtained from Datastream. We use the term "net purchases" as a measure of purchases minus sales. Net purchases are normalized by dividing by the related previous day's market capitalizations as in Griffin *et al* (2004) and Richards (2005). Such normalization is useful to understand how important is the net demand compared to total supply of available shares (Griffin *et al*., 2004). We use this measure as a direct indicator of net investor demand for all stocks in these five stock markets. The results of Augmented Dickey-Fuller unit root tests of the normalized five variables corresponding to each market are shown in Table 3.1.

Correlations between net inflows into different markets are also reported in Table 3.2. Since there are five market returns we have ten pair of correlations and nine out of these ten correlations are found to be positive. The coefficients of pair-correlations among four markets, namely; the KSE, KOSDAQ, TWSE and THAILAND are found to be more than 0.20. From these correlations there is some prima facie evidence that there are some common factors that primarily drive these net flows. This will be tested formally in the next section.

Table 3.2: Correlations Between inflows into Different Markets

	KSE	KOSDAQ	TSE	JXS	SET
Korea (KSE)		**0.34**	**0.4**	**0.02**	**0.25**
Korea (Kosdaq)	**0.34**		**0.2**	**-0.03**	**0.13**
Taiwan (TSE)	**0.4**	**0.2**		**0.03**	**0.32**
Indonesia (JSX)	**0.02**	**-0.03**	**0.03**		**0.07**
Thailand (SET)	**0.25**	**0.13**	**0.32**	**0.07**	

This table reports the correlations between daily net inflows into different markets. Net inflows are normalized by the previous-day market capitalization.

Daily return data for local market indices are collected from Datastream. Since recent comprehensive studies such as Griffin *et al* (2004) and Richard (2005) find that net foreign equity flows to emerging markets give more significant response to past US returns relative to local market returns in most emerging markets they investigated, we employ the S&P 500 return index as a proxy for the global factor obtained from http://finance.yahoo.com/ which is adjusted for stock splits and dividends. The S&P 500 market returns are measured as the daily log-differenced change in the price index.

We also use daily exchange rate changes as a possible determinant of net foreign equity flows to emerging market as in Griffin *et al* (2004), since a depreciation of the local currency can lead to more foreign inflows. Data for exchange rates for countries are obtained

from Datastream except for Indonesia, which is obtained from the central bank of Indonesia. Since in this study we also explore the effects of global risk appetite on the behaviour of foreign investors in emerging markets, as a proxy for risk appetite, we use the VIX (the Chicago Board Options Exchange Volatility Index) obtained from the CBOE which is commonly treated as a quick and easy proxy for risk appetite in many studies such as Ciarlone, Piselli, and Trebeschi (2008) and Rozada and Yeyati (2008). It is often referred to as the fear index. Investors buy and sell S&P 500 index options to change the amount of risk to which they are exposed. It measures the cost of using options as insurance against declines in the S&P 500. A change in global risk appetite is measured as the daily log-differenced change in the VIX index.

Table 3.1: Unit root test for normalized net flows

Null Hypothesis: Normalized net flows has a unit root
Exogeneous: constant

	Thailand		Korea		Kosdaq		Indonesia		Taiwan	
	stat	Prob*	stat	Prob*	stat	Prob*	stat	Prob*	Stat	Prob*
Augmented Dickey-Fuller test statistic:	-17,878	0.00	-13.485	0.00	-19.998	0.00	-38.719	0.00	-15.104	0.00

Test critical values:	1% level	-3.478
	5% level	-2.882
	10% level	-2.578

This table shows unit root test for net flows in each market normalized by the contemporaneous market capitalization. ADF (Augmented Dickey-Fuller) test is employed as a unit root test. ADF test is estimated that includes only constant in the test regression with automatic lag length selection based on Schwarz Information Criterion with a maximum lag length of 24. * denotes associated one-sided *p*- value for the ADF test statistic. Lag lengths of 0, 2, and 3 are selected for Indonesia, Taiwan and Kospi respectively and lag lengths of 1 are selected for Thailand and Kosdaq automatically based on the Schwarz Information Criterion.

3.4 Key changes in the five South-east Asian stock markets

A chronology of regulations on foreign investment is also given below for each country to see the key changes in these markets in terms of foreign investment opportunities.

3.4.1 Thailand

According to IFC (International Finance Corporation), Thailand officially liberalized its stock market in December 1988. Before that time, it was not possible for international investors to invest directly in Thai stocks. In 1995, the ratio of foreign ownership in Thai companies was restricted to a maximum of 49%, except for financial institutions. The limit was 25% for financial companies, which was then gradually lifted to 49%, beginning in June 1997 on a case-by-case basis. The SET eased the trading of shares among foreign investors that exceeded their foreign ownership limit by carrying out these trades on a special foreign board. However, in 2001, the SET issued a new trading instrument called NVDR (Non-Voting Depository Receipt) which allows foreigners to buy more than 49% of the shares while receiving all financial benefits except for voting rights.

3.4.2 Korea (Kospi and Kosdaq indices)

Foreign investors were officially allowed to invest in the Korean stock market in January 1992. Initially, foreigners were permitted to own up to 10% of Korean companies in aggregate. This limit was raised to 12% in December 1994, to 15% in July 1995 and to 18% in May 1996. Then foreign ownership was again relaxed to 20% in September 1996 and to 23% in May 1997. Restrictions on foreign ownership were lifted on Korean stocks in May 1998, except for some specific industries, such as the Korea Electric Power Corp (KEPCO),

the steel industry (POSCO), mining, air transportation and information and communication which were restricted to a limit of 30%, 30%, 49.99%, 49.99%, and 33% respectively. Unlike other industries, radio broadcasting and television broadcasting later on were completely closed to foreign investment in 2002.

3.4.3 Indonesia

Indonesia officially opened its stock market to foreigners in September 1989. As the stock market was liberalized, foreign investors were allowed to purchase up to 49% of all domestic companies excluding financial companies. The ownership limits in financial companies were then raised to 49% as well in January 1992. In September 1997, the authorities allowed foreigners to purchase unlimited shares of domestic firms excluding banking shares. They then removed the barriers to foreigners in retail trade and wholesale trade banks in March 1998 and April 1998 respectively. Like Korea, some sectors were closed to foreigners in 2002. Some of these sectors are germ plasm cultivation, lumber contractors, forest concessions, TV, radio, print media, film and cinema. Some of the industries of which foreigners are allowed to own up to 45% are airport/seaport construction and operation, transmission and distribution, electricity production, shipping, railway service, drinking water, atomic power plants, and certain medical services.

3.4.4 Taiwan

Official stock market liberalization took place in January 1991. Qualified Foreign Institutional Investors (QFII) were allowed to invest in Taiwan domestic shares up to no more than 12% of the total market capitalization and no more than 6% of individual ownership. The limit on foreign ownership then was raised to 20% in March 1996 and to 25% of the total

market capitalization in December 1996. Finally, QFII were permitted to buy up to 50% of domestic listed companies in March 1999. Although heavy foreign investment was still restricted in certain industries such as finance in 2003, these barriers are gradually coming down.

3.5 Methodology

Within each country, we examine our research questions by using Vector Autoregression (VAR) methodology, which enables us to study the dynamic relationship between flows and returns. Apart from these two endogenous variables we try to document the effects of global risk appetite on the equity flows and, since previous studies such as Griffin *et al* (2004) and Richards (2005) strongly suggest the inclusion of broad market returns as determinants of net inflows for a typical emerging country, we augment our bivariate-VAR model with the global risk appetite and broad market return, both of which are affected only by their own lags. This enables a more accurate characterization of the joint dynamic relationship between flows and domestic returns. The advantage of utilizing this specification instead of a standard VAR is that none of the lags of equity flows and local returns affect the global risk appetite and broad market returns, but contemporaneous values of them are affected by the instantaneous and lagged values of global risk appetite and broad market returns. Thus, global risk appetite and broad market returns are treated as exogenous variables. The system is estimated separately for each market as seemingly unrelated regressions (SURs), since the right-hand side variables explaining global risk appetite and global return are different. In line with the common treatment in the literature, net flows are assumed to have a contemporaneous effect on local returns, but not vice versa. Local returns

can only have an effect on equity flows with a lag. In other words, current returns can only affect future flows and returns.

Thus we follow Griffin *et al* (2004), which can be specified as:

$$\begin{bmatrix} f_{i,t} \\ r_{i,t} \end{bmatrix} = \begin{bmatrix} \alpha_{i,f} \\ \alpha_{i,r} \end{bmatrix} + \begin{bmatrix} b_{11}(L) & b_{12}(L) \\ b_{21}(L) & b_{22}(L) \end{bmatrix} \begin{bmatrix} f_{i,t-1} \\ r_{i,t-1} \end{bmatrix} + A_i(L)\mathbf{x}_{t-1} + \begin{bmatrix} \varepsilon_{i,t}^{f} \\ \varepsilon_{i,t}^{r} \end{bmatrix} \qquad (2)$$

Where *fi,t* denotes the daily net foreign flows (buy value - sell value) normalized by previous-day market capitalization, for country *i*. $r_{i,t}$ denotes the daily market returns for country *i*. The α's represent constant intercept terms, *b*(*L*) denotes a polynomial in the lag operator *L*, and $\varepsilon_{i,t}^{f}$ and $\varepsilon_{i,t}^{r}$ are zero-mean error terms that are assumed to be intertemporally uncorrelated. ***x****t* is a vector that includes daily broad market returns and global risk appetite as push (sourced from outside of the country in question) factors and the local exchange rate as a pull (sourced from inside of the country in question) factor which are all considered to be exogenously determined.

A point worth mentioning here is that since all Asian-Pacific countries are in different time zones relative to the USA, the Pacific exchanges are closed when the US market opens for the day. Therefore, we employ the previous overnight S&P 500 returns and global risk appetite levels in our VAR rather than the same day value. Furthermore, since every market has specific holidays it is inevitable that we have missing observations. Following Richards (2005) we deal with this problem in such a way that if there is no trading for the emerging market in question, that day is omitted and the price change is calculated from the last time that the market was open. This way, continuous series of foreign inflows and local returns are obtained for the emerging market. In a similar vein, we also eliminate any day when the US

market is closed and we aggregate net purchases of foreigners where the local market was open while the US market closed.

Having specified the model and given details about how to deal with the missing observations in the VAR framework, we now move to determine the number of lags to include in the VAR equations for the five markets. On this basis, table 3.4 below shows the optimal lag length for the five markets as suggested by both the Schwarz criterion (SIC) and the Hannan–Quinn information criterion (HQC).

As can easily be seen from table 3.5 the Hannan–Quinn information criterion (HQC) suggests the optimal lag lengths of one for Indonesia, two for KOSDAQ, three for Taiwan and Thailand and four for KOSPI. Since we have large sample sizes the degrees of freedom is not a concern. Therefore, we choose a common lag length of four lags for all five markets, as done in Richards (2005) and Griffin *et al* (2004), which also homogenises the analysis across markets. Following griffin *et al* (2004), the lag length of the exogeneous variables are also restricted to be the same as the endogenous variables across markets.

Table 3.3: VAR lag order selection criteria (01/06/2001-16/05/2008)

	KOSPI			KOSDAQ	
Lag	SC	HQ	Lag	SC	HQ
0	-18.29139	-18.29552	0	-18.26413	-18.26825
1	-18.55905	-18.57143	1	-18.47014	-18.48249
2	-18.585*	-18.60613	2	-18.47331*	-18.4939*
3	-18.58532	-18.61421	3	-18.46187	-18.49069
4	-18.57747	-18.6146*	4	-18.4493	-18.48636
5	-18.56436	-18.60976	5	-18.43739	-18.48268
6	-18.55362	-18.60728	6	-18.42055	-18.47407
7	-18.54216	-18.60407	7	-18.40555	-18.46731
8	-18.52552	-18.59568	8	-18.39336	-18.46336
9	-18.51016	-18.58857	9	-18.37893	-18.45716
10	-18.49807	-18.58474	10	-18.36266	-18.44913
11	-18.48522	-18.58014	11	-18.34902	-18.44372
12	-18.47062	-18.57379	12	-18.33223	-18.43517

	INDONESIA			TAIWAN	
Lag	SC	HQ	Lag	SC	HQ
0	-8.88272*	-8.886869	0	-18.46652	-18.47064
1	-8.876804	-8.88922*	1	-18.79862	-18.81097
2	-8.863166	-8.883871	2	-18.82748*	-18.84808
3	-8.849126	-8.878113	3	-18.82746	-18.8563*
4	-8.835697	-8.872966	4	-18.81648	-18.85355
5	-8.825551	-8.871102	5	-18.80029	-18.8456
6	-8.808866	-8.862699	6	-18.78383	-18.83738
7	-8.793304	-8.855418	7	-18.77197	-18.83376
8	-8.775825	-8.846221	8	-18.75477	-18.8248
9	-8.758774	-8.837452	9	-18.74209	-18.82036
10	-8.742071	-8.829031	10	-18.7275	-18.814
11	-8.729114	-8.824356	11	-18.71196	-18.8067
12	-8.712735	-8.816259	12	-18.69595	-18.79893

Table (3.4) continued

	THAILAND	
Lag	SC	HQ
0	-18.937	-18.9415
1	-19.3805	-19.3929
2	-19.41*	-19.4307
3	-19.403	-19.43*
4	-19.3931	-19.4303
5	-19.3793	-19.424
6	-19.3649	-19.4187
7	-19.3487	-19.4107
8	-19.3345	-19.4048
9	-19.3185	-19.397
10	-19.3036	-19.3905
11	-19.2863	-19.3814
12	-19.27	-19.3738

Table 3.4 shows the VAR lag order suggested by information criteria. SC and HQ denote Schwarz information criteria and Hannan-Quinn information criteria respectively. * indicates lag order selection criterion.

In section 3.7, we present our results by analyzing impulse-response functions, as a most intuitive tool to investigate the interaction among variables in the system. As mentioned in Stock and Watson (2001), VARs come in three varieties: reduced form, recursive and structural. Before moving to impulse response functions which are typically calculated for recursive or structural VARs one could suspect that the correlation between global risk appetite and the S&P 500 may create a problem in our VAR model. On this basis, we perform correlation analyses for each market. Table 3.5 shows the correlations with respect to different markets since all markets have different specific holidays.

As can be seen from table 3.5 the correlation between global risk appetite and the S&P 500 returns varies from 0.742 to 0.749. A point worth mentioning here is that we do not consider these ratios to be very high. One normally is not concerned with collinearity issues in a traditional VAR model, except in cases where it is so extreme as to cause significant

estimation problems. With a VAR, we are generally interested in the overall behaviour of the model rather than in the individual coefficient values, or the significance of individual coefficients. A reasonable amount of correlation is to be expected in any VAR model, almost by definition.

Table 3.4: The correlations between VIX and S&P 500 returns

Thailand	-0.749
Kosdaq	-0.748
Indonesia	-0.748
Taiwan	-0.745
Kospi	-0.742

This table shows the correlations between VIX and S&P 500 returns in each sample. The S&P 500 market returns are measured as the daily log-differenced change in price index. VIX changes is also measured as the daily log-differenced change in volatility index.

3.5.1 Reaction to lagged local returns conditional on the state of the economy

As a second point we explore whether foreign investors follow the same trading strategy with respect to local returns, irrespective of local conditions. In other words, we look at whether they engage in the same trading strategy across high and low state of the economy. We look at this issue by estimating VAR regressions of flows on local return with dummy variables. We construct two separate return series that correspond to the periods of high and low economic growth as below.

$r_{high,\,t} = HIGH_t\, r_t$

$r_{low,\,t} = LOW_t\, r_t$

Where,

$HIGH_t = 1$ if the local economic growth is in the high state at time t, and zero otherwise;

LOW_t = 1 if the local economic growth is in the low state at time *t*, and zero otherwise;

We examine this issue by following the similar methodology in specification (2) but replacing the new constructed local return series in place of the local return series. In other words, we have two VAR system estimations. One includes high state returns in place of local returns the other one includes low state returns in place of local returns. A point worth clarifying here is that since we analyze the issue by looking at the cumulative impulse responses in two different VAR systems, we do not employ wald tests as is typically employed to determine whether the coefficients are significantly different in a classical linear regression or in a system of regressions. Instead, we examine the cumulative impulse responses of foreigners' net purchases to an innovation in local returns individually in terms of sign and significance criteria in the two different states of the economy.

3.5.1.1 Classification of economic states

In order to explore whether foreigners' response to local return changes across different stages of the local business cycle, we need to classify the different levels of economic activity. To do so, we follow McQueen and Roley (1993) and use a seasonally adjusted monthly industrial production index for each emerging country in identifying the states of the local economy as a boom, recession and normal period.[18] To obtain three different states of the economy, we regress the actual log of industrial production on a constant and trend. Then we add and subtract a constant from the trend to create the upper and lower bounds as can be seen in figure 3.1 through figure 3.4. When the log of industrial

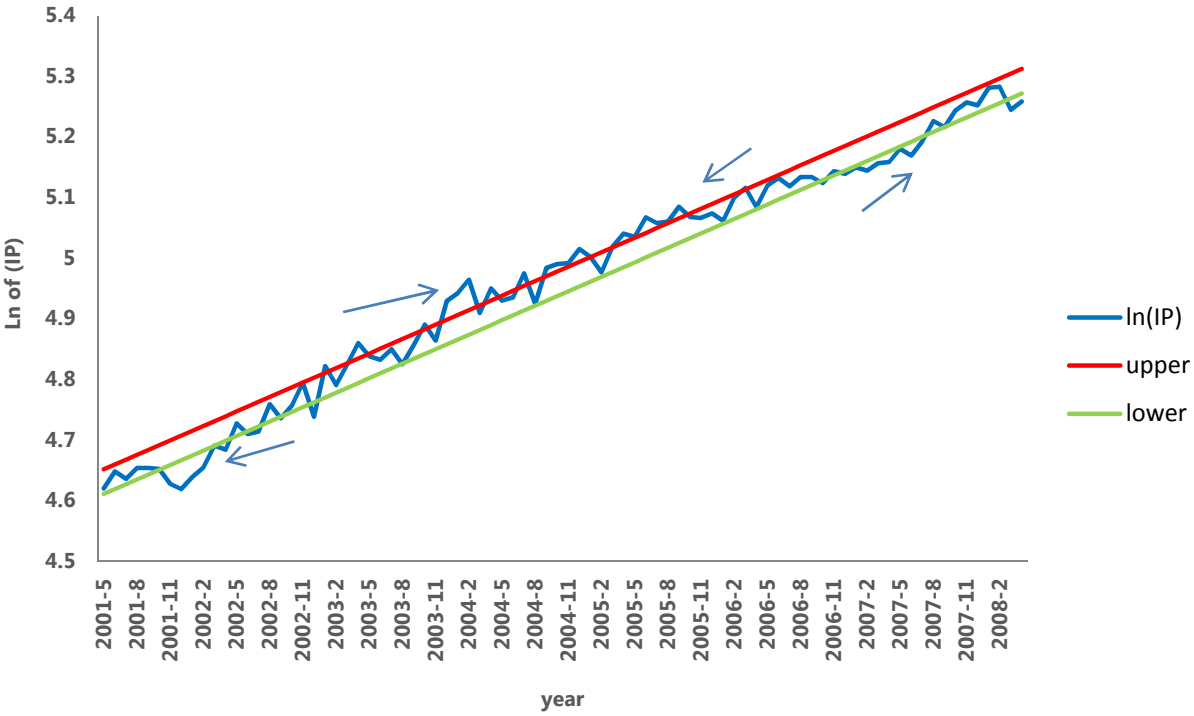
[18] If the country in question was the USA other methods such as the NBER business cycle turning points or the experimental coincident index which was constructed by Stock and Watson (1989) would easily be employed in determining the state of the economy as alternative methods. However, for emerging markets, the McQueen and Roley (1993) methodology is the most applicable one.

production (LNIP) is above the upper bound about 25 percent of the time it is denoted as "high" economic activity. When it is below the lower bound about 25 percent of the time it indicates low economic activity. The remaining observations between the bounds denote "Medium" economic activity.

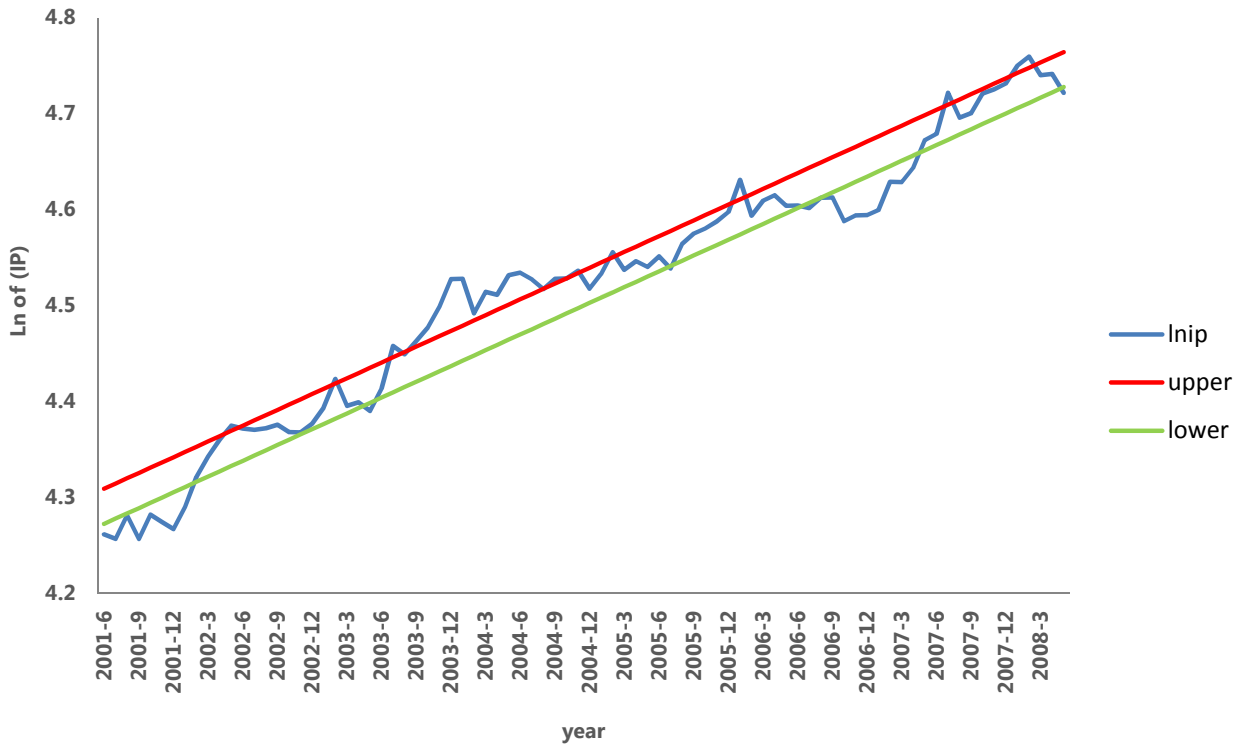
We begin with Thailand, which is shown in figure 3.1. We construct the bounds for the industrial production symmetrically. The deviations from the industrial production trend are chosen as +0.0203 and – 0.0203 for the upper and lower bounds respectively, which puts 25 percent of the observations in the high state and 25 percent of the observations in the low state. However, if the bounds for the industrial production were constructed symmetrically for other markets the best approximations would be achieved, for Taiwan by the constants between 0.0236 and 0.0239 which would put about 25 percent in the high state and about 16.7 percent in the low state, for Korea by the constants between 0.01297 and 0.01293 which would put about 25 percent in the low state and about 26.2 percent in the low state, for Indonesia by the constants between 0.0259 and 0.0264 which would put about 35.7 percent in the high state and about 26.2 percent in the low state. Therefore, the bounds are not constructed symmetrically for these markets. Instead the deviations from the industrial production trend are chosen as, +0.0236 and – 0.013 for the upper and lower bounds respectively for Taiwan, +0.013 and – 0.01297 for the upper and lower bounds respectively for Korea, +0.043 and – 0.0284 for the upper and lower bounds respectively for Indonesia. These constructed bounds put 25 percent of the observations in the high state and 25 percent of the observations in the low state for these markets.

Figure 3.1: Natural log of industrial production, actual and bounds.

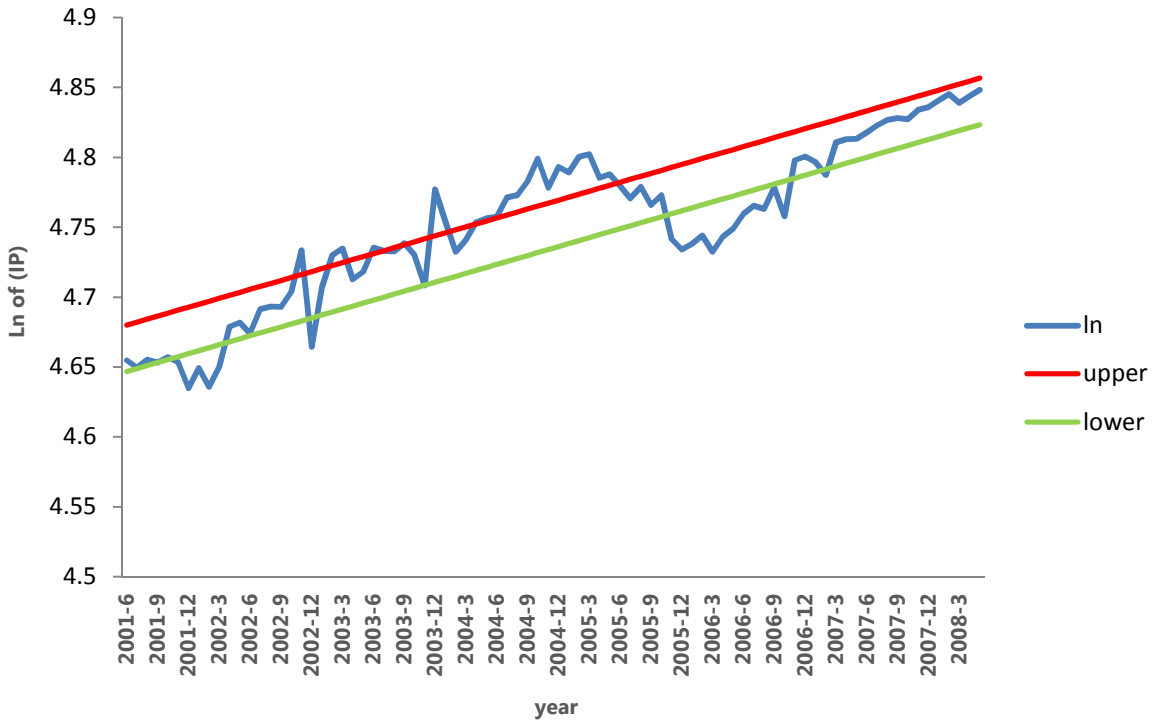
A: Natural log of industrial production, actual and bounds (Thailand).



B: Natural log of industrial production, actual and bounds (Taiwan).



C: Natural log of industrial production, actual and bounds (Indonesia).



D: Natural log of industrial production, actual and bounds (Korea).

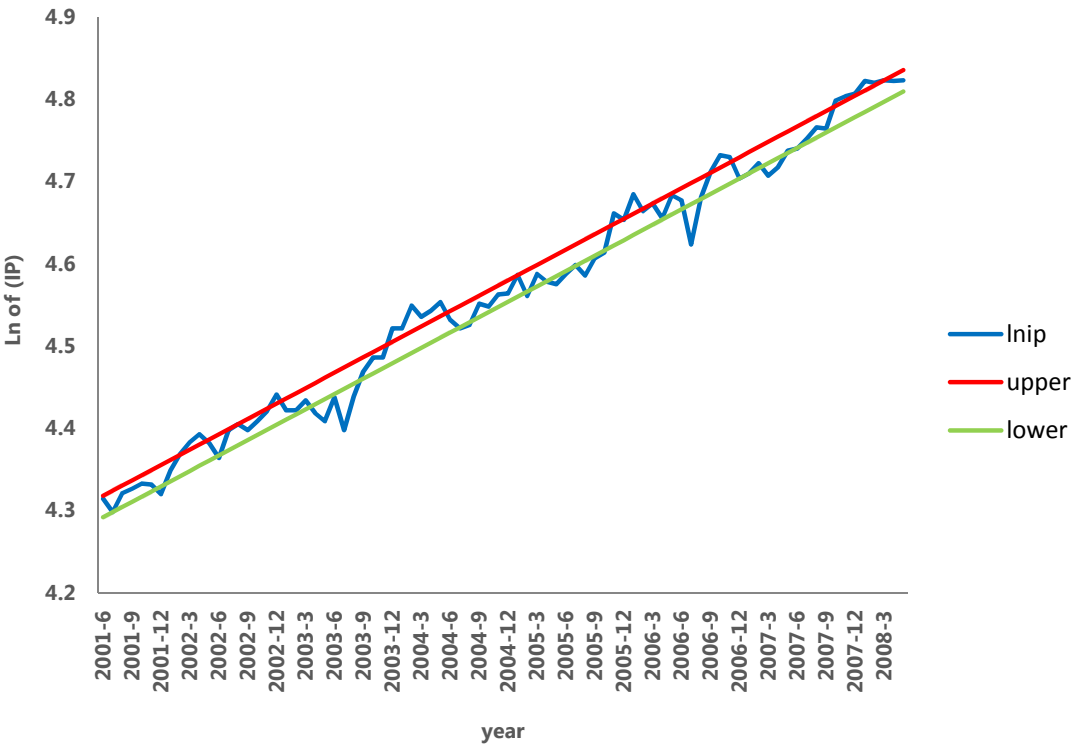


Figure 3.1 shows actual log of industrial production with its constructed upper and lower bounds in panel A, B, C, and D for Thailand, Taiwan, Indonesia, and Korea respectively.The vertical axis shows natural log value of industrial production net purchases. The horizontal axis shows time scale beginning in June 2001 and ending in May 2008. The blue line represents the actual log of industrial production, while red and blue line represent upper and lower bounds respectively.

In order to find a proxy for the economic states several methods could be employed when the country in question was the USA. For instance, we could use the experimental coincident index (XRIC) which was constructed by Stock and Watson (1989). The XRIC shows the probability that the economy is in recession. Furthermore, two alternative recession dummies could also be employed for the USA. First, standard NBER business cycle turning points could be employed which is commonly used in the literature. Second, we could also use Chicago Fed National Activity Index (CFNAI) which is a principal component of 85 economic indicators.

However, when coming to emerging markets, we don't have too many alternatives to employ. The McQueen and Roley (1993) methodology, which identifies the states of the local economy as a boom, recession and normal period via using industrial production, seems to be the most applicable one.

3.5.2 Reaction to lagged local returns conditional on the state of global conditions

Another important issue is whether foreign investors react differently to local returns across different global conditions. If risk tolerance of a global investor changes he/she may follow a different trading strategy with respect to local returns to adopt to his/her new investment plan that meets his/her new risk tolerance. We explore this issue by estimating VAR regressions of flows on local returns with dummy variables. We construct two separate return series that correspond to the periods of high and low global risk appetite levels as below.

$r_{high,\,t} = HIGH_t \, r_t$

$r_{low,\,t} = LOW_t \, r_t$

Where,

$HIGH_t = 1$ if the global risk appetite is in the high level at time t, and zero otherwise;

$LOW_t = 1$ if the global risk appetite is in the low level at time t, and zero otherwise;

We examine this issue by again following the VAR methodology as in specification (2), but using the newly constructed return series in place of the whole return series.

3.5.2.1 Classification of states of the global risk appetite

In order to investigate whether foreigners' response to local return varies across different global conditions, we need to classify the different levels of global risk appetite. We use the VIX index to determine the global risk appetite levels. It is better to see the historical levels of VIX to decide whether there is any upward or downward trend in our observation period. This is important because, if there is any trend we will follow the McQueen and Roley (1993) methodology and regress the actual log of the VIX value on a constant and trend. Then we will add and subtract a constant from the trend to create the upper and lower bounds as explained in the previous section to determine the economic states for each country. But if there is no trend there will be no need to create the upper and lower bounds following this method.

Before moving to the historical time series graph of the VIX it is useful to note that we prefer the observation period to be the same across five markets in order to make the analysis homogeneous. Therefore, the VIX period begins in June 2001 and ends in May 15,

2008 for all markets. Since every market has specific holidays we calculate related global risk appetite levels for each market by taking this fact into consideration. However, this issue makes a very small difference across countries. Therefore, for the sake of generality, we show only historical time series graph of the VIX index when the US market is open between June 2001 and May 15, 2008.

When looking at figure 3.2 we do not observe any trend in the historical VIX index levels within our observation periods. Therefore the trending method, as was employed in the previous section for determining the economic states, is not used to create the upper and lower bounds. Instead, we determine the relative standing of each VIX value within our observation period and denote "high" which has a value above the 75th percentile and denote "low" which has a value below the 25th percentile.

Figure 3.2 Historical VIX index values (06/2001-05/2008)

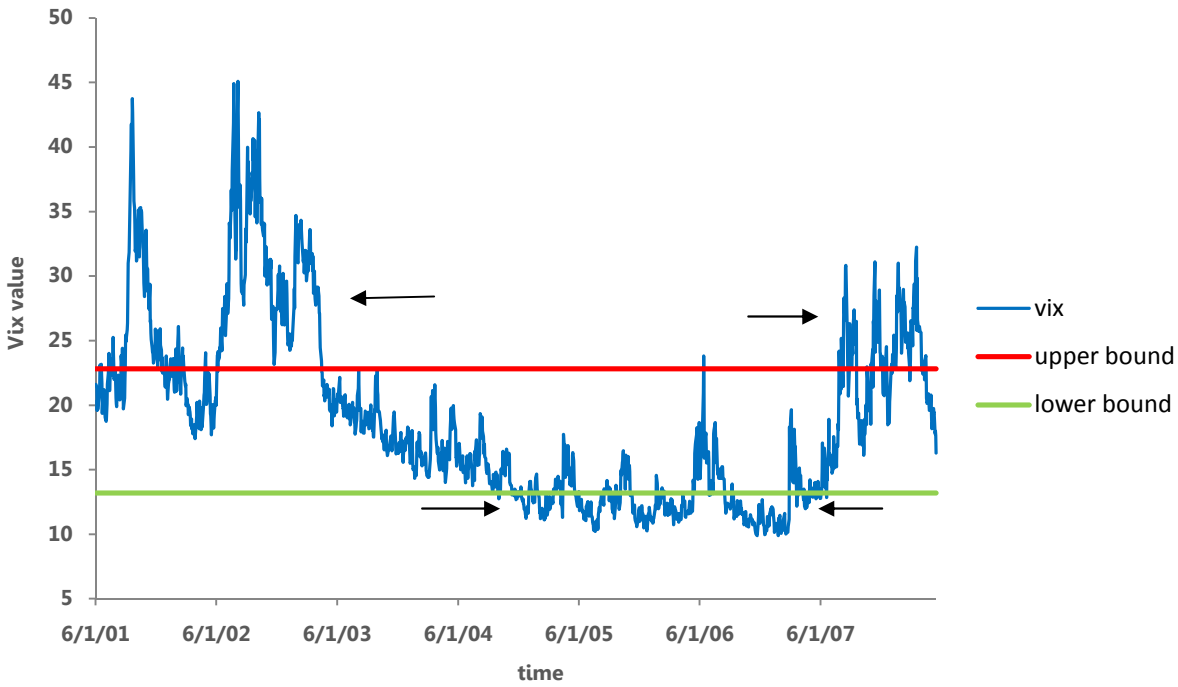


Figure 3.2 shows VIX index values with its constructed upper and lower bounds.The vertical axis shows actual VIX values. The horizontal axis shows time scale beginning in June 2001 and ending in May 2008. The blue line represents the actual VIX values, while red and green line represent upper and lower bounds respectively.

3.6 Descriptive statistics

In this section, we provide detail summary statistics for all the series used in our empirical analysis which includes five main variables namely net inflows, local returns, local exchange rate, S&P 500 and VIX. Table 3.5 shows summary statistics of net flows for each country in addition with the corresponding market capitalizations.

When looking at the Table 3.5 we see that the means of net inflows in each country are positive showing that foreigners have been net buyer on the average since June 2001. Standard deviation of net inflows relative to its mean is very high in the KOSPI market compared to standard deviations in other markets. In other words, net inflows in the Kospi markets experienced very high volatility during our observation period. In terms of skewness, net inflows in Indonesia are strongly positively skewed, whereas net inflows in other markets are slightly positively or negatively skewed.

Table 3.5 Summary statistics of net flows / Market Capitalization by country

	THAILAND(SET)	INDONESIA(JSE)	TAIWAN(TSE)	KOREA(KOSPI)	KOREA(KOSDAQ)
mean	3.18E-05	0.000134	0.000104	1.44E-06	5.00E-05
maximum	0.002991	0.007609	0.003575	0.002362	0.002835
minimum	-0.004663	-0.002607	-0.002929	-0.001945	-0.002932
std.dev	0.000383	0.000489	0.000451	0.00041	0.000389
skewness	-0.359179	6.050968	-0.145205	0.756409	0.081829
kurtosis	24.47175	68.71866	8.051955	6.879968	13.64756
Jarque-bera	31866.32	307740.5	1776.457	1200.264	7871.659
probability	0	0	0	0	0
observation	1657	1654	1665	1661	1661
Market Capitalization	197129	211692	663716	1016005	106601

This table shows summary statistics of net inflows (divided by the market capitalization) and market capitalization in million USD dollar for each country. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

For the kurtosis values, all net inflow series exhibit high levels of kurtosis showing that all series are leptokurtic. Especially net flows in Indonesia are very leptokurtic with the kurtosis value of 68 which shows that net inflows series in Indonesia is characterised by very frequent large changes than implied by the normal distribution. When looking at the Jarque-Bera test statistics we strongly reject the hypothesis of normal distribution for net inflows in all markets.

When looking at the summary statistics for the local returns reported in Table 3.6 the standard deviation of returns look quite similar. However, when comparing them with their mean values the standard deviation of Kosdaq return is much higher than its mean compared to those in other markets. In terms of risk-return trade-off the Kosdaq market is highly risky market relative to its expected return.

Table 3.6 Summary statistics of Local Return by country

	THAILAND	INDONESIA	TAIWAN	KOSPI	KOSDAQ
mean	0.000682	0.001142	0.00037	0.000671	9.48E-05
maximum	0.105954	0.076231	0.056126	0.077013	0.077678
minimum	-0.15155	-0.108531	-0.069123	-0.10862	-0.10704
std.dev	0.012966	0.014043	0.014153	0.015774	0.016632
skewness	-0.676151	-0.641818	-0.124087	-0.451525	-0.730475
kurtosis	17.36974	8.119796	4.918156	6.075759	7.507739
Jarque-bera	14382.63	1920.021	259.5257	711.1706	1558.688
probability	0	0	0	0	0
observation	1657	1654	1665	1661	1666

This table shows summary statistics of local return for each country. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

For skewness values, all return series are slightly negatively skewed. In terms of kurtosis, all series have high kurtosis values indicating that all series are leptokurtic. When coming to the Jarque-Bera test statistics the hypothesis of normal distribution for local return in all markets are strongly rejected at the 1% level.

When looking at the summary statistics for local exchange rates in Table 3.7 it is clearly seen from the mean values that all currencies, on the average, are appreciated against USD dollar during our observation period. Standard deviations are quite similar.
In terms of skewness values exchange rate return series are slightly positively skewed except for the Indonesian market which is moderately negatively skewed. When coming to kurtosis values we see that all series have high kurtosis values showing leptokurtic characteristics.
Jarque-Bera test statistics show that we can strongly reject the null hypothesis of normal distribution for all exchange return series at the 1% level.

Table 3.7 Summary statistics of Local Exchange rate by country

	THAILAND	INDONESIA	TAIWAN	KOSPI	KOSDAQ
mean	-0.000216	-9.19E-05	-6.74E-05	-0.000107	-0.000103
maximum	0.042103	0.05382	0.018477	0.033237	0.033237
minimum	-0.042551	-0.061976	-0.01557	-0.017334	-0.017334
std.dev	0.003162	0.006696	0.002529	0.003809	0.003793
skewness	0.428199	-0.851826	0.186027	0.609997	0.640039
kurtosis	45.11136	22.07358	10.26358	8.742642	8.737947
Jarque-bera	122486.8	25272	3669.796	2385.356	2399.223
probability	0	0	0	0	0
observation	1657	1654	1665	1661	1666

This table shows summary statistics of local exchange rate for each country. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

Table 3.8 Summary statistics of VIX

	THAILAND	INDONESIA	TAIWAN	KOSPI	KOSDAQ
mean	-0.000625	5.71E-05	0.000102	-4.74E-05	-4.74E-05
maximum	0.496008	0.496008	0.496008	0.496008	0.496008
minimum	-0.299872	-0.299872	-0.299872	-0.299872	-0.299872
std.dev	0.05748	0.058374	0.057853	0.058442	0.058442
skewness	0.624104	0.635534	0.640688	0.632775	0.632775
kurtosis	8.571421	8.258473	8.015536	8.237364	8.237364
Jarque-bera	2250.672	2016.995	1859.078	2002.995	2006.526
probability	0	0	0	0	0
observation	1657	1.654	1665	1661	1661

This table shows summary statistics of VIX for each country. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

The VIX period begins in June 2001 and ends in May 15, 2008 for all markets and every market has specific holidays. Even though, this issue makes small differences across countries we, nevertheless, report the summary statistics for VIX values which is included in each market own VAR regression.

For example, when looking at the VIX mean values in Table 3.8 while it is positive in Indonesia and Taiwan it is negative for other three markets. Standard deviations are almost similar across markets. For skewness values, VIX series are moderately positively skewed in all markets. In terms of kurtosis, VIX series in all markets are leptokurtic with having quite similar kurtosis values. Finally, Jarque-Bera test statistics show that the hypothesis of normal distribution for VIX series in all markets can be strongly rejected at the 1% level.

Table 3.9 Summary statistics of S&P 500

	THAILAND	INDONESIA	TAIWAN	KOSPI	KOSDAQ
mean	7.56E-05	2.71E-05	3.93E-05	6.85E-05	6.85E-05
maximum	0.055744	0.055744	0.055744	0.055744	0.055744
minimum	-0.050468	-0.050468	-0.042423	-0.050468	-0.050468
std.dev	0.010631	0.010626	0.010516	0.010646	0.010646
skewness	0.068828	0.069042	0.125094	0.070078	0.070078
kurtosis	5.569753	5.56822	5.348124	5.546178	5.546178
Jarque-bera	457.2338	455.8716	386.8545	450.0387	450.0387
probability	0	0	0	0	0
observation	1657	1654	1665	1661	1661

This table shows summary statistics of S&P 500 for each country. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

The period also begins for S&P 500 series in all markets in June 2001 and ends in May 15, 2008. We similarly report the summary statistics for S&P 500 values which is included in each market own VAR regression due to having specific holidays.

When looking at the standard deviations of S&P 500 series in Table 3.9 they have quite similar values in all markets. However, when comparing them with the corresponding mean values the S&P 500 series in the Indonesian market seems to be much riskier in terms of risk-return trade-off relative to S&P 500 series in other markets.

When looking at the skewness values, they are nearly symmetrical around the mean in all markets. For the kurtosis values, the S&P 500 series are leptokurtic in all five markets. Finally, Jarque-Bera test statistics show that we can strongly reject the null of normality for the S&P 500 series in all markets at the 1% level.

When looking at the summary statistics of local returns in high and low global risk appetite levels in Table 3.10 the first outstanding difference in return series across two risk

appetite levels is the means. The mean returns for all markets are negative when the global risk appetite is low, whereas they are positive when the global risk appetite is high. Standard deviations are quite similar across two risk appetite levels. In terms of skewness, while the return series in Thailand and Kosdaq are negatively skewed in the high global risk appetite levels it is negatively skewed only in Indonesia when the risk appetite is low. Other return series are either slightly positive or slightly negative across two risk appetite levels. For kurtosis, in both risk appetite levels, all return series are highly leptokurtic. It is also worth to note that return series for Thailand in the high risk appetite levels is extremely high leptokurtic with the kurtosis value of 229 compared to those in other markets.

When coming to normality test, Jarque-Bera test statistics show that we can strongly reject the null of normality for the return series in both risk appetite levels at the 1% level.

Table 3.10 Summary statistics of returns in High and Low Global risk appetite levels

High risk appetite

	Thailand	Indonesia	Taiwan	Kospi	Kosdaq
Mean	0.000243	0.000688	0.000369	0.000413	0.000499
Maximum	0.105954	0.030767	0.029698	0.040345	0.040351
Minimum	-0.15155	-0.0404	-0.032536	-0.030239	-0.085669
Std. Dev.	0.00648	0.005188	0.004073	0.004865	0.006081
Skewness	-5.128051	0.756885	0.364738	0.201041	-2.145607
Kurtosis	229.1335	14.67214	15.43218	15.88816	43.02172
Jarque-Bera	3537803	9547.05	10759.46	11507.01	112465.6
Probability	0	0	0	0	0
Observations	1657	1654	1665	1661	1666

Low Risk Appetite

	Thailand	Indonesia	Taiwan	Kospi	Kosdaq
Mean	-0.000114	-0.0003	-0.000176	-2.55E-05	-0.000256
Maximum	0.043341	0.076231	0.056126	0.077013	0.077678
Minimum	-0.044066	-0.108531	-0.059493	-0.10862	-0.10704
Std. Dev.	0.006553	0.008552	0.009385	0.010631	0.011105
Skewness	-0.096352	-1.631312	0.264148	-0.731829	-0.754857
Kurtosis	15.16099	34.76073	12.85862	21.31179	20.80851
Jarque-Bera	10213.11	70252.88	6762.091	23355.31	22173.23
Probability	0	0	0	0	0
Observations	1657	1654	1665	1661	1666

Table 2.6 shows Summary statistics of returns in high and low global risk appetite levels. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

Table 3.11 Summary statistics of returns in High and Low Local economic states

High Economic states

	Thailand	Indonesia	Taiwan	Kospi	Kosdaq
Mean	0.000172	6.54E-05	-2.10E-05	2.66E-05	3.90E-05
Maximum	0.046916	0.044291	0.054189	0.073635	0.053552
Minimum	-0.045751	-0.108531	-0.069123	-0.059007	-0.101109
Std. Dev.	0.006195	0.007084	0.007462	0.007795	0.008682
Skewness	-0.001495	-2.136434	-1.01734	-0.31945	-2.735899
Kurtosis	15.38657	44.96636	22.36258	19.77129	33.83253
Jarque-Bera	10650.4	122632.6	26296.54	19494.89	68069
Probability	0	0	0	0	0
Observations	1666	1654	1665	1661	1666

Low economic states

	Thailand	Indonesia	Taiwan	Kospi	Kosdaq
Mean	0.000185	0.000529	0.000311	0.00036	0.000167
Maximum	0.105954	0.054287	0.056126	0.057421	0.061334
Minimum	-0.15155	-0.065152	-0.040634	-0.074187	-0.088658
Std. Dev.	0.007287	0.006613	0.007101	0.007229	0.007922
Skewness	-3.730933	-0.364628	0.884743	-0.344088	-1.022941
Kurtosis	146.1867	26.92804	18.39942	21.96453	27.10049
Jarque-Bera	1427075	39494.95	16668.96	24923.78	40610.1
Probability	0	0	0	0	0
Observations	1666	1654	1665	1661	1666

Table 2.6 shows Summary statistics of returns in high and low local economic states. Observation period are the same for each market which starts in 01/06/2001 and goes through 16/05/2008.

When looking at the summary statistics of local returns across high and low economic states in Table 3.11 the mean returns for all markets are positive in both economic states except Taiwan. The mean of the return series is negative for Taiwan in the high economic states. Standard deviations of return series are quite similar in both economic states. In terms of skewness, in a similar vein, all series have negative skewness values in both economic

states except for Taiwan. It has positive skewness value in the low economic state. When comparing the skewness values of the return series they are strongly negatively skewed in Indonesia and Kosdaq in the high economic state and in Thailand in the low economic state. Other return series are moderately or slightly skewed. When coming to kurtosis, all return series are highly leptokurtic regardless of the economic states. Thailand has the highest kurtosis value with the 146 in the low economic state.

Finally, Jarque-Bera test statistics show that the null hypotheses of normal distribution for return series in all markets are strongly rejected at the 1% level in both economic states.

3.7 Results

VAR results are first presented in Table 3.12 and next we study our research questions by employing the impulse response functions (IRF), which are useful for analyzing the interactions between variables in a VAR model.

When looking at the Table 3.12 flows regressions in Panel A display several findings. First, apart from Indonesia, net flows are strongly related to their past values. For instance, one percent increase in yesterday's foreign flows in Kosdaq market leads to a 0.349 percent increase in today's flows. First lag coefficients are ranging from 0.035 to 0.349 across five markets. The impact of past flows decreases quickly at lag2 in all markets except for Indonesia. It increases in Indonesia at lag 2 though insignificant. Past flows is only significant at lag four in Indonesia. For the other markets, the impact of past flows persists out to lag 4.

Second, foreign flows are also highly influenced by the previous day's local return. For example, one percent increase in yesterday's Kosdaq market return leads to a 0.0032 percent increase in today's flows. Foreign flows in all markets are highly sensitive to yesterday's local returns, but this impact dies out quickly. The impact of lag 2 returns is also small and negative in three out of five markets.

Third, foreign flows are also related to Global risk appetite and S&P 500 returns. It is worth to mention that we employ the previous overnight S&P 500 returns and global risk appetite levels in our VAR rather than the same day values since the Pacific exchanges are closed when the US market opens for the day. Therefore, lag 1 is actually not the previous overnight variable values in our analysis. The response of flows to a shock in previous overnight S&P 500 returns and global risk appetite will be analyzed in depth via impulse response functions in the following section.

When turning to coefficients on S&P 500 returns we see that flows in all five markets are negatively related to S&P 500 returns at lag 1 though only in two out five markets are significant. The effect of S&P 500 on flows is smaller and also insignificant at longer lags for all markets. In a similar vein, flows in four markets are negatively related to global risk appetite at lag 1. The coefficients on global risk appetite at lag 1 are significant in two out of five markets. A point worth mentioning is that low values in the VIX index imply a high global risk appetite, whereas high values imply a low global risk appetite. In other words, foreign flows decrease following a decrease in yesterday's global risk appetite levels. When coming to exchange rate, flows are significantly negatively related with the exchange rate only in Taiwan. It is useful to note that an increase in the exchange rate corresponds to a

depreciation of the local currency. In this respect, foreign flows decrease following a depreciation in local currency yesterday in Taiwan. The effect of exchange rate on flows is insignificant at longer lags for all markets.

Our interest is focused on the behaviour of foreign flows rather than returns. Nevertheless, Table 3.12 also displays return equation of the VAR which investigates the relationship between current market returns and past foreign flows, past returns and as well as lagged of other variables.

When looking at the table 3.12, we find that foreign flows are significant predictors of local returns at lag 1 for four markets except Indonesia. This shows that foreigners are buying before price increases. The impact of foreign flows on current returns is small and insignificant at longer lags. However, in Taiwan lagged two periods foreign flows are negative and significant.

When looking at the past local returns all local returns are significant at lag 1. Returns in Kospi, Taiwan and Thailand are negatively related, whereas returns in Indonesia and Kosdaq are positively related. At longer lags, local returns are sometimes negatively and sometimes positively related to current returns. Lagged three-period returns for Taiwan and lagged four-period returns for Kospi, Kosdaq and Taiwan are significant.

Moving to coefficient on the S&P 500 returns we find that they are only significant in Indonesia at lag 1. However, at lagged two and three periods coefficients on the S&P 500 in three out of five markets are significant. When looking at the coefficients on the global risk appetite we see that for two out of five markets they are significant at lags 1 and at lags 2.

Finally, when looking at the exchange rate we find that local exchange rate is significant predictor for current return in Taiwan at lag 1. However, the exchange rate is also significant at lagged two-and three periods in Kospi.

Table 3.12 Vector Autoregression of Returns and Net Flows by Country

	Indonesia	Kospi	Kosdaq	Taiwan	Thailand
			Panel A: Flow Equations		
intercept	1.08E-02	0.00	2.0E-05	4.56E-05	1.21E-05
p-value	(0.00)	(0.98)	(0.00)	(0.00)	(0.11)
netflows lag1	0.0352	0.3122	0.3493	0.3259	0.3251
p-value	(0.15)	(0.00)	(0.00)	(0.00)	(0.00)
netflows lag2	0.0385	0.1273	0.0938	0.0472	0.1343
p-value	(0.11)	(0.00)	(0.00)	(0.08)	(0.00)
netflows lag3	0.0282	0.0881	0.0535	0.1094	0.09
p-value	(0.25)	(0.00)	(0.04)	(0.00)	(0.00)
netflows lag4	0.0618	0.0866	0.039	0.0559	0.0626
p-value	(0.01)	(0.00)	(0.11)	(0.02)	(0.01)
returns lag1	0.2206	4.5E-03	3.27E-03	3.62E-03	7.21E-03
p-value	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
returns lag2	0.0338	-2.0E-04	-1.96E-03	5.81E-04	-8.94E-04
p-value	(0.71)	(0.72)	(0.00)	(0.39)	(0.19)
returns lag3	0.1078	-1.6E-03	-6.53E-04	1.22E-03	-7.13E-04
p-value	(0.23)	(0.00)	(0.23)	(0.07)	(0.3)
returns lag4	-0.1072	-1.1E-03	1.96E-04	-1.23E-03	-2.16E-03
p-value	(0.24)	(0.05)	(0.72)	(0.06)	(0.00)
sp500 lag1	-0.2428	-4.1E-03	-4.68E-04	-1.65E-03	-3.17E-03
p-value	(0.15)	(0.00)	(0.69)	(0.18)	(0.00)
sp500 lag2	0.0598	-2.0E-04	-6.41E-04	8.57E-04	-3.40E-04
p-value	(0.72)	(0.85)	(0.59)	(0.48)	(0.74)
sp500 lag3	0.3332	1.00E-04	5.55E-04	-1.94E-04	8.73E-04
p-value	(0.05)	(0.92)	(0.64)	(0.87)	(0.41)
sp500 lag4	0.1633	1.10E-03	1.41E-03	1.96E-04	1.01E-03
p-value	(0.34)	(0.33)	(0.23)	(0.87)	(0.34)

Table (3.12) continued

VIX lag1	-0.0368	-7.00E-04	1.00E-05	-1.95E-04	-3.92E-04
p-value	(0.24)	(0.00)	(0.95)	(0.36)	(0.04)
VIX lag2	-0.001	-2.00E-04	-2.74E-04	-2.38E-04	-1.69E-04
p-value	(0.97)	(0.2)	(0.21)	(0.26)	(0.39)
VIX lag3	0.0536	-1.00E-04	3.13E-04	8.15E-05	5.43E-05
p-value	(0.09)	(0.55)	(0.15)	(0.7)	(0.77)
VIX lag4	0.0422	1.00E-04	3.00E-05	-3.88E-04	1.19E-04
p-value	(0.18)	(0.34)	(0.87)	(0.06)	(0.53)
FX lag1	0.1075	-5.00E-04	1.61E-04	-0.0135	1.18E-03
p-value	(0.56)	(0.79)	(0.94)	(0.00)	(0.62)
FX lag2	0.063	1.30E-03	-1.12E-03	-4.21E-03	1.77E-03
p-value	(0.73)	(0.54)	(0.62)	(0.2)	(0.46)
FX lag3	-0.1881	-2.80E-03	-1.12E-03	2.57E-03	4.19E-03
p-value	(0.3)	(0.17)	(0.66)	(0.44)	(0.07)
FX lag4	0.0347	2.90E-03	-6.85E-04	-1.35E-03	7.31E-04
p-value	(0.84)	(0.15)	(0.75)	(0.68)	(0.75)
		Panel B: Return Equations			
intercept	0.0011	0.0008	0.000005	0.0003	0.0007
p-value	(0.00)	(0.02)	(0.98)	(0.39)	(0.00)
netflows lag1	0.0046	2.725	2.5279	3.906	2.86
p-value	(0.49)	(0.02)	(0.03)	(0.00)	(0.01)
netflows lag2	-0.0045	-1.2427	-0.699	-4.375	-0.735
p-value	(0.5)	(0.31)	(0.57)	(0.00)	(0.55)
netflows lag3	-0.0012	0.0198	-0.196	1.503	-1.43
p-value	(0.85)	(0.84)	(0.87)	(0.16)	(0.23)
netflows lag4	0.0024	0.058	0.635	-0.667	1.154
p-value	(0.71)	(0.55)	(0.57)	(0.49)	(0.27)
returns lag1	0.0855	-0.0606	0.06	-0.086	-0.0817
p-value	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
returns lag2	-0.0398	-0.1059	0.014	-0.015	-0.0034
p-value	(0.11)	(0.00)	(0.57)	(0.57)	(0.9)
returns lag3	0.0412	-0.0179	0.006	0.0624	0.014
p-value	(0.1)	(0.51)	(0.79)	(0.02)	(0.62)
returns lag4	-0.02	-0.0775	-0.052	-0.049	-0.018
p-value	(0.42)	(0.00)	(0.04)	(0.05)	(0.49)

Table (3.12) continued

sp500 lag1	-0.117	-0.0391	-0.0115	0.028	-0.0714
p-value	(0.01)	(0.49)	(0.84)	(0.56)	(0.1)
sp500 lag2	0.1778	0.0926	0.0776	0.093	0.0979
p-value	(0.00)	(0.1)	(0.17)	(0.05)	(0.02)
sp500 lag3	0.02	0.1554	0.102	0.01	0.114
p-value	(0.67)	(0.00)	(0.07)	(0.83)	(0.01)
sp500 lag4	0.019	0.1403	0.0509	0.0038	-0.044
p-value	(0.68)	(0.01)	(0.36)	(0.93)	(0.32)
VIX lag1	-0.0117	-0.023	0.01	0.007	-0.022
p-value	(0.18)	(0.01)	(0.28)	(0.4)	(0.00)
VIX lag2	0.0158	-0.0185	-0.0032	-0.0008	0.0026
p-value	(0.07)	(0.05)	(0.75)	(0.92)	(0.74)
VIX lag3	-0.0048	0.00484	0.008	0.0002	0.0016
p-value	(0.57)	(0.61)	(0.41)	(0.97)	(0.84)
VIX lag4	-0.0028	0.0153	0.0004	-0.015	-0.0092
p-value	(0.74)	(0.11)	(0.96)	(0.06)	(0.25)
FX lag1	0.0431	0.0379	0.044	-0.3918	0.0918
p-value	(0.4)	(0.71)	(0.67)	(0.00)	(0.36)
FX lag2	-0.0523	-0.017	0.1868	-0.1128	0.065
p-value	(0.31)	(0.86)	(0.08)	(0.39)	(0.52)
FX lag3	-0.0673	0.0198	-0.1946	-0.067	0.0656
p-value	(0.18)	(0.84)	(0.07)	(0.61)	(0.36)
FX lag4	0.0109	0.058	0.1109	0.01	-0.033
p-value	(0.82)	(0.55)	(0.29)	(0.93)	(0.73)

This table shows VAR results based on specification (2) for five markets namely Indonesia, Kospi, Kosdaq, Taiwan and Thailand. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

3.7.1 Impulse response analysis

We test our hypotheses by analyzing impulse-response functions (IRF), as is the common treatment in this line of literature. In all our IRF graphs to follow, they include a point estimation of impulse response functions which is represented by the black line. We also compute error bands for impulse responses using Monte Carlo simulation procedure of

Sims and Zha (1999), as was employed in previous chapter, represented by the upper and lower blue lines.

3.7.2 The impact of broad market returns on foreigners' trading

We first analyze the response of net inflows (normalized by the previous day's market capitalization) to innovations in the S&P 500 returns, since previous studies such as Griffin *et al* (2004) and Richards (2005) document a significant response for foreign equity flows to past US returns. Accordingly, as mentioned in section 3.6, our VAR system also includes S&P 500 return as a determinant of net inflows for a typical emerging economy. On this basis, figure 3.3 shows the accumulated effects of a one standard deviation innovation in the S&P 500 return over a 20 day period. This will tell us how foreign inflows react over a 20 day period when giving a shock to the S&P 500 return in the system. Impulse response functions start from period 0 as the US returns are assumed to have a contemporaneous effect on net inflows in each market.

In four out of five markets we find that the accumulated effects of US return shocks on net inflows are positive and significant out to 20 lags. In the fifth case (Indonesia) although the point estimate is positive the cumulative response is not significant up to third lag. However, from that point forwards it turns out to be significant and remains significant thereafter. A shock in the S&P 500 returns has different impacts at different periods on foreign flows. For example, the biggest impacts are observed in the contemporaneous periods with 35%, 37%, 40%, 42% and 44% of the total effect for Indonesia, Kosdaq, Taiwan, Thailand and Kospi respectively.

In the KOSPI case in figure 3.3, the estimate of 0.0102% for period 0 implies that for an unanticipated one standard deviation increase (corresponding to 1.063%) in the previous night S&P 500 return, foreign net inflows in KOSPI increase by 0.0102% of market capitalization. Other estimates for the period 0 in other markets are interpreted similarly. When coming to the cumulative responses they correspond to 0.54%, 1.01%, 2.31%, 2.34% and 0.98% of market capitalization for Indonesia, Kosdaq, Kospi, Taiwan and Thailand respectively. These ratios defined in percentages show how big an additional foreign demand is compared to the total supply of available shares after a shock in the S&P 500.

Our median estimate for these five markets cannot be compared directly with the median estimate of Richards (2005) that was obtained for six Asia-Pacific markets due to the fact that our SVAR includes three exogeneous variables namely, US returns, VIX and the local exchange rate compared to only one exogeneous variable, namely US returns, employed in Richards (2005) study. Furthermore, our observation period starts in June 2001 and ends in May 2008 whereas he studied the period between January 1999 and December 2002. Therefore we do not compare our estimates with the estimate of Richards (2005). However, to see whether our inferences change when including additional exogeneous variables we estimate our SVAR regression with and without some of the exogeneous variables.

When including only one exogeneous variable namely US returns as employed in Richards (2005), we find a median estimate of 3.89 % of market capitalization as a cumulative response for net inflows in response to a 1% innovation in US returns, whereas our median estimate is found to be 0.95% of the market capitalization to a similar innovation in the US returns when including our additional exogeneous variables. Based on these results, we can suggest that adding additional exogeneous variables changes the measured effect of

US returns on foreign inflows. Since both VIX and the local exchange rate are found significant it justifies the need for using control variables.

Figure 3.3 VAR Impulse Responses of Net Inflows to a Positive Shock in U.S. Returns

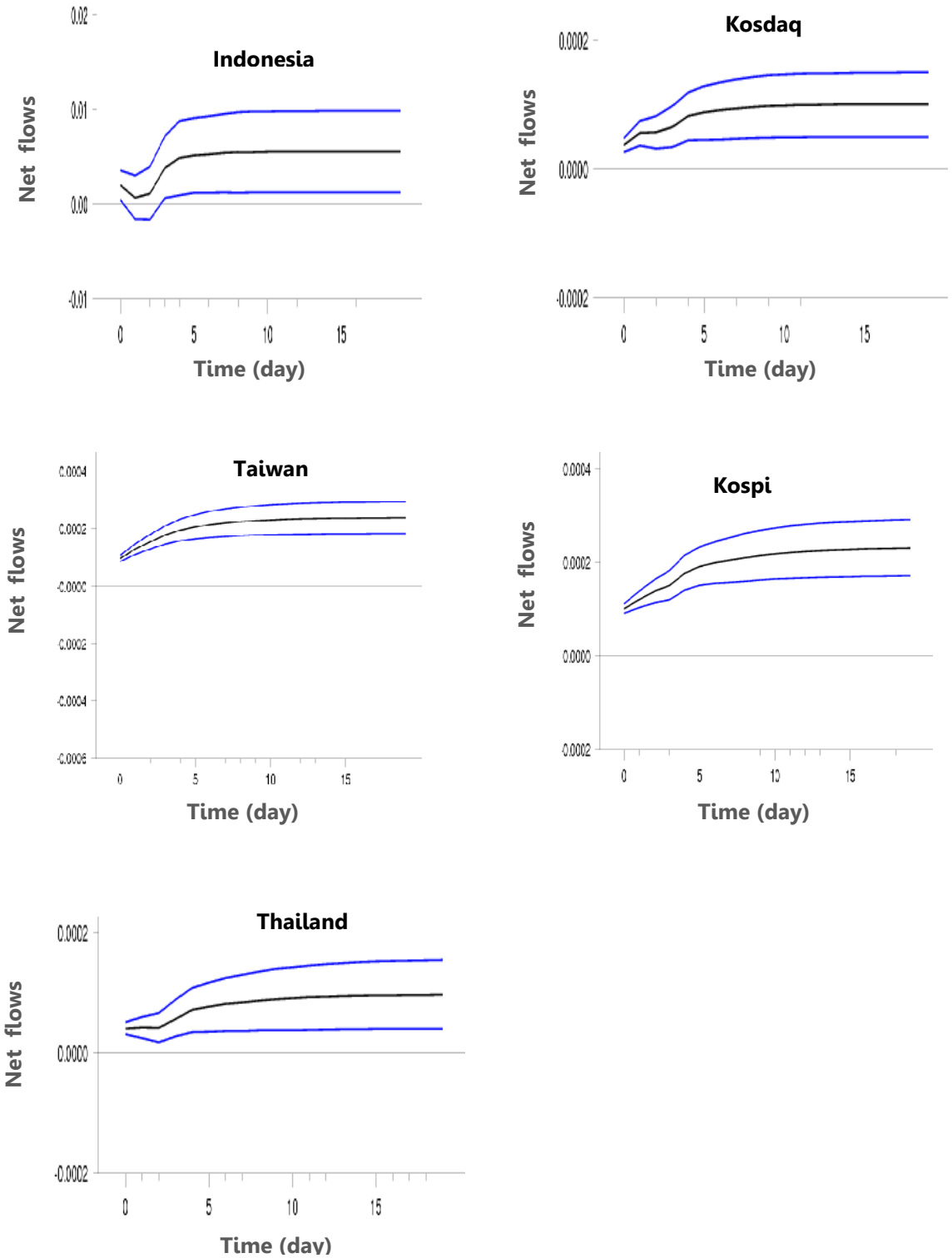


Figure 3.3 shows VAR Impulse Responses of Net flows in five markets to a one standard deviation positive shock in U.S. Returns. The markets namely Indonesia, Kosdaq, Taiwan, Kospi, and Thailand are portrayed in Panel A, B, C, D, and E respectively. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.7.3 The impact of global risk appetite on foreigners' trading

In this section, we analyze the impact of global risk appetite on net inflows. We test the hypothesis one by studying the impulse response functions as is customary in this line of research. It is useful to mention that we use the VIX index as a proxy for global risk appetite. In terms of scores in the VIX index low values represent trader confidence, which is generally associated with a low level of volatility, whereas high values correspond to the opposite, since it is generally associated with a large amount of volatility sourced from investor fear. On this basis, low values in the VIX index imply a high global risk appetite, whereas high values imply a low global risk appetite. Therefore, we prefer to present our results as the impulse response of a negative shock rather than positive shock in the VIX index on foreign inflows in order to facilitate the analysis.

When we move to the response analysis in figure 3.4, regarding the hypothesis one, we find that in four out of five markets the accumulated effects of a one standard deviation negative shock in the VIX index on net inflows are positive and significant. However, for the Indonesian case, the cumulative impulse response is positive and significant out to the third lag but becomes insignificant thereafter. The question then arises as to what makes Indonesia different. One explanation, which we find most consistent with the data, is that foreigners in Indonesia are likely to overreact to a negative shock in the global risk appetite, resulting in a high increase in net purchases followed by partial corrections. When we look at the impulse response graphs we see that subsequent net inflows after the third lag exhibit partial reversals making the cumulative response insignificant but still positive. We can regard this as evidence of partial overreaction.

In addition, the cumulative impulse response of foreigners in Indonesia to a shock in global risk appetite is just the opposite compared to that found to a shock in U.S returns. It is positive and significant out to the third lag and remains positive but becomes insignificant thereafter. In a similar vein, as mentioned previously, the impacts are different at each period and we find the largest impacts in the contemporaneous periods with 30%, 31%, 35%, 40% and 61% of the total impact for Kospi, Thailand, Taiwan, Kosdaq and Indonesia respectively. For example in the Indonesian case, a one standard deviation negative shock in the previous day's VIX index leads to an increase in net inflows by 0.024% of market capitalization.

The cumulative responses of net inflows to a negative innovation in the VIX index are 0.39%, 1.6%, 2.4%, 3.3% and 4.6% of market capitalization for Indonesia, Kosdaq, Thailand, Kospi and Taiwan, respectively. Moving from these results it is obvious that an increase in global investor confidence creates relatively more foreign demand in Taiwan compared to the total supply of available shares in respective local markets. As a result, regarding the hypothesis one, it is clear that an increase in global risk appetite causes an increase in net inflows to emerging markets which is consistent with our expectation. One explanation for our finding is that since the risk appetite of international investors is constantly changing, international investors continuously try to balance their portfolios in order to meet their risk tolerance. In this scenario, they want to shift their portfolio to a more conservative allocation following a decrease in their risk tolerance levels. In our research the question of interest to us is actually whether the trading of international investors in emerging markets is affected by the developments in global risk appetite even on a daily basis and our findings show that it is. This finding is important because it is generally believed that international investors revise their portfolios annually or quarterly rather than on a daily basis, which actually ignores the impact of global risk appetite on the formation of portfolios on a daily basis. However, our

results reveal a different story about the formation and management of international portfolios sourced from changing global risk appetite.

It is also worth mentioning that our SVAR model also includes the US returns and local exchange rate as exogeneous variables in addition to global risk appetite. Therefore, our findings shed new light on the issue of whether global risk appetite affects foreign inflows in the presence of other exogeneous variables in emerging markets. Thus, our study documents the first evidence about the impact of global risk appetite on foreigners' trading in emerging markets.

Figure 3.4 VAR Impulse Responses of Net Inflows to a negative shock in VIX index

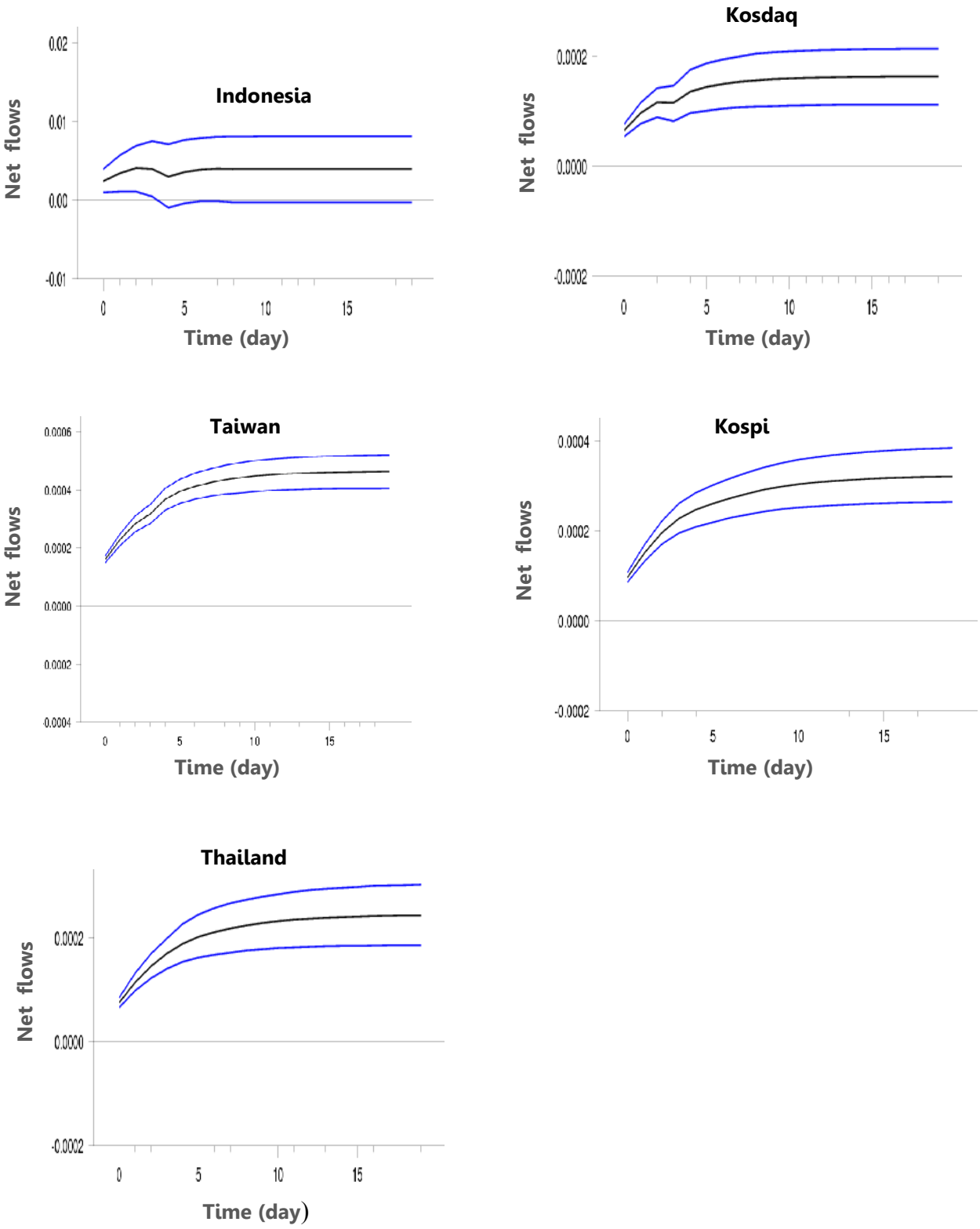


Figure 3.4 shows VAR Impulse Responses of Net flows to a negative shock in VIX in five markets. The markets namely Indonesia, Kosdaq, Taiwan, Kospi, and Thailand are portrayed in Panel A, B, C, D, and E respectively. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.7.4 The impact of local exchange rate on foreigners' trading

Exchange rate changes are known to have a contemporaneous correlation with local equity markets. In a similar vein, net flows are also documented to have a contemporaneous correlation with local return. However, if net inflows are influenced by the exchange rate then the apparent correlation between net inflows and local returns could be proxying for the correlation between the exchange rate and local return. Therefore, following Griffin *et al* (2004), we also include exchange rate changes as an exogeneous variable in our SVAR model. We investigate the response of net inflows to a one standard deviation positive shock in the local exchange rate. Estimated impulse response functions are reported in figure 3.5. The immediate impact can be seen in period 0 as the local exchange rate affects net inflows contemporaneously in each market.

When we turn to analyze the responses of net inflows following a one standard deviation shock in the exchange rate we come up with puzzling results. The accumulated impulse responses of net inflows are negative in four out of five markets. In other words a positive exchange rate shock, which corresponds to a depreciation of the local currency, causes foreigners to sell their stocks. In the Kospi and Kosdaq markets the responses are negative, but not statistically significant, but in Thailand and Taiwan the cumulative responses are both negative and statistically significant. Only in Indonesia is the cumulative response positive though not significant. These results may seem at first glance somewhat puzzling, since they are not consistent with what is predicted. A depreciation of the local currency is expected to increase foreign equity inflows as is found for Indonesia, though the relationship is not statistically significant. However, it seems to us that more factors are at work. These investors are actually equity investors. Therefore, it may be very reasonable for

them to specifically focus on stock prices rather than the change in the foreign exchange rate. On this basis, a possible explanation for this response is foreign investors' perceptions on the stability of the local economy. In an environment where foreigners are at an informational disadvantage relative to domestic investors they may use the exchange rate as a proxy for local macroeconomic fundamentals and use these signals in making buy/sell decisions. In this scenario, a depreciation of the local currency may signal negative conditions about the economy which leads them to sell stocks.

Figure 3.5: VAR Impulse Responses of Net Inflows to a positive shock in exchange rate

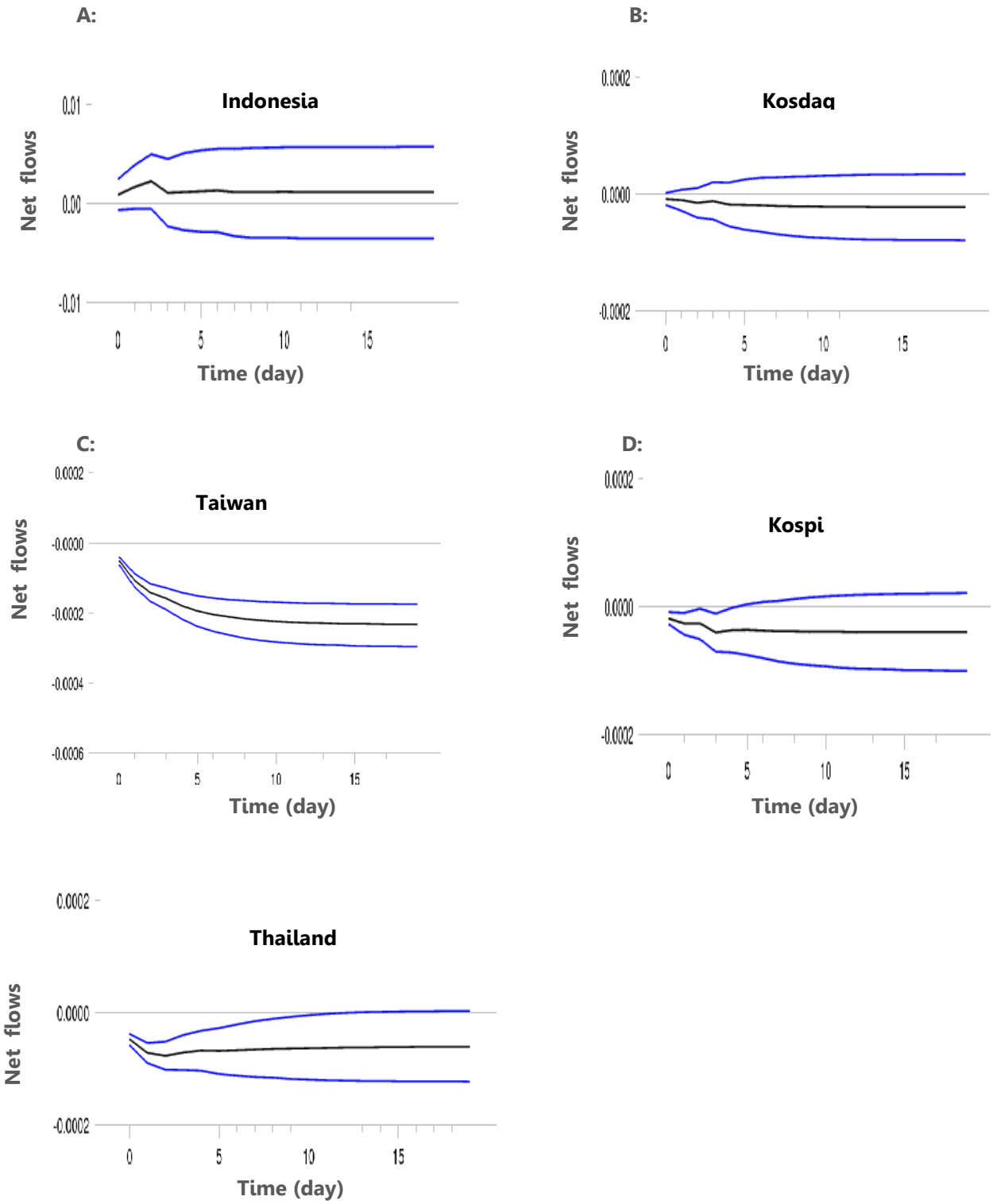


Figure 3.5 shows VAR Impulse Responses of Net flows to a positive shock in the local exchange rate in five markets. The markets namely Indonesia, Kosdaq, Taiwan, Kospi, and Thailand are portrayed in Panel A, B, C, D, and E respectively. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.7.5 The impact of local returns on foreigners' trading

The main question investigated in this line of research is whether foreign equity flows are determined by past local returns. In other words, whether foreign investors engage in positive feedback trading strategies with respect to local return. Therefore, in this sub-section, our research does not differ from previous studies by examining the relationship between foreign inflows and local return, since all previous studies, with few exceptions, have already documented positive feedback trading for foreign investors in emerging markets. The key contributions of our work regarding the behaviour of foreign investors with respect to local return will be presented in the following sections. However, since in the following sections we will investigate the interaction between foreign inflows and local returns, taking the changing global and local conditions into consideration, it is useful here to examine the relationship between foreigners' trading and local returns for the whole sample as a starting point for our analysis. Thus, in this section we study the response of net purchases of foreigners to innovations in local returns. The cumulative responses of net purchases to innovations in local returns are portrayed in figure 3.6. Impulse response functions for net inflows start at period 1 rather than period 0 as we place the net purchases of foreigners first in the order which indicates that net purchases of foreigners contemporaneously affect local returns, but not vice versa. This way, local returns can only affect net purchases with a lag.

When we move to the results we find that in three markets, namely Indonesia, Thailand and Taiwan, the cumulative responses of net inflows to a one standard deviation shock in local returns are both positive and statistically significant. In the Kosdaq and Kospi markets the cumulative responses of net inflows are also positive, but not statistically significant. However, while in the first three lags for the Kosdaq market and four lags for the

Kospi market the cumulative responses are found to be statistically significant, they become insignificant thereafter, but remain positive out to 20 lags. Since local return affects net inflows with a one period lag, the biggest impact on net flows can be observed in the first period with 43%, 67% and 87% of the total impact for Taiwan Indonesia and Thailand respectively. Since accumulated total impacts of local returns on net inflows decrease after the first and second periods for Kosdaq and Kospi, respectively, the impacts of local returns on net inflows in their first periods exceed the total impact. The cumulative responses of net inflows to a one standard deviation shock in local returns correspond to 0.29%, 0.43%, 0.48%, 0.91% and 0.98% of market capitalization for Kosdaq, Indonesia, Kospi, Thailand and Taiwan respectively. Given these results it is obvious that a one standard deviation increase in yesterday's local returns leads to a relatively large increase in foreign demand in Taiwan compared to the total supply of available shares in the respective local markets.

It is clear from these estimates that the cumulative median impact of US returns on net inflows is much higher than the cumulative median impact of local returns on net inflows, with the estimates of 0.95% versus 0.48% of market capitalization. This finding is similar to those of Griffin *et al* (2004) and Richards (2005) who examine foreigners' trading in emerging markets on a daily basis. Finally, our results support the notion that foreign investors are positive feedback traders with respect to local return.

Figure 3.6 VAR Impulse Responses of Net Inflows to a Positive Shock in Local Return

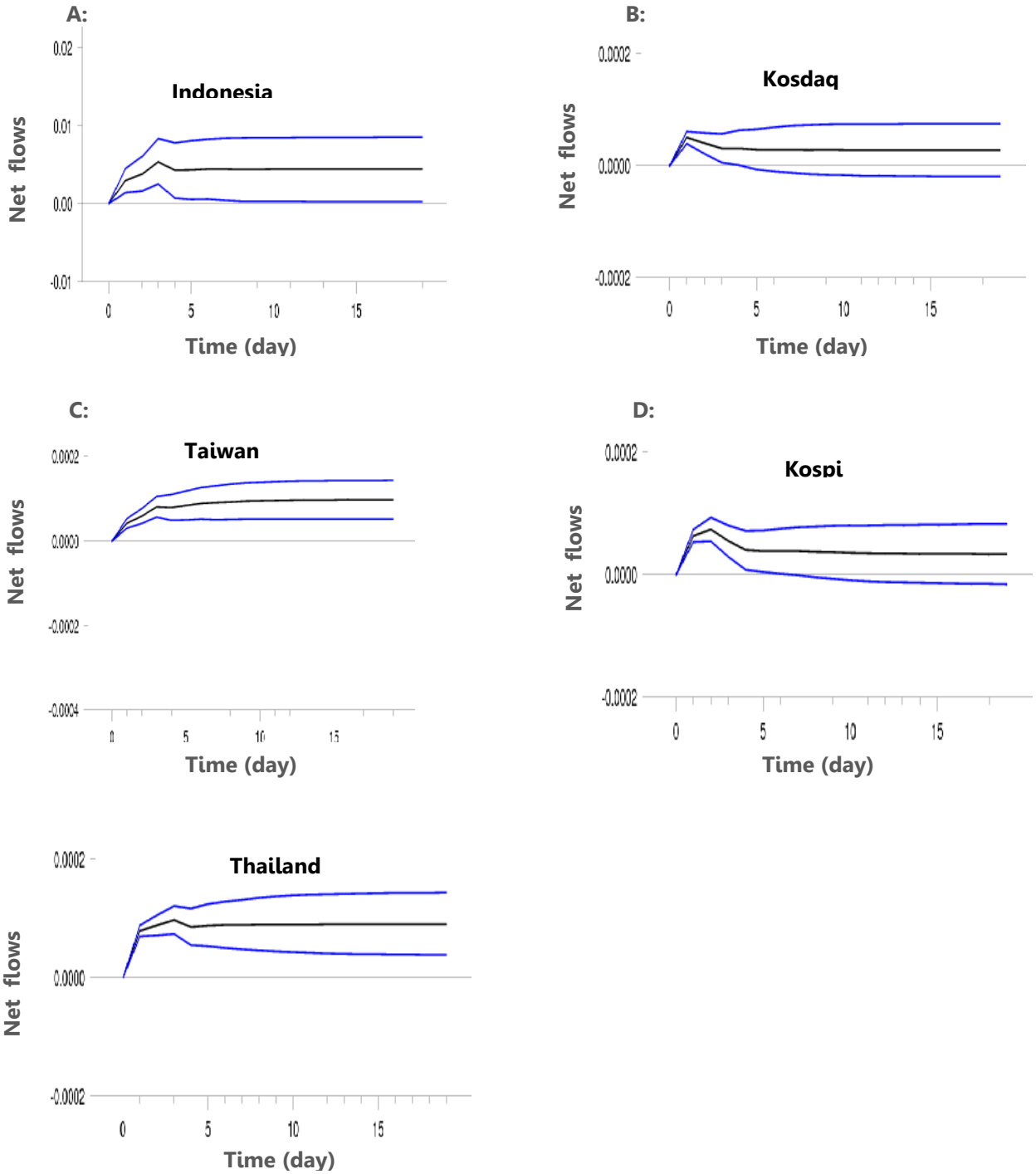


Figure 3.6 shows VAR Impulse Responses of Net flows to a positive shock in local return in five markets. The markets namely Indonesia, Kosdaq, Taiwan, Kospi, and Thailand are portrayed in Panel A, B, C, D, and E respectively. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.7.6 The impact of local returns on foreigners' trading at different global risk appetite levels

In section 3.8.4, similar to the findings of previous studies we find that foreign investors follow positive feedback trading strategies with respect to local return. The contribution of this section lies in being the first attempt to relate foreigners' trading strategies to global risk appetite. To this end, we classify levels of global risk appetite as "high" and "low". We then estimate our impulse response functions for foreign net flows to a one standard deviation shock in local return in the high and low risk levels separately. The hypothesis two is tested by looking at the cumulative impulse responses in these two different VAR systems in terms of sign and significance criteria in the two different levels of global risk appetite. As mentioned before, since we are dealing with cumulative impulse responses in two different systems we do not employ wald tests as is typically employed to determine whether the coefficients are significantly different in a classical linear regression or in a system of regressions. With a VAR, we are generally interested in the overall behaviour of the model rather than in the individual coefficient values, or the significance of individual coefficients.

We report the cumulative responses of foreign inflows to a shock in local returns in figure 3.7. Responses in both high and low risk appetite levels are portrayed side by side. Regarding the hypothesis two, when looking at the impulse response graphs we come up with interesting results. A first point to mention is that in three out of five markets namely Indonesia, Kosdaq and Kospi the cumulative responses of foreign inflows to a one standard deviation shock in local return are different across high and low risk appetite levels. For example, in Kosdaq, while the cumulative impulse response of foreign inflows is negative with borderline significance in high levels of global risk appetite, it is found to be positive

and statistically significant in low global risk appetite levels. This implies that foreign investors are positive feedback traders at times when the global risk appetite is low and negative feedback traders at times when the global risk appetite is high. Given this finding, the question then arises as to what might be the cause of this behavioural difference in the Kosdaq market. One explanation is that foreigners use recent local returns as information signals only at times when they have a low appetite for risk, whereas they use other information sources as information signals for expected return of the local market at times when they have a high appetite for risk. The reason for this kind of behaviour can lie in an ambition to earn money when they have a high appetite for risk. Thus, they may prefer to use other information sources rather than just chasing recent returns.

Similar responses are also found for foreign inflows in Kospi although they are insignificant. Since Kosdaq and Kospi are the two stock markets in South Korea, it is not surprising that we obtain the same behaviours for foreigners in Kospi market. However, when looking at the case of Indonesia the result is puzzling, because, our finding is just the opposite behaviour compared to that found in the Kosdaq and Kospi markets. That is to say, the cumulative impulse responses of foreign inflows to a shock in local returns in Indonesia is found to be positive, with borderline significance in high risk appetite levels, while it is found to be negative though insignificant in low risk appetite levels. In other words, foreign investors act in a contrarian style with respect to local returns when their risk appetite is low and act in a momentum manner when their risk appetite is high.

One possible explanation for the negative feedback trading in Indonesia when foreigners are risk averse may result from foreign investors' perceptions on valuations. When foreigners are more risk averse they may be more sensitive about pricing the assets and they

may have weaker extrapolative expectations for that local market than those they have when they are less risk averse. That may be why foreigners are positive feedback traders when they are less risk averse since they have stronger extrapolative expectations for that local market than those they have when they are more risk averse.

However, in terms of foreign investors, a question still remains as to what makes Indonesia different from Kospi and Kosdaq. One possible explanation for this difference is that since Korea market is nearly five times as big as Indonesia's in terms of market capitalization global institutional investors can prefer to invest relatively more in Korea compared to Indonesia, and it is also plausible to believe that global institutional investors can invest in information sources, thanks to their size, global experience, talent and resources which renders them to be at an informational advantage relative to locals. Therefore, foreigners in Korea may not be more sensitive about pricing the local assets when global risk appetite is low compared to foreign investors in Indonesia. In this scenario, foreigners in Korea may even have advantages in analyzing push factors, especially at times when domestic markets are highly influenced by global factors, in other words when the global risk appetite is high, compared to foreigners in Indonesia.

When we move to the reactions of foreigners following a shock in local returns in the Taiwan and Thailand markets we find positive cumulative impulse responses for foreign flows in each market at both risk appetite levels. In Taiwan, both responses are positive with borderline significance levels, whereas in Thailand despite having positive responses in both risk appetite levels it is found to be statistically significant only in the low risk appetite level. Given the above, our results for Thailand and Taiwan demonstrate that foreigners in these markets use recent local returns as the only information signal. In other words they have

extrapolative expectations about the expected returns of the local market irrespective of their risk tolerance levels.

Figure 3.7 VAR Impulse Responses of Net Inflows to a positive shock in local return at low and high periods of global risk Appetite.

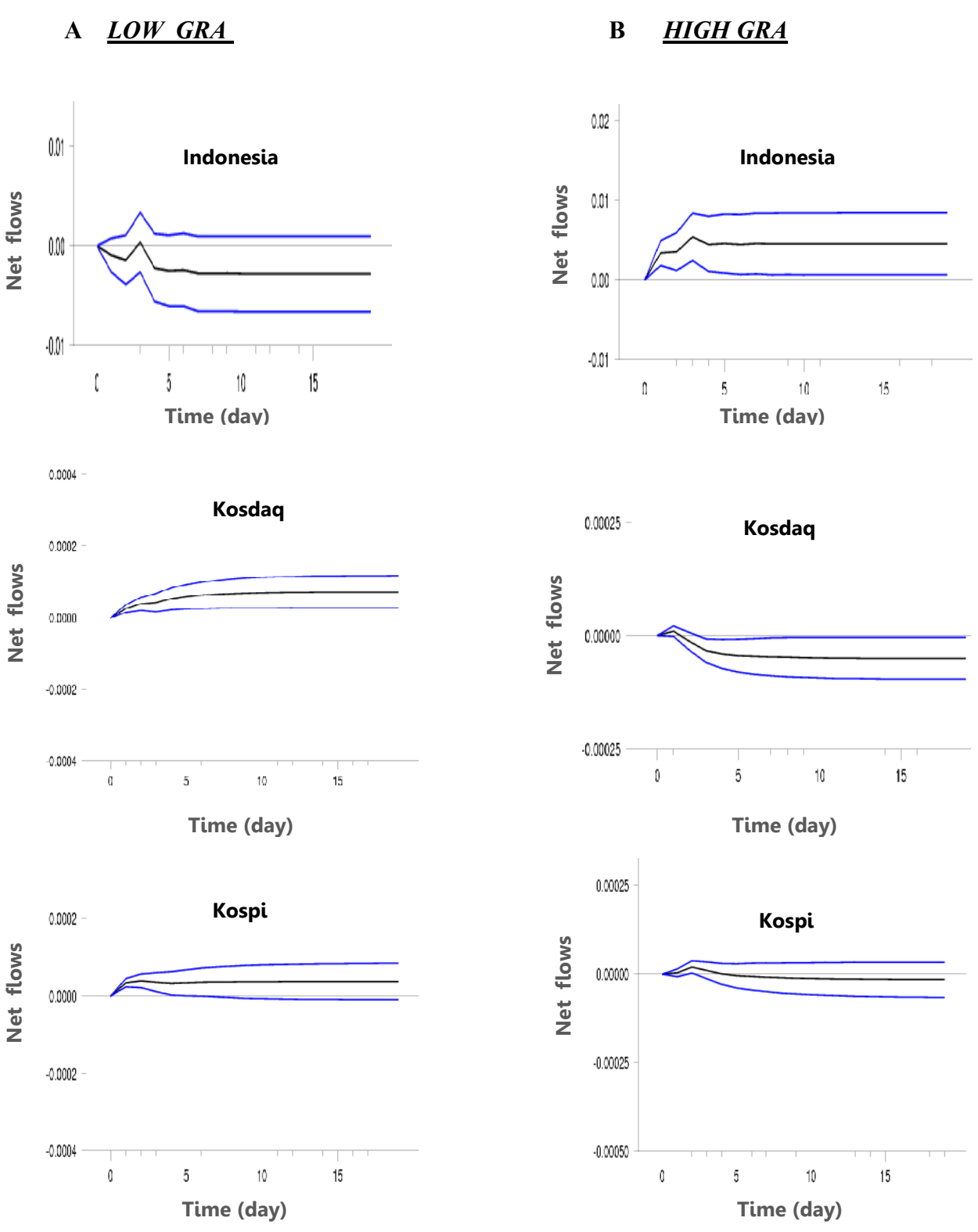
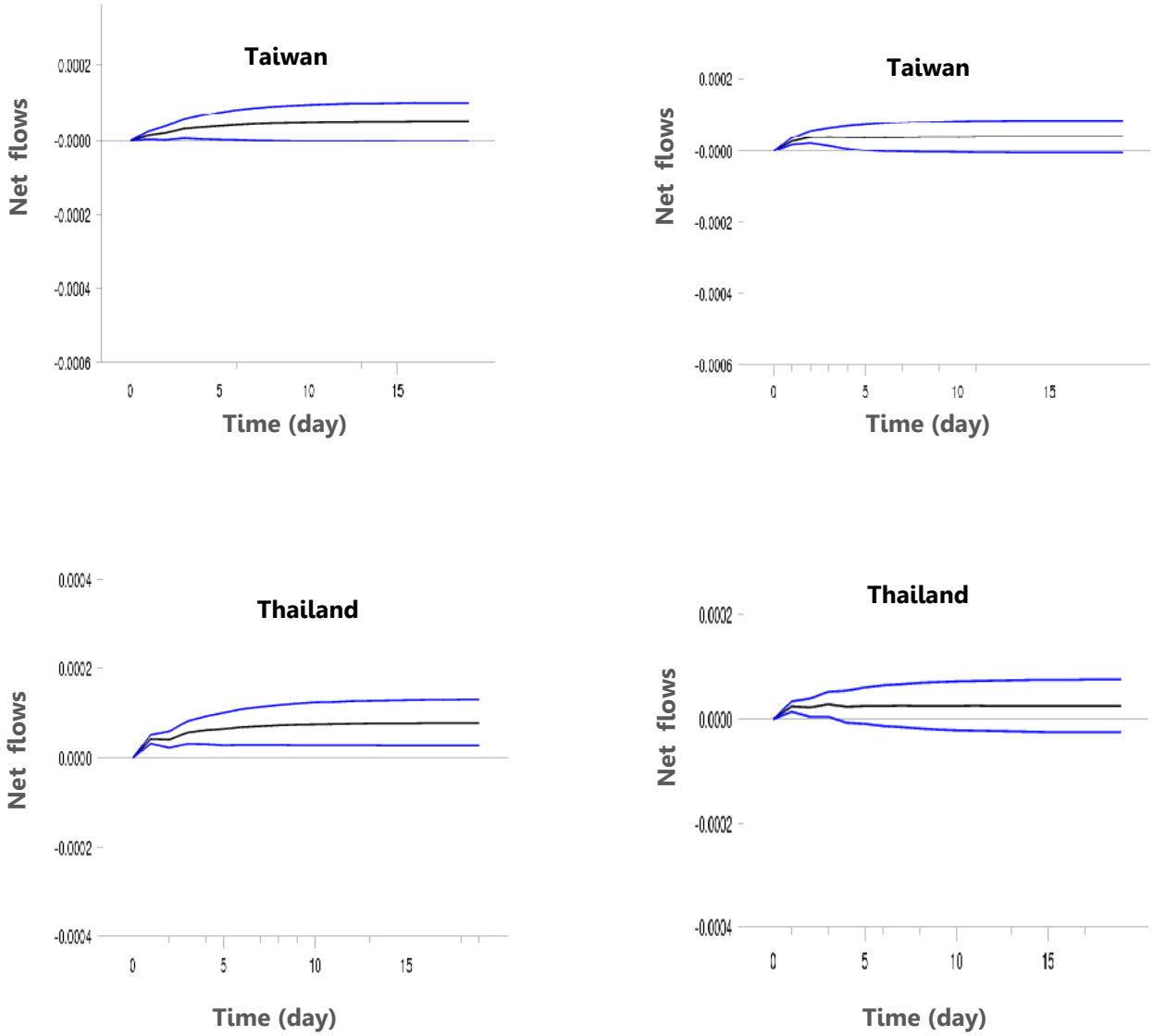


Figure (3.7) continued



Panel A and B, in figure 3.7, show VAR impulse responses of net inflows to a positive shock in local return in five markets at low and high periods of global risk appetite respectively. The markets are Indonesia, Kosdaq, Taiwan, Kospi, and Thailand. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.7.7 The impact of local returns on foreigners' trading at different states of the economy

Having documented that foreign investors engage in positive feedback trading strategies with respect to local returns, we now look at whether foreigners chase recent local returns irrespective of economic conditions in the emerging country. To do so, we classify levels of economic activity as "boom", "recession" and "normal" periods and we similarly estimate the response of foreign flows to innovation in local returns in boom and recession periods. Our interest, in this section, is focused on the trading differences with respect to local return across two states of the economy. We test the hypothesis three by looking at the cumulative impulse responses in these two different VAR systems in terms of sign and significance criteria in the two different states of the economy.

The cumulative impulse response functions of net inflows to a one standard deviation shock in local returns are shown in figure 3.8. Regarding the hypothesis three, we find that in two out of five markets namely KOSPI and Thailand the cumulative impulse response functions for foreign flows are different. For example, in Kospi, while the response is positive and statistically significant in the low state of the economy it is found to be negative in the high state of the economy, though insignificant. In Thailand, unlike Kospi, the cumulative impulse response of foreign flows is negative, but very close to zero, in low states while it is found to be positive in the high state of the economy, though both cumulative responses are not statistically significant. It is also worth noting that we find different responses for foreign flows in the Kosdaq when comparing the responses for the whole period. The cumulative impulse response of foreign flows to a shock in local returns is found to be negative in both states of the economy, whereas we find a positive cumulative impulse response function for foreign flows for the whole period.

In the content of Taiwan and Indonesia we find no difference in cumulative impulse response functions across two states of the economy. In Taiwan, the cumulative responses are both positive and insignificant in both states of the economy. When we come to Indonesia the responses are found to be positive in both states of the economy, though a significant response is found only in the high state of the economy.

To sum up, since we find no significant differences in trading behaviours across states of the economy, our results can be regarded as evidence that supports the model of Brennan and Cao (1997). This suggests that foreign investors use recent returns as information signals for that local market, as they have an informational disadvantage in emerging markets. Our finding demonstrates that their model works irrespective of local conditions.

Figure 3.8 VAR Impulse Responses of Net Inflows to a Positive Shock in Local Return at Low and High Economic States.

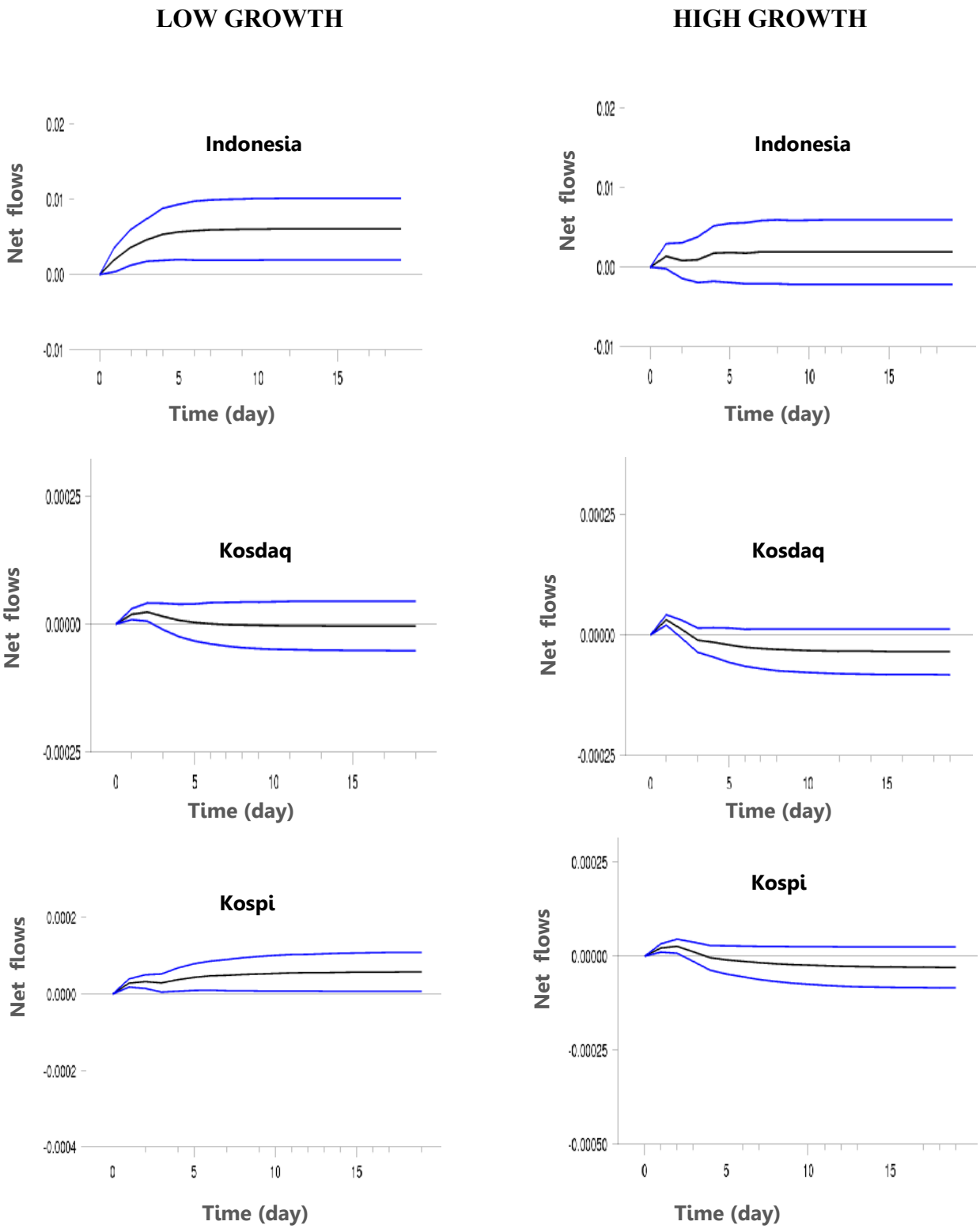
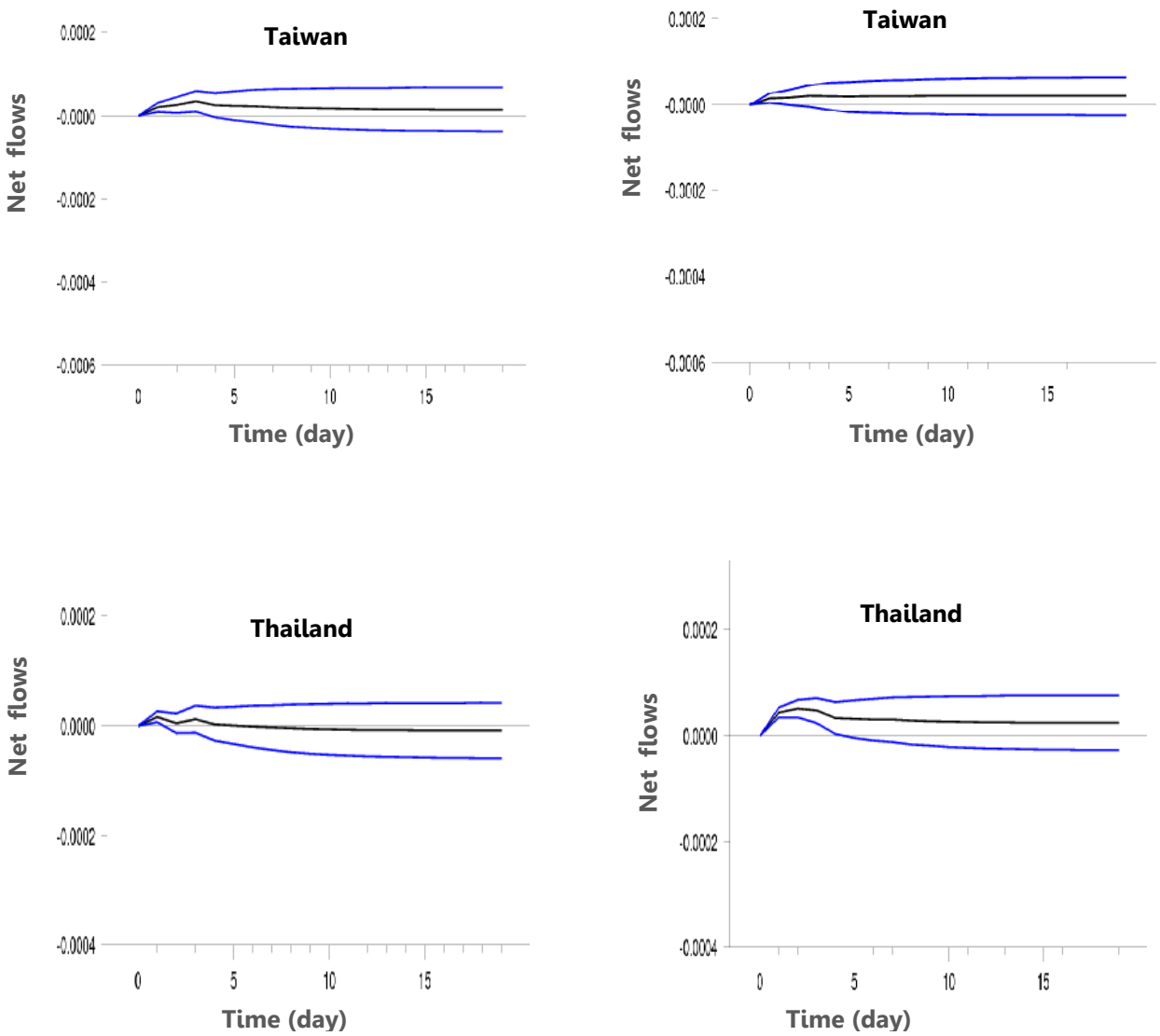


Figure (3.8) continued



Panel A and B, in figure 3.8, show VAR impulse responses of net inflows to a positive shock in local return in five markets at low and high states of the economy respectively. The markets are Indonesia, Kosdaq, Taiwan, Kospi, and Thailand. The vertical axis in each panel shows normalized net purchases (as a percentage of previous day's market capitalization). The horizontal axis shows time scale which is expressed in days. The black line in the middle represents the impulse responses, and the upper and lower blue lines represent the 90% error bands derived from a Monte Carlo simulation.

3.8 Conclusion

This study is the first to investigate the impact of global risk appetite on equity flows to emerging markets. This issue is of great concern to both academicians and policy makers, especially given the recent ongoing credit crisis or subprime panic started in the USA which led to capital outflow from almost every emerging stock market. Taken together, the findings in this chapter show that global risk appetite is also an important factor, in addition to local and global returns, that affects net purchases of foreigners in emerging markets. It is not likely to obtain unbiased estimates of the variables included in the regression in the absence of global risk appetite. Moreover, two further innovations, in this chapter, suggest different implications for policy makers at different times, which show the importance of the innovations we have introduced in terms of regulators in the emerging markets.

Now, when we move to the analysis of foreigners' trading in a more detailed way we find that in four out of five markets the cumulative responses of foreign inflows to a one standard deviation negative shock in the VIX index are positive and significant. In the fifth (Indonesian) case, the cumulative response is also found to be positive out to 20 lags, but only significant up to the third lag and becomes insignificant thereafter. The most likely reason for this difference, which we find most consistent with the data, is that foreigners in Indonesia are likely to overreact to a negative shock in the global risk appetite, resulting in high increase in net purchases followed by partial corrections. When looking at the impulse response graphs we see that subsequent net inflows after the third lag exhibit partial reversals making the cumulative response insignificant but still positive, which can be regarded as evidence of partial overreaction.

We also examine the effects of US returns on net inflows to emerging markets. In a similar vein, in four out of five markets the cumulative responses to a positive shock in the US returns are positive and significant out to 20 lags. In the Indonesian case, while the cumulative response is positive up to 20 lags, statistical significance is found after the third lag.

When we move to analysis of foreigners' trading with respect to local returns we find that cumulative responses are positive and significant in Indonesia, Thailand and Taiwan showing that foreigners are positive feedback traders. In Kosdaq and Kospi markets cumulative responses of foreign inflows are also positive though insignificant. Similar to previous findings as in Griffin *et al* (2004) and Richards (2005) we find that the impact of US returns has much more influence on the trading decisions of foreign investors compared to the impact of local returns on their trading.

We also include the foreign exchange rate into the VAR system and find some interesting results. For example, the accumulated effects of a positive shock in the exchange rate, corresponding to a depreciation of the local currency, are negative in four out of five markets. In the Kospi and Kosdaq markets the accumulated impacts are not statistically significant, but in Thailand and Taiwan they are. The results may appear at first glance as puzzling, but one possible explanation for this response is that in an environment where foreigners use the exchange rate as a proxy for local macroeconomic fundamentals, and in a context where a depreciation of the local currency signals negative conditions about the economy, foreign investors use this as an informational signal and sell their stocks.

As a second innovation, our study also investigates the interaction between foreign flows and emerging stock market returns, while taking the global risk appetite into

consideration. We examine how foreigners behave with respect to local return at different risk appetite levels. We find different cumulative impulse responses for foreign inflows across high and low risk appetite levels in Indonesia, Kosdaq and Kospi markets. For example, we find that foreigners behave in a momentum style with respect to local return at times when the global risk appetite is low and in a contrarian style when the global risk appetite is high. Similar behaviour is also found for foreigners in Kospi, although it is insignificant. A possible explanation for this difference is that foreigners use recent local returns as information signals only at times when they have a low appetite for risk, whereas they use other information sources as information signals for expected returns on the local market at times when they have a high appetite for risk. The reason for this kind of behaviour can lie in an ambition to earn money when they have a high appetite for risk. Thus, they may prefer to use other information sources rather than just chasing recent returns.

However, we document completely opposite behaviour for foreigners in Indonesia. The cumulative impulse response is positive at high risk appetite levels with borderline significance, whereas it is negative at low risk appetite levels though insignificant. One possible explanation for the negative feedback trading in Indonesia when foreigners are risk averse may result from foreign investors' perception on valuations. When foreigners are more risk averse they may be more sensitive about pricing the assets and they may have weaker extrapolative expectations for that local market than those they have when they are less risk averse. That may be why foreigners are positive feedback traders when they are less risk averse since they have stronger extrapolative expectations for that local market than those they have when they are more risk averse.

However, in terms of foreign investors, a question still remains as to what makes Indonesia different from Kospi and Kosdaq markets. One possible explanation for this difference is that since Korea is nearly five times as big as Indonesia in terms of market capitalization global institutional investors may prefer to invest more in Korea compared to Indonesia, and it is also plausible that global institutional investors can invest in information sources, thanks to their size, global experience, talent and resources which renders them to be at an informational advantage relative to locals. Therefore, foreigners in Korea may not be more sensitive about pricing the local assets when global risk appetite is low compared to foreign investors in Indonesia. In this scenario, foreigners in Korea may even have advantages in analyzing push factors, especially at times when domestic markets are highly influenced by global factors, in other words when the global risk appetite is high, compared to foreigners in Indonesia.

From a policy making point of view our finding about these three markets especially for Kosdaq is of high relevance for regulators when introducing necessary measures to enhance stability of the market.

Finally, as a third innovation, when we analyze foreigners' trading with respect to local returns under different states of the local economy we find that the cumulative impulse response of foreign flows to a shock in local returns are different across the two states in KOSPI and Thailand. In KOSPI the cumulative response is found to be positive and significant in the low state of the economy, whereas it is negative and very close to zero though insignificant in the high state of the economy. The responses are found to be opposite when looking at Thailand. That is to say the cumulative response is found to be negative in the low state of the economy and positive in the high state of the economy, though both

responses are insignificant. At this point, since we find different behaviours in our VAR model for these two markets it is not likely to support the model of Brennan and Cao (1997) which suggests that foreign investors use recent returns as information signals about the expected return of the local market as they have an informational disadvantage in emerging markets. In contrast, our finding regarding these two markets suggests that foreigners do not follow positive feedback trading strategies irrespective of local economic conditions.

Chapter 4: How Do Different Players in the Stock Market React to Macroeconomic News?

4.1 Introduction

Do foreigners react differently on the announcement of macroeconomic news, compared to local institutions or private investors? This question should be of great importance to stock market regulators. It is often argued that foreigners cause large and unpredictable currency flows and movements in share prices. However, if foreigners react in the opposite way to locals, then it could be argued that they have a calming effect on the local market, rather than increasing volatility. Any argument in favor of exchange controls or limits on foreign shareholdings would then become more difficult to support. This study is the first empirical research in the literature that looks at the reaction of foreign investors to local macroeconomic announcements in emerging markets.

According to the Dividend Discount Model, share prices should be based on the sum of the expected future dividend flows, discounted back to the present. Thus share prices should be affected by news that is likely to change future dividends or discount rates. Macroeconomic conditions are a major determinant of these, so it is unsurprising that many studies have looked at macroeconomic news announcements as a likely source of price changes (see, for example, McQueen and Roley, 1993, and Flannery and Protopapadakis 2002).

An equally popular area of research has been the trading behavior of different groups of investors. As Rubinstein (1993) stated, people reading the same news items can come to different conclusions. Much work in behavioral finance has shown that private investors are more prone to behavioral biases and more likely to act in a contrarian manner.

However, there has been little research into how different groups of market participants behave when they learn of macroeconomic news announcements. Financial economists should be greatly concerned with whether players in the stock market react differently to news announcements, since it is the trading of these market participants that changes share prices and moves them to new equilibria.

As far as we know, there have only been two studies that have analyzed the *differential* impact of macroeconomic news on different groups of investors. Nofsinger (2001) looked at the reaction of institutional and individual investors around macroeconomic news releases for NYSE stocks. However, his study aggregated all news announcements, and only looked at stocks over a three-month period starting from 1 November 1990 and ending in 31 January 1991.

The only other study we have found is that of Erenburg, Kurov, and Lasser (2006). They looked at how macroeconomic announcements affect the trading behavior of exchange locals and off-exchange traders in S&P 500 index futures contracts. They found that local traders reacted more quickly to macroeconomic news releases than off-exchange traders, i.e. they bought futures more quickly after good news and sold them more quickly after bad.

However, both studies either have some shortcomings in their methodology or need to be extended in different aspects. Our study differs from above two studies in the following ways.

First, a potential shortcoming with respect to Nofsinger's (2001) study is related with the methodology that the study has used due to having a short sample period. Nofsinger (2001) implements an aggregated approach by constructing a single dummy variable that aggregates information for 17 different macroeconomic news releases over 63 days. Therefore, the question of which macroeconomic news releases (individually) have a significant effect on (buying or selling) behaviour of different types of investors remains an unresolved issue. In addition, the second drawback of the study is that it determines whether the macroeconomic news is good or bad by calculating the adjusted returns. However, in this way, it is not possible to determine whether a specific macro announcement is good or bad if it is released concurrently with the other announcements. Therefore, our study addresses these issues by using forecast data coming from an international economic survey organization which allows us to calculate surprises and separate the effects of macroeconomic variables that gets announced simultaneously.

Second, the main shortcoming of the previous studies is that they do not take the same-day correlation between investors' purchases and local returns into consideration while investigating reactions of different types of investors around macroeconomic announcements. However, previous studies for emerging markets, (e.g., Griffin *et al*, 2004; Richards, 2005) have found significant evidence of correlations between net purchases (which can be considered as investor sentiment) of market participants and contemporaneous local market returns. Therefore, one could argue that any model not taking this correlation into account is incomplete since if domestic market returns are influenced by the macroeconomic announcement releases there is a risk that macroeconomic announcements can be found to have an effect on net purchases (investor sentiment) of investors, but this might be spurious due to picking up the correlation between net purchases (investor sentiment) and domestic

return. Furthermore, this correlation can also be sourced from possible endogeneity relationship between investors' purchases and local return, and if endogeneity is present, it will not be possible to obtain unbiased and consistent estimates due to the regressor- error correlation. In such cases, Instrumental variables (IV) or GMM method provide a general solution in obtaining consistent estimator. Therefore, unlike both studies, the main distinguishing feature of our paper is that we initially test for the endogeneity of the same-day returns in these equations in a very detailed way in order to decide whether there is need to resort to IV or GMM estimation methods. If local returns are found to be endogenous one should proceed with the IV/GMM methods. However, if it is not found to be endogenous this time local returns should be included as an exogenous variable in these equations in order to obtain unbiased estimates of the impact of the macroeconomic news. Therefore, both studies are incomplete in this sense.

Third, many studies, for emerging markets, have documented significant correlation between net purchases of investors and other independent variables. For example, Richards (2005) has found significant evidence of correlation between net purchases of investors and lagged local market returns and the study has also documented substantial autocorrelation in net purchases of market participants as well. Thus, unlike methodology of both studies, lagged net purchases and lagged local returns are used as control variables to obtain unbiased estimates of the impact of the macroeconomic news.

Fourth, many studies, such as McQueen and Roley (1993) and Li and Hu (1998), have investigated the response of stock prices over different stages of the business cycle since investors can consider the same type of news to be bad in some stages of the business cycle and good in others. Therefore, unlike both studies, we also take different states of the

economy into consideration to see whether the reactions of investors to macroeconomic news are different at different points in the business cycle.

Fifth, unlike both studies, we also take different states of the stock market into account since investor reaction can be different in bull and bear market periods (see for example, Hardouvelis and Theodossiou, 2002).

Furthermore, our work is also related to another literature that investigates the trading behaviour of foreign investors in emerging markets. Our research will also be the first study in the literature that examines the reaction of foreign investors to local macroeconomic announcements in emerging markets.

By analyzing the above issues, our study is of certain relevance to academics, since our results can provide useful insights on market efficiency and price discovery, because, according to the efficient market theory, at any given time prices should reflect all available information regarding a particular stock. Only new and unpredictable component of information is expected to move asset prices. Since unexpected component of macroeconomic news is used in our study as "news" it enables us to see which type of investor's trading behaviour acts as catalysts in the price discovery process or helps to facilitate to gain market efficiency. This issue is important not only to academicians but also to regulators especially in terms of obtaining information about foreign investors. The behaviour of foreigners around macroeconomic announcements in emerging markets has not been investigated so far in the literature. Therefore, this new findings can shed some light on the issue about whether they trade on announced public information or completely have non-fundamental motives.

In sum, we seek to determine what types of macroeconomic news cause market participants to buy and / or sell shares and whether investors have different trading patterns around macroeconomics news releases in the Stock Exchange of Thailand (SET). The choice of Thailand is not arbitrary. To our knowledge amongst all emerging markets in the world, Thailand, Taiwan, and South Korea are the only markets that provide daily detailed trading data (purchases and sales) for three different types of investors namely; local individuals, local institutional and foreign investors. However, with respect to foreign investors, during our observation period, regulations on foreign investment in these markets have changed frequently. For example, in the beginning of our observation period, the ratio of foreign ownership limit was 49% for Thailand and 12% for Korea and Taiwan. Although barriers were gradually coming down in these markets foreign investment was still restricted or completely closed for certain industries in Korea and Taiwan stock markets. However, in 2001, the SET issued a new trading instrument called NVDR (Non-Voting Depository Receipt) which allows foreigners to invest more than 49% of the shares with receiving all financial benefits except for voting rights. Given this flexibility in Thailand stock market, it enables us to explore the trading patterns of foreign investors more accurately relative to foreign investors in Korean and Taiwan stock markets.

The rest of the chapter is organized as follows: in section 4.2 we provide a review of the literature addressing the issues mentioned above and state our hypotheses regarding our research questions. Sections 4.3 and 4.4 describe the data and methodology employed in this study respectively. Sections 4.5 and 4.6 present descriptive statistics and results, respectively, and section 4.7 summarizes main conclusion.

4.2 Theoretical background

Academics have long thought that arrival of new information should have significant effect on asset prices due to the basic premise of efficient market theory (EMT). Therefore, many studies both theoretical and empirical have investigated the impact of "new information" on stock prices. The information variable is considered to include both a private and a public component. With respect to private information, firm-specific news is considered to be the main source of information that affects stock prices. With respect to public information, macroeconomic announcements are thought to be excellent candidates by which public information arrives.

This study examines the trading behaviour of foreigners, local individuals, and local institutional investors around macroeconomic news releases in the Stock Exchange of Thailand (SET). Thus, our work has its origins in two different literatures: first, an extensive literature that investigates the effects of macroeconomic announcements on asset prices. Second, a growing literature that examines the trading behaviour of different types of investors. We seek to link these two different literatures by the questions addressed in this study. Since there are numerous studies in both two literatures we present a brief overview of some important studies in each literature which we regard as influential to our research questions. With respect to first literature, it is also useful to note that while a voluminous literature can be found for the role of scheduled macroeconomic information releases on the volatility of asset prices in various asset markets we prefer to provide a brief review of some important papers that focus on mean rather than volatility of returns since this study deals with mean changes in investor sentiment of each investor group.

4.2.1 Empirical literature on market reactions to macroeconomic news

According to the basic assumption of efficient market theory, only new and unanticipated part of the information can affect asset prices. Failure to distinguish between expected and unexpected part of the announcement would tend to bias the news effect on stock prices. Early studies which take this issue into consideration begin with Pearce and Roley (1985), who use survey expectations data provided by Money Market Services (MMS) for the expected portion of these macroeconomic announcements, while investigating the daily response of S&P 500 index to macroeconomic announcements to examine whether the result supports the efficient market hypothesis. The sample period starts on September 29, 1977, and ends on October 15, 1982. Six macroeconomic announcements (namely narrowly defined money stock, Consumer Price Index, Producer Price Index, unemployment rate, industrial production, and Federal Reserve's discount rate) are considered as fundamental public information signal about the economy. Money announcement surprises are found to have significant effect on equity prices. The study finds little evidence of association between stock prices and surprises in both inflation and real activity. Additionally, the study finds that anticipated portion of the economic announcements have no effect on stock prices that supports efficient markets view. Jain (1988) extends Pearce and Roley (1985) work by employing hourly stock returns data for US market to obtain more precise estimates for equity price responses. The sample period employed in the study begins at the start of 1978 and ends at the close of 1984. Jain (1988) finds that surprises of money supply announcements have significant negative effects on equity prices. Jain (1988) documents more strong relationship (high *t* statistics) for the surprises of money supply announcements than those of Pearce and Roley (1985) study. Additionally, he finds that inflation related announcement surprises have significant effect on stock prices which was found to have no

effect on equity prices in the study of Pearce and Roley (1985). Hardouvelis (1987) investigates the responses of four representative equity price indexes (namely the S&P 500 (large companies), the AMEX (small companies), NYSE (financial companies) and Value Line Index) to 15 macroeconomic announcements with distinguishing monetary news from nonmonetary news. The study employs two sub periods. The first sub period begins on October 11, 1979, and ends on October 5, 1982 and the second sub period begins on October 6, 1982 and ends on August 16, 1984. Hardouvelis (1987) finds that equity prices react primarily to monetary announcements. NYSE Financial index is observed to be the most sensitive index to monetary announcements among all four stock prices indexes.

Above studies find little evidence of correlation between surprise component of macroeconomic news and stock prices. In previous studies the response of stock prices is assumed to be the same over different states of the economy. However investors can consider the same type of news to be bad in some stages of the business cycle and good in others, therefore it may not be possible to obtain the unbiased estimates of the impact of the surprise component since it is expected to bias toward zero. Therefore, McQueen and Roley (1993) investigate the daily response of S&P 500 to macroeconomic news over different states of the economy. Response of stock prices is allowed to vary over different stages of the business cycle to be able to provide unbiased estimator and identify good news and bad news across different states of the economy. They find that real activity news, which is higher than expected, is associated with lower stock prices in a strong economy, whereas the same surprise results in higher stock prices when the economy is weak. Thus, their finding helps to explain why some macroeconomic news is found to have insignificant effect on stock prices in previous studies.

Similar to McQueen and Roley (1993), Li and Hu (1998) also examine the reactions of four stock markets (namely, the S&P 500, the Dow Jones Industrial Index, the Russell 1000 and the Russell 2000 Index) to macroeconomic announcements conditional on the state of the economy. The study finds that the responses of stock market to the same macroeconomic announcements vary across different states of the economy. Furthermore, once the response coefficients are allowed to vary across different economic states more macroeconomic variables are observed to be significant which have received little attention in earlier studies. The study also investigates whether small firms and large firms react differently to macroeconomic surprises and find that small caps respond differently to surprises in a relative set of macroeconomic announcements both in terms of magnitude and signs. In this sense, recent study of Boyd, Hu, and Jagannathan (2005) that explores the short run reaction of US stock prices to the arrival of unemployment news between February 1957 and December 2000 also documents that on average, equity prices react positively to an announcement of rising unemployment when the economy is in an expansion, and negatively when the economy is in a contraction.

Another study by Flannery and Protopapadakis (2002) looks at this issue in terms of multifactor asset pricing models. They argue that previous studies may have failed to find evidence of significant relation between stock prices and some macroeconomic news if the market response to surprises in economic announcements is time varying. Therefore, Flannery and Protopapadakis (2002) extend earlier studies by estimating a GARCH model in which any macroeconomic announcement series is identified as a potential risk factor that either impacts stock returns or increases conditional volatility of stock returns. The study uses value-weighted daily return of NYSE- AMEX-NASDAQ indexes and also extensive data set including 17 macroeconomic announcements. They find that six of the 17 economic

announcement surprises have significant effect on either returns or conditional volatility of returns. Similar to previous studies, Kim and Kow (2005) look at the same issue in Japanese market. They investigate the effects of announcement releases of 16 macroeconomic variables on returns and volatility in the stock, debt and foreign exchange markets of Japan. The study finds that macroeconomic news has significant effect on both return and volatility of return in all three markets in Japan. The debt market is found to be more sensitive to macroeconomic news compared to other two markets. Volatility in three financial markets is found to increase after the release of the announcements. While inflation related news is found to drive volatilities in foreign exchange and debt market, it is the growth related news that causes the stock market to react more sensitive.

Empirical research in this field has mostly documented evidences for mature markets. Few studies examined the effect of economic announcements on markets prices in emerging countries. Andritzky, Bannister, and Tamirisa (2007) extend the literature by investigating the impact of economic announcements on emerging bond prices both in terms of level and volatility for 12 developing countries. The sample period employed in the study begins on January 5, 1998 and goes through July 15, 2004. To a great extent, the results are found to be consistent with those documented for mature markets. The study finds no evidence of a systematic effect of macroeconomic announcements on the level of emerging bond spreads but they are found to have a significant impact on the volatility of bond spreads. Announcements in these emerging markets are also documented to have varying effects depending on their characteristics. Individual macroeconomic announcements are found to have less effect in relatively more transparent countries.

All above studies have used daily data and relatively smaller set of macroeconomic announcements. The study of Balduzzi, Elton, and Green (2001) adds to the literature by employing high frequency stock data to examine the effects of 26 macroeconomic announcements on the prices of U.S Treasury bonds. Intraday price information allows the study to analyze the impact of economic news on prices of government bonds at very short intervals which helps to examine how quickly public information is incorporated into bond prices. Balduzzi *et al* (2001) find that several economic news releases have significant impact on the prices of bonds and these impacts vary significantly depending on maturity. The price adjustment to news releases is found to take place within one minute or less after the release of economic news. In addition, the study finds that surprises in economic variables have significant effect on price volatility. Since bid-ask spreads are found to reverse quickly to their previous normal levels the study suggests that public information is rapidly incorporated into prices.

Here, it is worth noting that while using intraday data has advantages it has also some disadvantages. In one sense, while analyzing the prices at very short intervals allows a researcher to investigate how quickly information is incorporated into prices, in another sense, investors can also be thought to need some time to process the information for sound decisions. Therefore, studies having different frequency of data can make complementary contribution over each other.

Finally, it is clear from the above literature review that work into the impact of macroeconomic announcements have been confined to stocks and bonds prices. Given the importance of the investor behaviour differences in determining the asset prices there is

clearly a need to examine the impacts of macroeconomic announcements on the behaviour of market participants.

4.2.2 Literature on trading behaviour of different types of investors

Heterogeneity of agents is accepted as the most plausible explanation for trade in the economics and finance literature. In most of the early models of trade such as Pfleiderer (1984), and Kyle (1985), it is assumed that agents have identical interpretation of information. A notable exception compared to early studies is Rubinstein (1993) who states that: "In almost all models of economic theory, behavioural differences among consumers are attributed to differences in preferences or in the information they possess. In real life, differences in consumer behaviour are often attributed to varying intelligence and ability to process information. Agents reading the same morning newspapers with the same stock price lists will interpret the information differently" (p 473). Later on, Kandel and Pearson (1995) address the issue of whether the assumption that agents have identical interpretations is appropriate by investigating the relation between trading volume and returns of stocks around anticipated public announcements in US market. The study finds economically and statistically positive association between abnormal trading volume and quarterly earnings announcements even when there is no change in price level. They argue that their finding is consistent with the view of Rubinstein (1993) that agents have differential interpretations of public information signals. On the other hand, they assert that it is also inconsistent with traditional models of trade that assume that agents have homogeneous interpretations.

Another study by Bamber, Barron, and Stober (1999) test the argument, that whether Kandel and Pearson (1995) findings can be attributed to differential interpretation, by

exploring the direct relationship between differential interpretations and trading volume in the US market (NYSE/AMEX). The sample period employed in the study begins from the first quarter of 1984 and goes through to the last quarter of 1994. They document direct evidence that supports Kandel and Pearson's (1995) argument that trading associated with small price changes shows investors' differential interpretation of public information. As a result, differential interpretation is found to play significant role in speculative trading. This differential interpretation of investors can be sourced from differences in endowments, differences in preferences (i.e., risk appetite) or differences in information. Thus, information announcement is expected to generate price and volume changes due to trading through time by heterogeneous participants trying to understand beliefs of each other since market participants try to understand each others' beliefs while forming their own beliefs. Trading volume jumps as different market participants rebalance their portfolios in response to their own beliefs and their perception of others which then leads to changes in the levels to re-establish equilibrium pricing (Keem and Sheen, 2000). This observed trading volume persistency occurs after information shocks realizations.

Trading of individual investors is generally thought to be more prone to psychological bias compared to institutional trading in the behavioural finance literature. Therefore, many studies began to investigate the reaction of institutional and individual investors separately to different types of news releases. For example, Lee (1992) investigates intraday volume reactions around various types of earnings announcements in the NYSE. The sample period starts on January 4, 1988 and ends on December 30, 1988. Market orders placed less than $10,000 are assumed as small traders. The study finds that two groups react differently to the same earnings news when accepting trade size as a credible proxy for distinguishing small traders from institutional traders. Small traders are found to be net buyers during the periods

of earnings announcements irrespective of the sign of the news, whereas institutional traders involve in intense buying only subsequent to good news.

Hirshleifer *et al* (2008) examine the trading behaviour of U.S individual investors in response to extreme surprises in quarterly earnings to see whether it is the source of post-earnings announcement drift (PEAD). The sample period is January 1991 - December 1996. They find no evidence that individual investors are the cause of PEAD. Individual investors are found to be significant net buyers regardless of whether earnings surprises are positive or negative. Etter *et al* (1999) investigate the speed in processing of new information for the case of annual earnings announcements by individual and institutional investors. They use a sample of non –US and non-Canadian firms that are listed on either NYSE or AMEX for the period between 1983 and 1992. The study finds that Institutional investors seem to process new information more rapidly than do individual investors. Yuan (2007) investigates the impact of market wide attention grabbing events on the trading behaviour of US individual and institutional investors for the sample period between January 1983 and December 2005. High attention is found to cause individual investors to decrease their stock holdings dramatically in good times and modestly increase their stock holdings in bad times.

Malmendier and Shanthikumar (2007) examine the trading reaction of U.S individual and institutional investors to analysts' recommendations for the sample period that begins on October 29, 1993 and ends on December 31, 2002. Individual investors are found to follow analysts' recommendations literally. They display a positive abnormal response to both buy and strong buy analysts' recommendations and no response to hold recommendations. Whereas, institutional investors display, a positive abnormal response to strong buy recommendations, no response to buy recommendations and strong selling reaction to hold

recommendations. Schmitz (2007) analyze the reaction of individual investors to corporate news in the media employing 125 companies in German market for the period between July 1998 and October 2006 and find that they react slightly slower to corporate news compared to other market participants. Barber and Odean (2008) test the proposition that individual investors buy only stocks that catch their attentions. They test this proposition for the US market with the sample period from January 1991 through December 1996. Attention driven buying behaviour of investors is tested by sorting stocks on attention grabbing events. Proxies employed for attention grabbing events are stocks abnormal daily trading volume, previous one day return and whether a firm is in that day's news. They find that individual investors exhibit attention driven buying behaviour by using these three proxies, whereas the study finds no evidence of attention driven buying behaviour for institutional investors.

Another group of studies investigates trading decisions of institutional and individual investors in different aspects. For example, Odean (1998) tests the disposition effect, the tendency to sell winners too early and to hold losers too long, labelled by Shefrin and Statman (1985), for the US market with the data beginning in January 1987 and ending in December 1993 and finds that individual investors tend to realize their profits from winning stocks and retain their losers. Genesove and Mayer (2001) document a similar behavioural pattern, behaving in a loss-aversion fashion, for both individuals (owner-occupants) and professional investors for the real estate market in USA. Heath, Huddart, and Lang (1999) also find an evidence of disposition effect on the exercise decisions of employees for stock options using exercise records of seven companies in the USA between August 2, 1985, and December 23, 1994. Heisler, J (1994) and Locke and Mann (2000) document the same evidence for the existence of disposition effect for small investors and professional investors in the USA respectively. Apart from US markets, Shapira and Venezia (2001) also show that

disposition effect also exists among professional investors in Israel besides finding stronger effect for individual investors for the period that begins on January 1, 1994 and goes through the end of 1994.

There is also a growing body of research that investigates the relation between past returns and individual and institutional trades. Badrinath and Wahal (2002) examine the trading behaviour of 1200 institutions in all NYSE, AMEX NASDAQ firms for the period between third quarter of 1987 and the third quarter of 1995 and find that institutions tend to be positive feedback traders when they have new equity positions but negative feedback traders both when they leave the previous equity positions and make adjustments to existing holdings. Nofsinger and Sias (1999), investigating the cross-sectional relation between changes in institutional ownership and equity returns in the US market for the period between 1977 and 1996, find that institutional investors follow momentum trading strategies, and this momentum trading of institutions is largely found to be limited to small firms. In the study of Lakonishok, Shleifer, and Vishny (1994) for the NYSE and AMEX market between the end of April 1963 and end of April 1968 period, individual investors are posited to engage in irrational momentum trading due to extrapolation of past growths. Jackson (2003) investigates the behaviour of individual investors in Australia for the period that begins in September 1991 and goes through December 2002 and finds that individual investors appear to be contrarian traders at both aggregate market and cross sectional levels. They are also found to be net buyers of equities with high recent volatility. Griffin, Harris, and Topaloglu (2003) investigate the cross-sectional relation between individuals and institutions' trading and equity returns in Nasdaq 100 securities on both daily and intradaily basis from May 1, 2000 to February 28, 2001. They find a strong contemporaneous relationship between equity returns and changes in institutional ownership at the daily level. Institutions are largely found

to follow past stock returns. The study finds that stocks in the top deciles based on the previous days' performance is 23.9% more likely to be purchased by institutions sold by individuals.

There is also another growing literature that studies the relation between past returns and foreign investors' trades in emerging markets. Choe, Kho, and Stulz (1999) examine the patterns of foreign investor trading in Korea market for the period that begins on November 30, 1996 and goes through the end of 1997 and find that foreign investors pursue momentum trading and engage in herding before the Korean economic crisis. During the crisis, herding is decreased and momentum trading by foreign investors is mostly disappeared. Grinblatt and Keloharju (2000), examining the past return based behaviour of various investor types in Finland market from December 27, 1994 to the end of December 1996, find that foreigners tend to follow momentum strategies. The study finds significant relationship between the sophistication of the investor type and the degree of contrarianism. While less sophisticated local individuals are found to pursue contrarian strategies more sophisticated local institutions tend to be momentum investors like foreign investors. Kim and Wei (2002) investigate the trading patterns of foreign investors in different categories in Korea for the period beginning on January 1, 1997 and ending on June 30, 1998. They find that foreigners outside Korea are more likely to pursue momentum trading strategies and are more likely to exhibit herding behaviour than the foreigners living in Korea. Dahlquist and Robertson (2004) study the behaviour of foreign investors in Swedish market for the 1993 to 1998 period and find that foreign investors act as uninformed positive feedback traders. Griffin, Nardari, and Stulz (2004) examine the equity flows (net purchase of foreign investors) to nine emerging countries and find that foreigners tend to be momentum traders in these local markets. Richards (2005) investigates the trading behaviour of foreign and domestic investors

in six Asian markets in the period January 1999 to September 2002. Foreign investors are found to be positive feedback traders and local individuals appear to be contrarian traders.

Finally, apart from above studies, two studies investigate the reaction of investors around macroeconomic news releases. The first study by Nofsinger (2001) examines the trading behaviour of institutional and individual investors around macroeconomic and firm-specific announcements for NYSE stocks. In this study, in terms of specific news, local individuals are found to sell on good news rather than bad news which is in line with the disposition effect. Unlike individual investors, institutions are found to buy and sell following both good and bad news. In terms of macroeconomic news releases, although both Individuals and institutions are found to increase their purchases subsequent to good economic news, individuals are documented to have higher purchase rates compared to institutions. In terms of selling behaviour, institutions are found to make significantly high level of purchases during bad economic news, whereas individuals are not found to have significantly high sales. The second study by Erenburg *et al* (2006) investigates the effect of major macroeconomic announcements on the S&P 500 index futures. The study identifies trader types as exchange local traders and off-exchange traders. Local traders are found to react to macroeconomic news releases faster than off-exchange traders. That is they are found to buy (sell) futures following good (bad) news faster than off-exchange traders. The study also documents profitable strategy for local traders compared to off-exchange traders.

To sum up, only two papers have investigated the behaviour of investors around macroeconomic announcements. However, both papers have not produced conclusive evidence due to potential shortcomings in their methodology and also both studies need to be extended in different aspects as well.

4.2. 3 Shortcomings of previous studies and motivation

In view of the two different literatures given above, it is rather surprising to note that very little attention has been devoted to the analysis of investor behaviour around macroeconomic news releases. To the best of our knowledge the only studies that we know of that try to analyze the effect of macroeconomic news on different types of investors are the ones of Nofsinger (2001) and Erenburg *et al* (2006) for NYSE stock market and Index futures market of USA, respectively. However, since these two studies either have potential drawbacks or need an extension in their methodologies they fall short of our goals in one way or another.

For example, one potential drawback in Nofsinger (2001) study is the methodology the study uses in investigating the reaction of institutional and individual investors around macroeconomic news releases for NYSE stocks. The study uses a single dummy variable that contains information from 17 different macroeconomic variables over 63 days. Therefore, it is not possible to isolate the individual effect of specific macroeconomic announcement on the behaviour of different types of investors. Since we employ forecast data about each macroeconomic variable coming from an international economic survey organization our methodology allows us to capture the effect of each macroeconomic announcement on the trading behaviour of investors.

Another point that our research diverges from both studies is that both studies do not take potential endogeneity issue (resulted from the mutual dependence of local returns and investors' purchases) into account while investigating the reaction of investors around macroeconomic announcements. However, this may lead to biased coefficients due to the

potential same day correlation between foreigners' purchases and local returns. In addition, we also take different states of the economy into account in our study since the reactions of investors to macroeconomic announcements can be different at different states of the economy (see for example, McQueen and Roley, 1993). Similarly, we also take different states of the stock market into account since behaviour of investors can change during bull and bear market periods (Hardouvelis and Theodossiou, 2002). Finally, our work will also be the first to study the behaviour of foreign investors around macroeconomic news in an emerging country.

To sum up, given the above literature review and shortcomings of previous studies**,** this chapter presents these important issues with their stated hypotheses.

This study will analyze aforementioned research questions such as how local individual, local institutional and foreign investors behave (buy and / or sell shares in the Stock Exchange of Thailand) around macroeconomic announcements and whether the reactions of these investors to macroeconomic news are consistent with the stylized facts documented regarding the behaviour of different types of investors in the literature. For example, as mentioned in the literature review, a great deal of empirical evidence shows that foreign and institutional investors exhibit momentum investment style, whereas individual investors follow contrarian investment style with respect to past returns (see, e.g., Grinblat and Keloharju, 2000, Kim and Wei, 2002, Dahlquist and Robertson, 2004, Griffin, Nardari, and Stulz, 2004, and Richard 2005). In this context, momentum (contrarian) behaviour can be translated into a tendency to buy (sell) stocks after positive news and sell (buy) stocks after negative news around the macroeconomic announcement (Vieru, Perttunen, and Schadewitz, 2006).

Given the above, the behaviours with respect to macroeconomic announcements can be formally stated as hypotheses as follows:

Hypothesis (1a): Local individuals sell on good macroeconomic news and buy on bad macroeconomic news.

Hypothesis (1b): Local institutions sell on bad macroeconomic news and buy on good macroeconomic news.

Hypothesis (1c): Foreign investors sell on bad macroeconomic news and buy on good macroeconomic news.

While testing above hypotheses, the state of the economy can also be of certain relevance to investors. Macroeconomic announcements affect asset prices if announcement has new information that impacts discount rates or future dividend expectations. However, the same type of news can be considered bad in some states and good in other states. For example, McQueen and Roley (1993) find that an unexpected increase in industrial production leads to a decline in stock prices in high state of the economy due to fears of an overheating economy. In contrast, the study documents a different sign for the response coefficient on the same macroeconomic news in the low state of the economy. Similarly, while an unexpected decrease in unemployment is found to decrease stock prices in high state of the economy, the study documents an increase in stock price for the same news in low state of the economy.

For the reasons stated above, it would be useful to investigate whether investors tend to exhibit same type of trading behaviours around macroeconomic announcements over different states of the economy.

Given the above, the hypotheses can also be stated as below:

Hypothesis (2a): The behaviours of Local individual investors around macroeconomic announcements are not same across different states of the economy.

Hypothesis (2b): The behaviours of Local institutional investors around macroeconomic announcements are not same across different states of the economy

Hypothesis (2c): The behaviours of foreign investors around macroeconomic announcements are not same across different states of the economy

Many studies have investigated the empirical link between investor reaction and the recent direction of the stock market. For example, Goldberg and Vora (1981) find evidence of stock return variation with the direction of stock market returns. Klein and Rosenfeld (1987) document divergent results for the identical events during bull and bear markets. Bowman, Robin, and Weintrop (1995) also find that recent underlying market conditions (bull/bear markets) have influence on the event study results. In a more recent study, Docking and Koch (2005) find that investors perceive good (bad) news as better (worse) news when the recent direction of the stock market is down (up) and volatile. Given this finding, it would be useful to investigate whether investors tend to exhibit the same type of trading behaviours around macroeconomic announcements over different conditions of the stock market.

In view of the above, related hypotheses can be stated as below with respect to first set of hypotheses regarding the momentum/contrarian investment style;

Hypothesis (3a): The behaviours of Local individual investors around macroeconomic announcements are not same across bull and bear markets.

Hypothesis (3b): The behaviours of Local institutional investors around macroeconomic

announcements are not same across bull and bear markets.

Hypothesis (3c): The behaviours of foreign investors around macroeconomic announcements are not same across bull and bear markets.

In principle, investors are expected to learn from their trading experiences which, in turn, improve their trading skills. In this respect, one can argue that if investors lose money by following momentum or contrarian strategies their trading pattern should not exist persistently. However, this may not be the case due to two psychological biases, namely investor overconfidence and self-attribution bias. Overconfident investors are the people who overestimate their ability and who believe that they have superior ability than others at choosing the best stocks. Those people, in general, have a tendency to attribute favorable outcomes to their ability and unfavorable outcomes to external factors. This phenomenon is known as self-attribution bias which hinders investors learning from their trading experiences even if they lose money (Gervais and Odean, 2001). In view of the above, one could argue that during our sample period there was a pervasive financial crisis in Pacific-Asia region which could have changed the trading behaviour of investors. Therefore, as a robustness check, it would be useful to investigate whether investors change their trading behaviours after the crisis compared to pre-crisis period.

Given the above, related hypotheses can be stated as below:

Hypothesis (4a): The behaviours of Local individual investors around macroeconomic announcements are not same across pre and post crisis periods.

Hypothesis (4b): The behaviours of Local institutional investors around macroeconomic announcements are not same across pre and post crisis periods

Hypothesis (4c): The behaviours of foreign investors around macroeconomic announcements

are not same across pre and post crisis periods.

It is worth mentioning that hypothesis one is the main hypothesis that will be analyzed throughout the study. In all sub-periods mentioned above, investor sentiment will be analyzed with respect to the hypothesis one in addition to Wald tests that test for whether their sentiment changes across sub-periods.

In a nutshell, our research makes the following contributions:

- The first study that investigates the behaviour of investors around macroeconomic announcements taking into account the endogeneity issue (contemporaneous mutually dependence of local return and investors sentiment).
- The first study in the literature that examines the reaction of foreign investors to local macroeconomic news releases in emerging markets
- The first study in the literature investigating the reaction of different type of investors to macroeconomic news releases that takes the states of the economy into consideration.
- The first study in the literature that explores the behaviour of different types of investors around macroeconomic announcements during bull and bear market periods.

4.3 Data

In order to investigate trading behaviour of investors in more detail there is clearly a need for actual trading data. This study employs daily purchases and sales values for local individuals, local institutions and foreign investors in Stock Exchange of Thailand (SET) which allows us to test our hypotheses presented in section 4.2. There are three main investor groups trading in the SET:

1. Local Individuals

2. Local Institutions

3. Foreign Investors

Daily purchases and sales values for local individuals, local institutions and foreign investors are obtained from the SET. In our data set foreign investors are not divided into individual and institutional parts. Our data start in February 1995 through May 2008. The beginning of our sample is dictated by the availability of the investor transaction data. The nature of our data allows us to examine the reaction of different types of investors to macroeconomic announcements on a daily basis. On the one hand, using intraday data is not consistent with the thought that investors need some time to process information for making sound decision. On the other hand, using monthly or quarterly data might lead to a problem in differentiating the impact of macroeconomic information from other information. Therefore, our daily data are long enough to process the information for making decisions and are short enough to differentiate the impact of economic information from other information.

The motivation of this study is to examine how different types of investors react to macroeconomic news releases. In order to investigate this relationship, we need a proxy for investor reaction as the dependent variable and news surprises proxies for the independent variables. In this line of research, previous studies (eg., Lee, 1992, and Nofsinger 2001) have developed some measures which are derived from actual trades of investors to capture their behaviours during news releases. One of these measures which is called “buy-sell imbalance” is as follows:

$$BSI_{i,t} = \frac{(buy_{i,t} - sell_{i,t})}{(buy_{i,t} + sell_{i,t})} \quad (1)$$

Where, BSI_{it} refers to "buy-sell imbalance" and buy_{it} / $sell_{it}$ denote the total value of shares (in local currency) purchased/sold by investor class *i* during day *t*. This measure, *BSI*, is also used in the asset pricing literature (e.g., in Kumar and Lee, 2006 as a proxy for investor sentiment). Therefore, we similarly employ this measure as a proxy for investor sentiment while investigating the reaction of investors around macroeconomic news releases.

Another measure of BSI, which Lee (1992) named "abnormal order imbalance, (ABSI), is also used in some studies such as Nofsinger (2001) and Vieru, Perttunen and Schadewitz (2006) to investigate whether investors buy or sell shares more than usual around news releases. This measure is defined as:

$ABSI = BSI - E(BSI),$ Where $E(.)$ refers to expectation operator which is the time series average of *BSI* in the pre-event period. For example, Vieru *et al* (2006) use 57 trading days (t=-60,…-4) as the average (BSI) for the pre-event period while examining whether investors behaviour on announcement days, (t = 0) differ from the pre-event period. However, employing this measure as a proxy for investor reaction has some drawbacks in terms of the information content, because, this measure as a proxy for investor reaction may not capture the true response of investors around news releases due to the fact that investor sentiment may have different trends during our observation period. It is these trends which our study mainly wishes to investigate how investor sentiment changes relative to normal periods. For example, many studies (e.g., Mc Queen and Roley, 1993; Adams, McQueen and Wood, 2004) document a different stock return response to the same macroeconomic news in different state of the economy. In a similar vein, previous studies such as Goldberg and Vora

(1981), Klein and Rosenfeld (1987) and Weintrop (1995) also document different results for the identical news during bull and bear markets. Furthermore, Pacific-Asia region experienced a severe financial crisis during our observation period which could have altered investor sentiment. Therefore, it may not be possible to examine how investors react to macroeconomic news across different states of the economy or across different states of the stock market. It may not be possible to compare how investor behave around macroeconomic news releases across pre and post crisis periods either since the abnormal measure of BSI cleans out these trends by subtracting the E (*BSI*) from BSI. Therefore, to sum up, we employ BSI measure as was employed in Kumar and Lee (2006) rather than ABSI measure as a proxy for investor sentiment.

For local market returns, we use SET Price index obtained from Datastream that includes all common stocks listed on the Stock Exchange of Thailand. Local market returns are computed by taking first difference of the logged daily SET price index that is readjusted for stocks dividends. Trading on the SET is order-driven and fully computerized and opening and closing prices are determined via call auctions in the SET.

There are currently 525 companies listed on the SET. Our sample begins with 389 companies as of January 1995 and reached 525 in May 2008. Table 4.1 shows the annual number of stocks listed on the stock exchange of Thailand (SET) at the end of each year from 1995 to 2008. We include all stocks that have traded through our sample period. Stocks that are now dead were included when they were alive.

Table 4.1: Annual number of stocks listed in SET

Year	number of companies
1994	389
1995	416
1996	454
1997	431
1998	418
1999	392
2000	381
2001	385
2002	398
2003	420
2004	463
2005	504
2006	518
2007	523
2008	525

This table shows the annual number of stocks listed on the stock exchange of Thailand (SET) at the end of each year from 1995 to 2008.

We consider three scheduled macroeconomic announcements in our analysis (namely industrial production, consumer prices, and trade balance) which we think are representative of different aspects of the Thailand economy. Two of these announcements i.e. consumer prices and trade balance are also studied in Wongswan (2006) as important macroeconomic factors while analyzing the transmission of information originating from USA and Japan to Thai and Korea stock markets. Besides these two factors we also include industrial production as it is generally thought to be the most important indicator about economic activity for any economy. Actual announcements are obtained from the government agencies that published them. Sources of each announcement are given in table 4.2. For the anticipated portion of these macroeconomic announcements we prefer to use survey expectations as in most of the studies in this line of research rather than utilizing econometric estimates as survey expectations are believed more accurately to reflect contemporary market sentiment due to containing more recent information. Survey forecasts are also documented to be

unbiased and efficient compared to econometric estimates in many studies such as Pearce and Roley (1985) and McQueen and Roley (1993). Therefore, most of the studies investigating the impact of economic announcements commonly use survey data such as Ederington and Lee (1993), McQueen and Roley (1993), Li and Hu (1998), Balduzzi *et al* (2001), Flannery and Protopapadakis (2002) Beber and Brandt (2005) and Andritzky *et al* (2007).

Our expectation data comes from international economic survey organization called "Consensus economics" that polls more than 180 prominent forecasters each month to obtain their view and forecasts about the Asian economies. http://www.consensuseconomics.com Median of analysts' expectations about each macroeconomic variable is used as a measure of the market's expected value for that particular announcement. In this line of research, median value is commonly preferred in place of mean value since market expectations may not be represented truly in the existence of extreme values. We calculate "surprises" in macroeconomic announcements by the difference between the actual data and the median of analysts' expectations. Since most of the economic variables have different units of measurement, we employ standardized surprises of these macroeconomic announcements while comparing the responses to different macroeconomic announcements. Standardization is achieved by dividing the surprises by the standard deviation of each announcement surprises across the sample as was done in Balduzzi *et al* (2001).

$$E_{i,t} = \frac{F_{i,t} - A_{i,t}}{\sigma_{i,t}} \qquad (2)$$

Where, $E_{i,t}$ denotes the standardized surprise of announcement i, $F_{i,t}$ and $A_{i,t}$ denote the median of the forecast survey and the actual released value for announcement i respectively.

This does not affect the explanatory power of the model or the statistical significance of the estimated effects. On the contrary, by providing meaningful deflators it facilitates to compare the quantitative importance of the estimated responses since a unit variance is guaranteed for all surprises of the macroeconomic variables. The expectations of Consensus Economics, Asia Pacific Consensus Forecasts, are made on a monthly basis but are reported as a year-on-year growth rate. We follow Wongswan (2003) methodology and assumption to convert year-on-year growth rate expectations to monthly expectations. Details of the conversion methodology and related unbiased and efficiency tests can be found in appendix A4.1.

4.4 METHODOLGY

4.4.1 Reaction to economic announcements

Regarding the hypothesis one, we investigate whether investors have a tendency to buy/sell stocks after positive/negative news with respect to their documented trading strategies in the literature. Although our sample period covers roughly 13.5 years, how market participants react to news is estimated only for 317 days on which an announcement is made. In other words our base line equation is the conditional mean equation of BSI measure (which is used as a proxy for investor sentiment or investor reaction) conditioned on days on which an announcement is released. There may also be more than one announcement on some days. Our study is inspired by the seminal works of Mc Queen and Roley (1993), who examine the reaction of stock returns to macroeconomic announcements and Nofsinger (2001) who investigates the trading behaviour of individuals and institutions around news releases. Since our work has its origins in two different literatures we accommodate their models by the following specification. In this specification, we have investor reaction or

investor sentiment proxy as the dependent variable and macroeconomic news surprises proxies as the independent variables for each investor type.

$$IS_{it} = \alpha + \mathbf{x}_t^u \mathbf{b} + e_t \qquad (3)$$

Where,

IS_{it} = investor reaction or investor sentiment (proxied by "buy-sell imbalance" measure) of investor group *i* on that particular day *t* (the day on which an announcement is made).

$\mathbf{x}_t^u$ = 1x3 vector of unexpected (surprise) components of economic announcements (Inflation, Industrial production and trade balance) calculated as the standardized difference between the actual announcement values and the median value of analysts' expectations.

e_t = error term, α is a scalar and **b** is vector of coefficients.

4.4.1.1 Preliminary analysis

In this section, we try to augment equation (3) with several potential independent variables as a control variable to obtain unbiased estimates of the impact of the macroeconomic news. On this basis, we begin with the day of the week effect since trading volume of different types of investors may be different on different day of the week. For example, Kallunki and Martikainen (1997) examine the behaviour of small and large investors in different days of the week for the stock market of Finland. In the study, while small investors are found to be more willing to sell in the beginning of the week big investors are found to increase their buy orders. In view of this, we also examine whether macroeconomic announcements in Thailand are clustered on certain days of the week which can be seen in table 4.2.

Table 4.2 shows the total number of announcements, their respective start dates and end dates, the total number of announcements released on each day of the week and the sources of each announcement. All announcements, Consumer Price Index (CPI), Industrial Production Index (IPI) and Trade Balance (TB), are made on a monthly basis and released when the market is open. When we look at the table we see that the number of inflation announcements for each day is quite similar for Tuesday through Friday within the range of 22-30, whereas the number increases to 59 for Monday. The numbers of industrial production and trade balance announcements, they are released at the same time, have a little bit reversal pattern. They are very similar for Monday through Thursday within the range of 22-27. However, the numbers increase to 69 for Friday. We also test for the equality of means for all announcements across the days of the week and find that the null hypothesis that all weekdays have equal means is strongly rejected at the 0.00001 level which can be seen in table 4.2. These results strongly suggest the modification of specification (3) with the day of the week effect observed in Thailand market. Therefore, we augment our specification with the day of the week effect as below:

$$IS_{it} = \alpha + \mathbf{x}_t^{u}\mathbf{b} + \mathbf{d} + e_t \qquad (4)$$

Where, $\mathbf{d}$ = 1 x 4 vector of day-of-the-week dummy variables for Monday through Thursday. All the other variables and coefficients are defined similarly as in equation (3).

Table 4.2: Macroeconomic Announcements (Actual Announcements)

Announcement	No of Ann	Start Date	End Date	Monday	Tuesday	Wednesday	Thursday	Friday	Source
Consumer Price Index (CPI)	160	01/02/1995	02/05/2008	59	30	27	22	22	MoC
Industrial Production Index (IPI)	159	28/02/1995	30/04/2008	20	21	27	22	69	BoT
Trade Balance (TB)	159	28/02/1995	30/04/2008	20	21	27	22	69	BoT

Null hypothesis: $\mu_{monday} = \mu_{tuesday} = \mu_{wendesday} = \mu_{thursday} = \mu_{friday}$

F test :

Prob : 0.0001***

The table shows the total number of announcements, start and end dates, day distribution, and the sources of each announcement. Source is the reporting agency where NESDB represents the National Economic and Social Development Board. MoC represents Ministry of Commerce. BoT represents bank of Thailand. CPI, IPI, and TB announcements are made on a monthly basis. The table also shows the test for the equality of means for all announcements across the days of the week with related F test and Probability values. Null hypothesis is that all week days have equal means. *** indicates significance at the 1 percent level.

Furthermore, it can be argued that our results could be driven by the correlation between net purchases of investors and other independent variables that are not included in our specification. For example, previous studies, for emerging markets, have found significant evidence of correlations between foreigners' purchases and lagged local market returns and between foreigners' purchases and lagged mature market returns. These studies have also documented substantial positive autocorrelations in daily net purchases of foreign investors as well. In preliminary analysis, the first two lags of net purchases of each investor type are found to be significant in each equation. Similarly, previous day local market return is also found to be significant in each equation while the previous day S&P 500 index return is not. Therefore, unlike the studies of Nofsinger (2001) and Errenburg *et al* (2006), the first two two lags of net purchases of investor group *i* and previous day local market return are included as control variables so as to account for the movement in net purchases of investors. Therefore, we augment our specification (4) with our control variables as below:

$$IS_{it} = \alpha + \mathbf{x}_t^u \mathbf{b} + \mathbf{y}_t \mathbf{c} + e_t \qquad (5)$$

Where, **y** = 1x3 vector of variables (the first two lags of net purchases of investor group *i* and previous day local market return) and **c** is vector of coefficients. All the other variables and coefficients are defined similarly as in equation (4). A point worth clarifying here is that after including three control variables none of the week days are found to be significant in any equation. Therefore, they are excluded from the equations.

In addition to this, one could argue that our model is still incomplete in the sense that investor sentiment and contemporaneous local market return can be correlated. Because, previous studies for emerging markets (for example Richards, 2005) have found significant

evidence of correlations between net purchases (can be thought as investor sentiment) of foreign investors and contemporaneous local market return. Therefore, if domestic market returns are influenced by the macroeconomic announcement releases there is a risk that macroeconomic announcements can be found to have effect on investor sentiment but this might be spurious due to picking up the correlation between investor sentiment and domestic returns. On this basis, we perform correlation analysis, as shown in table 4.3, to see whether there is any correlation between different types of investors' sentiment and same day local returns.

Results in table 4.3 appear to be consistent with what is documented in the literature. In other words, it is reasonable to include same-day return as a control variable in order to avoid possible spurious correlation between investor reaction and macroeconomic announcements. However, it is also likely to have a suspicion about whether the reactions (proxied by "buy-sell imbalance") of foreign investors and local individuals are endogeneously related with the same day local returns. So, if endogeneity is present, it will not be possible to obtain unbiased and consistent OLS estimates due to the regressor- error correlation. In such cases, Instrumental variables (IV) or GMM method provides a general solution in obtaining consistent estimator.

Table 4.3 Correlations Between Investor Sentiment and Same Day Local Return

	Same day local return
Foreign investors	0.37
Local Institutions	0.015
Local Individuals	-0.40

This table shows the correlations between investor sentiment and same day local return in the SET for the period 01/02/1995 – 30/04/2008.

In this setup, the information about the movements in explanatory variable (here, the same-day returns) that is not correlated with the error term is gleaned from one or more observable variables, called instrumental variables. However, the use of IV or GMM does come with a price. Because, if the OLS estimator is unbiased and consistent it is inevitable to lose efficiency when turning to IV or GMM estimation methods (Wooldridge 2003). It is therefore very important to test for the endogeneity of the same-day returns in these equations in order to decide whether there is a need to resort to IV or GMM estimation methods. To test the endogeneity of local returns, we have to find a set of instrumental variables. The choice of the suitable instruments is an important step. A valid instrument must satisfy two conditions. First it must be correlated with the explanatory variable (same-day returns) that is causing the problem known as instrument relevance. Second, it must be uncorrelated with the error term known as instrument exogeneity. The instrument relevance is very crucial because if the instruments are not correlated with the endogeneous regressors the IV estimator will suffer from the same bias as that of OLS estimator. Another serious problem can also appear when the instruments explain little variation in explanatory variable –which are called as weak instruments- due to suffering from finite sample bias problems (Baum 2007). Similar to the instrument relevance, instrument exogeneity is also a very important concept in IV regression. In the case of single endogeneous variable, as in our case, when we have one instrument the model is said to be exactly identified and it is not possible to test whether the instrument is exogeneous. On the other hand, when the number of instrument is greater than one, M, >1 the model is said to be overidentified and this time it is possible to test the M-1 overidentifying restrictions which provides information about the validity of the instruments.

Before searching candidate instruments for this purpose one has to know some specialized terminology regarding the definitions of endogeneity and exogenity. For example,

in traditional usage in economics, a variable is endogeneous if it is determined within the model and is exogeneous if it is determined outside the model. On this basis, we are inspired by Richards (2005) which investigates the trading behaviour of foreign investors in six pacific countries. In explaining local returns in emerging markets, the study uses same-day returns of other countries in the same region as explanatory variables. The intuition is that there may be some unobserved factors that affect all returns in the region. On this basis, initially, the market returns in the same region can be thought as appropriate instruments for local return in Thailand. For this purpose, the returns that we think of are as follows: Korea, Indonesia, Taiwan, Philippines, Hon Kong, Japan, Australian and Singapore. In this scenario, in terms of economics terminology, it is very reasonable to think of these market returns as instruments because the returns in these markets are not expected to be determined by the volume (net purchases of different types of investors) in the Thailand market. In other words, since these are different markets, they are not expected to be determined in the context of our model. However, in econometrics terminology, while related to this traditional definition, a variable is said to be "endogeneous" if it is correlated with the error term and said to be "exogeneous" if it is uncorrelated with the error term which can be determined by testing overidentfying restrictions in this respect. However, as mentioned in Wooldridge (2002), many authors such as Tauchen (1986), Altonji and Segal (1996), and Ziliak (1997) show that using many overidentifying restrictions is not recommended due to rendering GMM estimators to have very poor finite sample properties. Therefore, we prefer to choose three markets out of eight (after preliminary tests), namely Taiwan, Indonesia and Singapore which are found to have more strong correlations with the Thailand market returns compared to others and which passed the first stage regression F statistic (will be mentioned later) with the higher number.

After having determined the set of instruments to employ, a point worth mentioning here is that the standard diagnostic tests for instrument relevance, instrument exogeneity (overidentifying restrictions) and endogeneity are not valid in the presence of non iid errors in IV regression. For example, the common approach when faced with unknown form heterogeneity is to use Generalized Method of Moments (GMM) rather than IV since it is more efficient. However in the presence of homoskedastic errors IV is preferable to GMM. It is therefore important to check heteroskedasticity in the IV regression residuals to decide whether to employ IV or GMM.

As mentioned in Baum (2003) that the standard tests such as Breusch-Pagan/Godfrey/Cook- Weisberg and White/Koenker to detect heteroskedasticity in an OLS regression can be valid tests in an IV regression only in the presence of heteroskedasticity in that equation and nowhere else in the system. This requirement is relaxed in Pagan and Hall (1983) test statistic which is designed specifically to detect heteroskedasticity in an IV regression irrespective of the presence of heteroskedasticity elsewhere in the system. Given the above, we perform Pagan-Hall test, as shown below in table 4.4, to see whether there is heteroskedasticity in the residuals of IV regressions. [19]

In table 4.4 it is seen that whether the disturbance is assumed to be normally distributed or not doesn't make any difference and in both test statistics we fail to reject the null hypotheses that the errors are homoskedastic for both local individuals and foreigners. Thus, we proceed with IV rather than GMM.

[19] Here, it is also useful to note that since there is no correlation between local returns and the reaction of local institutions around macroeconomic announcements IV regression is not used for local institution regression. Therefore, Hausman endogeneity test and all other preliminary tests are reported only for local individuals and foreign investors.

Table 4.4 Heteroskedasticity test in the IV regression

IV Heteroskedasticity test
Ho: Disturbance is homoskedastic

	Foreign investors	
Pagan Hall general test statistic :	8.623 Chi-sq(9)	P-value = 0.4728
Pagan-Hall test w/assumed normality:	10.89 Chi-sq(9)	P-value = 0.2828
	Local individuals	
Pagan Hall general test statistic:	5.371 Chi-sq(9)	P-value = 0.8008
Pagan-Hall test w/assumed normality:	9.259 Chi-sq(9)	P-value = 0.4137

This table shows the results of heteroskedasticity test in the IV regression for foreign investors and local individuals. The pagan hall statistic is distributed as χ^2 with p degrees of freedom under the null hypothesis that the disturbances are homoskedastic irrespective of the presence of heteroskedasticity elsewhere in the system. The test statistic is also reported under the maintained hypothesis that the disturbances are normally distributed.

Similarly, we also check for serial independence in the residuals of IV regression to see whether there is need to proceed with IV estimator that is robust to autocorrelation. Similar to the heteroskedasticity tests, the standard tests for detecting autocorrelation such as the Box-Pierce test, Breusch-Godfrey test and the Durbin's h test are not valid in the presence of endogeneous regressors. We follow Baum (2007) suggestion and employ the Cumby–Huizinga test, as shown below in table 4.5, which is specifically designed to test autocorrelation in an IV regression.

When looking at table 4.5, we see that the null hypothesis that the residuals are nonautocorrelated is not rejected for foreign investors. However, we can reject the same null hypothesis for local individuals at order 1…4 at the conventional 0.05 significance level. Thus, it is clear that we have to use auotocorrelation robust IV estimator for local individuals.

Table 4.5: Cumby-Huizinga autocorrelation test in IV

Foreign investors

H0: errors nonautocorrelated at order 1..4
Test statistic: 3.806 Under H0, Chi-sq(4) with p-value: .432

H0: errors nonautocorrelated at order 1..8
Test statistic: 4.721 Under H0, Chi-sq(8) with p-value: .786

Local individuals

H0: errors nonautocorrelated at order 1..4
Test statistic: 11.555 Under H0, Chi-sq(4) with p-value: .0209

H0: errors nonautocorrelated at order 1..8
Test statistic: 14.735 Under H0, Chi-sq(8) with p-value: .0644

This table shows the results of Cumby-Huizinga test in the IV regression for foreign investors and local individuals. The test statistic is distributed as χ^2 with s degrees of freedom under the null hypothesis that the errors are not correlated for lags q – (q+s). s denotes the number of lag orders to be tested and q denotes the lowest lag order to be tested.

Now, we can move to the diagnostic tests for instrument relevance, instrument exogeneity and endogeneity for same-day return in the foreigners and local individuals equations.

Table 4.6 below reports the results for foreigners and individuals equations in part A and part B, respectively, obtained from Stata. When estimating IV regression in Stata with enhanced routines it automatically reports underidentification test, weak identification test, overidentifying restriction test and endogenous test together. Panel A reports the results of underidentification tests. This test is an LM test which essentially tests the rank of a matrix. The null hypothesis is that the equation is underidentified which means that the matrix is rank-deficient. A rejection of the null hypothesis implies that the equation is identified that is to say the matrix is full column rank. For foreigners' equation the LM version of the

Anderson (1951) canonical correlations test is employed for this purpose and null hypothesis is found to be strongly rejected which means that the equation is identified. However, as mentioned before that in the presence of non-i.i.d errors all diagnostics are no longer valid. Since local individuals' equation is found to suffer from autocorrelation the Anderson LM statistics is no longer valid. Therefore, we employ LM version of the Kleibergen-Paap (2006) rk statistic for local individuals' equation which is robust to autocorrelation (Kleibergen and Paap (2006), and Kleibergen and Schaffer (2007)), and we see from panel A that we can strongly reject the null hypothesis that the equation is underidentified for local individuals.

However, there may still be a weak instrument problem present. Therefore, Panel B, reports weak identification tests for both foreigners and local individuals. As mentioned before "weak identification" arises when our instruments are weakly correlated with the endogenous regressor. Determining whether our instruments are weak has crucial importance in choosing the right estimator since different estimators (e.g., the GMM continuously updated estimator, CUE, and limited-information maximum likelihood, LIML) are documented to be more robust in the presence of weak instruments than others (Baum *et al*., 2007)). In the case of i.i.d errors an F version of the Cragg-Donald Wald statistic is employed as a weak identification test. Critical values have been compiled by Stock and Yogo (2005). Here, the null hypothesis that the equation is weakly identified is strongly rejected for foreigners' equation. Therefore, there is no need to resort to another estimator rather than IV for foreigners' equation. When we move to the same test for local individuals' equation since the i.i.d assumption is violated an F version of the Cragg-Donald Wald statistic is no longer valid as a weak identification test. Instead, robust Kleibergen-Paap Wald rk F statistic is employed and we find that the test can strongly reject its null that the equation is weakly identified.

These two tests show that our instruments have passed the instrument relevance tests in both foreigners and individuals' equations. Now we move to the test of overidentifying restrictions to determine whether our instruments are uncorrelated to the error term in other words whether they are valid instruments. Panel C reports the Sargan-Hansen test which is a test of overidentifying restrictions. The joint hypothesis is that the instruments are uncorrelated with the disturbances and the model is correctly specified. A rejection of the null hypothesis indicates that the instruments may not be truly exogenous or they might be incorrectly excluded from the regression. Under conditional heteroskedasticity this test statistic is commonly known as Hansen J statistic. But when the errors are homoskedastic the Hansen J statistic test becomes Sargan's statistic. Here, as can be seen in panel C that we fail to reject the null hypothesis which implies that our instruments are valid instruments for foreigners' equation. When we apply the same test for local individuals' equation it is useful to note that when the errors are homoskedastic but autocorrelated Sargan statistic is still consistent. Accordingly, employing the same sargan statistic we find that we fail to reject the null hypothesis for local individuals' equation which means that our instruments are valid instruments for local return in individuals' equation.

Finally, having confirmed that our instruments are valid instruments in terms of relevance and exogeneity in both foreigners and local individuals' equations, we now can move to the test of endogeneity reported in panel D. In this test, the null hypothesis is that the endogenous (suspected) regressor can be treated as exogenous. The endogeneity test is essentially the difference of two Sargan-Hansen statistics. In one, the equation has smaller set of instruments where suspected variable is treated as endogenous. In the other, the equation has larger set of instruments where suspected variable is treated as exogenous. Under

homoskedastic errors this test statistic is numerically equal to Hausman test statistic (Hayashi, 2000, pp. 233-34). When looking at Panel D it is clear that we fail to reject the null hypothesis which implies that we can treat local returns as exogenous in foreigners' equation. In other words there is no need to use IV method rather than OLS estimation. When we look at the same test employed for local individuals which is robust to autocorrelation we find that the test fails to reject its null which implies that local returns can be treated as exogenous variable in local individual's equation.

Having tested the endogeneity of local returns appropriately, it is clear that local returns have to be included in both of these equations as a control variable. Therefore, we augment our specification (5) with the local return as a control variable as below:

$$IS_{it} = \alpha + \mathbf{x}_t^{u}\mathbf{b} + \mathbf{y}_t\mathbf{c} + z_t g + e_t \qquad (6)$$

Where, z = local returns and g is the related coefficient on it. All the other variables and coefficients are defined similarly as in equation (5). A point worth clarifying here is that the local return is found to have no correlation with the institutional purchases. Therefore, local returns are not included as a control variable in the institutions' purchase equation.

Table 4.6: Diagnostic tests for instrument relevance, instrument exogeneity and endogeneity

PART A: **FOREIGNERS**	PART B: **LOCAL INDIVIDUALS**
IV (2SLS) estimation	IV (2SLS) estimation
Estimates efficient for homoskedasticity only	Estimates efficient for homoskedasticity only
Statistics consistent for homoskedasticity only	Statistics robust to autocorrelation
	kernel=Bartlett; bandwidth= 2
	Automatic bw selection according to Newey-West (1994)
Panel A: Underidentification tests	**Panel A: Underidentification tests**
Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)	Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)
Ha: matrix has rank=K1 (identified)	Ha: matrix has rank=K1 (identified)
Anderson canon. corr. N*CCEV LM statistic: Chi-sq(3)=52.63	Kleibergen-Paap rk LM statistic: Chi-sq(3)= 51.05
p-val= 0.00	p-val= 0.00
Panel B: Weak identification test	**Panel B: Weak identification test**
Ho: equation is weakly identified	Ho: equation is weakly identified
Cragg-Donald Wald F-statistic: 21.05	Kleibergen-Paap Wald rk F statistic: 20.31
Stock-Yogo weak ID test critical values:	Stock-Yogo weak ID test critical values:
5% maximal IV relative bias: 13.91	5% maximal IV relative bias: 13.91
10% maximal IV relative bias: 9.08	10% maximal IV relative bias: 9.08
20% maximal IV relative bias: 6.46	20% maximal IV relative bias: 6.46
30% maximal IV relative bias: 5.39	30% maximal IV relative bias: 5.39
Panel C: Overidentification test of all instruments	**Panel C: Overidentification test of all instruments**
Ho: the instruments are valid instruments	Ho: the instruments are valid instruments
Sargan statistic: 1.32	Sargan statistic: 0.43
Chi-sq(2) P-Val = 0.51	Chi-sq(2) P-Val = 0.80
Panel D: Endogeneity test	**Panel D: Endogeneity test**
Endogeneity test of endogenous regressors: 0.07	Endogeneity test of endogenous regressors: 0.08
Chi-sq(2) p-Val = 0.79	Chi-sq(2) p-Val = 0.78
Regressors tested: Local return	Regressors tested: Local return

This table reports the diagnostic tests for instrument relevance, instrument exogeneity and endogeneity for same-day return in the foreigners and local individuals equations. Diagnostics tests for foreigners and local individuals are reported in part A and B respectively. Panel A reports the results of underidentification tests. The test is an LM test and the null hypothesis is that the equation is underidentified. For foreigners' equation the LM version of the Anderson (1951) canonical correlations test is reported. For local individuals' equation LM version of the Kleibergen-Paap (2006) rk statistic is reported which is robust to autocorrelation. Panel B, reports weak identification tests for both foreigners and local individuals. The null hypothesis is that the equation is weakly identified .F version of the Cragg-Donald Wald statistic is reported as a weak identification test for foreigners, while

robust Kleibergen-Paap Wald rk F statistic is reported for local individuals. Critical values have been compiled by Stock and Yogo (2005). Panel C reports the Sargan-Hansen test which is a test of overidentifying restrictions. The joint hypothesis is that the instruments are uncorrelated with the disturbances and the model is correctly specified. Panel D shows the test of endogeneity which is numerically equal to Hausman test statistic under homoskedastic errors. The null hypothesis is that the endogenous (suspected) regressor can be treated as exogenous.

4.4.1.2 Seemingly unrelated regressions

Having completed our preliminary analyses we end up with specification (6) and now we have three separate equations to estimate for three different investor groups. It can be thought that OLS estimation method can be employed separately to estimate these equations. However, since all three regressions are conditional regressions (conditional on economic announcements) the behaviours of investors are determined by exogenous shocks (news surprises) which suggest that these equations are likely to be related through their error terms. Furthermore, since these three types of market players trade with each other the correlation is more likely to be present between the residuals. Therefore, we employ seemingly unrelated regression (SUR) model known as Zellner estimation which is an application of generalized least squares (GLS). Similar to OLS, all regressors are assumed to be independent in the SUR method, but the correlations among the residuals in different equations are used by SUR method to improve estimates. As it is mentioned in Greene (2007) that the higher correlations there are between residuals of the equations, the grater is the gain in efficiency from using GLS over OLS, since GLS use this information to improve estimates.

Additionally, there is also a gain in efficiency when the regressors are not the same in each equation. In our case, by its nature, lag purchases of each investor are different in these equations.

Furthermore, another reason why we do not prefer to employ single OLS equations is that since we wish to examine whether the responses of different investors are different to the same macroeconomic news we have to put restrictions on coefficients across equations and this would only be possible when all parameters of the equations are estimated

simultaneously in the system. Therefore, we employ seemingly unrelated regression (SUR) model which can estimate all the parameters simultaneously in the system while investigating the reactions of investors around macroeconomic announcements.

It is useful to mention that the consistency of SUR approach is automatically provided. Because, in our preliminary analyses we find that local returns can be treated as exogeneous regressor in each equation. As SUR is just a variant of running OLS on each equation, if all of the equations have suitably exogenous regressors, we may then easily apply SURE, which assumes that each equation may be estimated consistently with OLS. However, one could question the consistency of SUR method when using GLS rather than OLS. A first point to note is that using GLS does not create a problem. Because, GLS after all is merely OLS on transformed data. SUR makes use of the residual covariance matrix from our OLS estimates to perform the GLS (Zellner) step. If each equation is consistently estimated by OLS, SUR is appropriate, as it is based on residuals which are functions of the estimated coefficients. If they are consistent, then any technique or test based on them is also consistent.

4.4.1.2.1 Preliminary analyses

Before estimating a SUR model it is useful to check the presence of heteroskedasticity and autocorrelation within the equations (each equation within the system). Therefore, initially each equation is estimated by OLS separately and we test each equation in turn to see whether they contain heteroskedasticy or autocorrelation. The results of the heteroskedasticity and autocorrelation tests are shown below in table 4.7 and table 4.8 respectively.

Table 4.7 Heteroskedasticity test: White (cross of all variables)

	Statistic	DF	Pr > ChiSq
Foreigners	44.47	33	0.08
Local Individuals	39.74	33	0.19
Local Institutions	37.129	25	0.06

This table shows the results of White's (1980) heteroskedasticity test for foreigners, local individuals and local institutions' equations. The null hypothesis is that the errors are homoskedastic against heteroskedasticity of unknown. White's test statistic is asymptotically distributed as χ^2 with degrees of freedom equal to the number of slope coefficients (excluding the constant) in the test regression. DF denotes degrees of freedom.

Table 4.8 Breusch-Godfrey LM test for autocorrelation

Ho: no serial correlation up to lag order 5.

	LM statistic	Prob Chi-square(5)
Foreigners	2.58	0.764
Local individuals	10.316	0.067
Local institutions	6.257	0.282

This table shows the results of Breusch-Godfrey LM test for autocorrelation in foreigners, local individuals and local institutions' equations. The null hypothesis is that there is no serial correlation up to lag order five. Breusch-Godfrey LM test statistic is asymptotically distributed as χ^2 with p degrees of freedom. p denotes the number of lag orders to be tested.

As can be seen in table 4.7 we fail to reject the null hypothesis that the errors are homoskedastic for all investor types. In a similar vein, in table 4.8 the null hypothesis that there is no serial correlation up to lag order 5 is not rejected at the conventional 0.05 signifcance level.

Given the above results, there is no need to correct for heteroskedasticity or autocorrelation within the equations. However, there can still be need to correct for heteroskedasticity or autocorrelation between equations. For example, in some softwares such as E-views a typical SUR model is estimated that accounts for heteroskedasticity as a default, because, heteroskedasticity is more likely to be present between equations than not.

Nevertheless, we also want to test the equality of the variances between the residuals of the equations. Therefore, we initially extract the residuals after OLS regressions then we employ three different methods for variance testing namely the Bartlett test, Levene test and Brown-Forsythe (modified Levene) test. The null hypothesis in all these tests is that the variances in these residuals are equal against the alternative that at least one of the residual has a different variance. The results of the variance tests for each equation are shown in Table 4.9.

As can be seen from table 4.9 the null hypothesis that the variances of residuals are equal is strongly rejected as expected. In a similar vein, we test for autocorrelation between equations employing a Breusch-Pagan (1980) test that tests whether the variance-covariance matrix is diagonal. Table 4.10 below shows the result of the Breusch-Pagan test and also displays the correlation matrix of the residuals between equations which gives information about the degree of contemporaneous correlation between the residuals. It can be seen that there is a very high correlation between the residuals of foreigners and individuals equations with the value of 0.69, and some correlation between the residuals of foreigners and institutions and between the institutions and individuals equations with the value of 0.23 and 0.22, respectively. Furthermore, the null hypothesis that the disturbance variance-covariance matrix is diagonal is strongly rejected.

Table 4.9 Test for equality of variances between residuals

Method	df	value	probability
Bartlett	2	365.7474	0.000
Levene	(2, 951)	116.6611	0.000
Brown-Forsythe	(2, 951)	115.892	0.000

Category statistics

Variable	Count	Std. Dev.	Mean Abs. Mean Diff.	Mean Abs. Median Diff.
RESFOR	318	0.1119	0.0872	0.0872
RESINS	318	0.2095	0.1597	0.1596
RESIND	318	0.0699	0.0497	0.0498
All	954	0.1428	0.0989	0.0989

Bartlett weighted standard deviation: 0.1429

This table shows the test for equality of variances between the residuals of OLS regressions. RESFOR, RESINS, RESIND denote residuals of foreigners, institutions, and individuals' equations respectively. Bartlett, Levene and Brown-Forsythe (modified Levene) are three different tests employed for variance testing. The null hypothesis in all these tests is that the variances in these residuals are equal against the alternative that at least one of the residual has a different variance.

Table 4.10 Autocorrelation test in the system residuals

Correlation matrix of residuals:

	foreigners	individuals	institutions
foreigners	1		
Institutions	-0.2327	1	
individuals	-0.6945	-0.2258	1

Breusch-Pagan test of independence: chi2(3) = 186.814, Pr = 0.0000

This table shows the correlation matrix of the residuals between equations and also performs a Breusch-Pagan test which tests whether the disturbance variance-covariance matrix is diagonal.

In the light of the above results we employ SUR method that accounts for heteroskedasticity, autocorrelation and contemporaneous correlation in the errors across equations using the nonlinear iterated SUR procedure. Details of the seemingly unrelated regression methodology are explained in Appendix A4.2.

4.4.2 Reaction to economic announcements conditional on state of the economy

Regarding the hypothesis two, we explore whether reactions of investors to macroeconomic news releases are the same across different states of the economy. Specification (6) assumes that investors' reactions to macroeconomic news are constant over different economic sates. For reasons mentioned previously in section 4.2, the impact of macroeconomic announcements on investor trading is allowed to vary over different states of the economy. To do so, we specify our model as in McQueen and Roley (1993) and estimate the conditional responses of different types of investors to economic announcements with the following specification:

$$IS_{it} = \alpha + HIGH_t \mathbf{x}_t^{u} \mathbf{b}^{HIGH} + MEDIUM_t \mathbf{x}_t^{u} \mathbf{b}^{MEDIUM} + LOW_t \mathbf{x}_t^{u} \mathbf{b}^{LOW} + \mathbf{y}_t \mathbf{c} + z_t g + e_t \quad (7)$$

Where,

$HIGH_t$ = 1 if the economy is in the high stage of business cycle at time *t*, and zero otherwise;

$MEDIUM_t$ = 1 if the economy is in the medium stage of business cycle at time *t*, and zero otherwise

LOW_t = 1 if the economy is in the low stage of business cycle at time *t*, and zero otherwise

All the other variables and coefficients are defined similarly as in specification (6).

4.4.2.1 Classification of economic states

In order to test the hypothesis that investors' response to economic news varies across different business conditions, we need to classify the different levels of economic activity. We follow McQueen and Roley (1993) and use seasonally adjusted monthly industrial

production index in identifying the states of the economy as a boom, recession and normal period as is explained in chapter 3. If the bounds for the industrial production were constructed symmetrically the best approximations were achieved by the constants between 0.0615 and 0.0625 which would put about 28.3 percent of the observations in the high state and about 25.1 percent in the low state. Therefore, the bounds are not constructed symmetrically. Instead, the deviations from the industrial production trend are chosen +0.062 and – 0.0665 for the upper bounds and lower bounds respectively, shown below in figure 4.1, which put 25 percent of the observations in the high state and 25 percent of the observations in the low state.

Figure 4.1 Natural Log of Industrial production, Actual and Bounds (trend +0.062 and trend -0.0665)

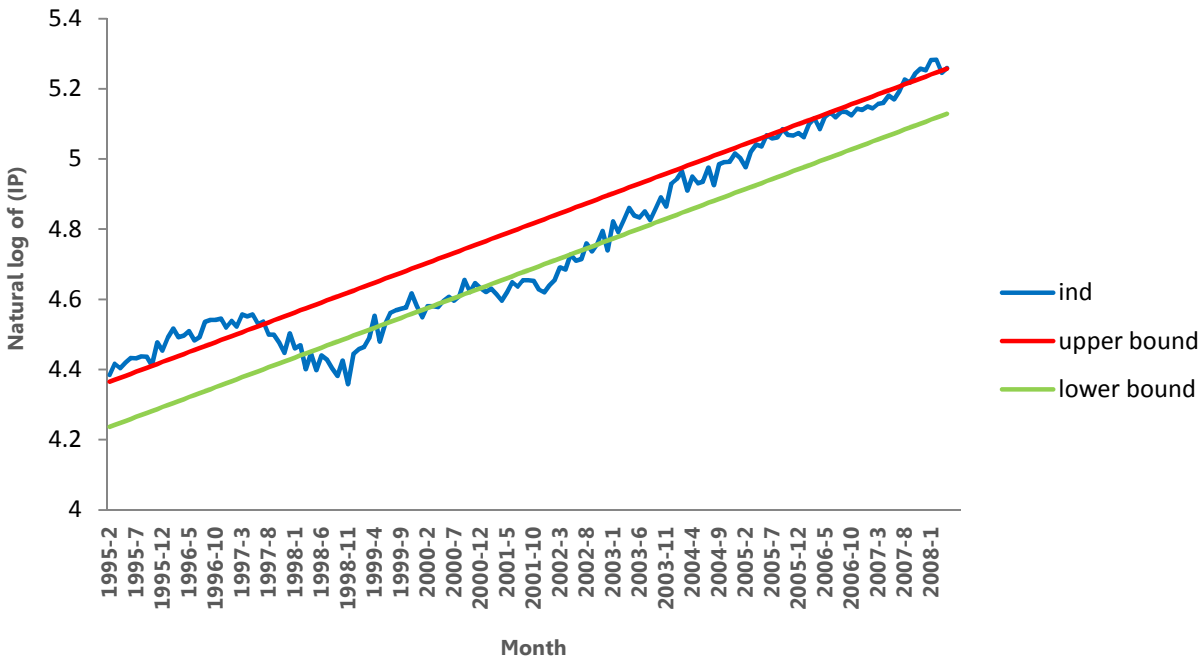


Figure 4.1 shows natural log of industrial production with its constructed upper and lower bounds for Thailand.The vertical axis shows natural log value of industrial production. The horizontal axis shows time scale beginning in February 1995 and ending in May 2008. The blue line represents the natural log of industrial production, while red and blue line represent upper and lower bounds respectively.

When comparing the economic states with those identified in the second chapter there are some mismatches for some months for Thailand due to nature of the chosen methodology. In this methodology economic states are identified in a relative manner within the time span. Each high and low economic activity cannot exceed 25 percent of the total observations. In this respect, upper and lower bounds created for that time span can differ from those bounds created for other time span. However, the methodology is widely used in the literature due to being accepted as consistent in itself.

4.4.3 Reaction to economic announcements conditional on states of the market

Regarding the hypothesis three, we explore whether investors continue to exhibit same trading behaviour in the event of macroeconomic news releases across different states of the stock market. Specification (6) assumes that investors' trading strategies around macroeconomic announcements are the same over different periods of the stock market. However, Goldberg and Vora (1981) find evidence of stock return variation with the direction of stock market returns. Furthermore, Klein and Rosenfeld (1987) document divergent results for the identical events during bull and bear markets. Therefore, in order to see whether the trading behaviour of investors around macroeconomic announcements are same over different conditions of the stock market we specify our model that allows the effects of macroeconomic announcements on investor trading to vary over different states of the market. To do so, we use dummy variables that capture bull, bear and normal market periods, as McQueen and Roley (1993) employed while determining the state of the economy, using Hardouvelis and Theodossiou (2002) definition for the bull and bear market periods.

To investigate this issue, we estimate the conditional responses of different types of investors to economic announcements with the following specification:

$$IS_{it} = \alpha + BULL_t \mathbf{x}_t^{u} \mathbf{b}^{BULL} + NORMAL_t \mathbf{x}_t^{u} \mathbf{b}^{NORMAL} + BEAR_t \mathbf{x}_t^{u} \mathbf{b}^{BEAR} + \mathbf{y}_t \mathbf{c} + z_t g + e_t \quad (8)$$

Where,

$BULL_t$ = 1 if the stock market is in the bull market period at time *t*, and zero otherwise;

$BEAR_t$ = 1 if the stock market is in the bear market period at time *t*, and zero otherwise

$NORMAL_t$ = 1 if the stock market is the normal period at time *t*, and zero otherwise.

All the other variables are defined similarly as in specification (6).

4.4.3.1 Classification of the States as Bull and Bear Markets

The term "bull market" and "bear market" are used to refer to a period of consecutive monthly increases and decreases in equity prices, respectively. The horizon should last beyond one month, but there is no general accepted definition about how many consecutive monthly equity returns a bull or bear period should contain. Following Hardouvelis and Theodossiou (2002), we characterize a bull or bear market as the period whose horizon contains at least three consecutive monthly changes in returns with the same algebraic sign. Through our observation period, given the at least three month rule, there are 8 disjoint "bull" periods which contain 37 monthly observations corresponding to a 23.4 percent of the sample. The bear periods are found to be 6 and contain 28 monthly observations equivalent to 18.13% of the sample. The remaining periods which are called "normal" periods have at most two consecutive monthly returns with the same algebraic sign and contain 95 (160-37-28) months that correspond to 59.3% of the sample.

4.4.4 Reaction to Economic Announcements Before, During, and After the Crisis Period

Regarding the hypothesis four, we investigate whether investors continue to exhibit same trading behaviour around macroeconomic announcements across different sub-periods. As mentioned previously investors are expected to learn from their trading experiences. In this context, if investors lose money by pursuing a specific strategy their trading patterns are not expected to exist persistently. Moving from this view one could argue that during our observation period there was a pervasive financial crisis in the region, which started in Thailand on 2 July 1997 with the collapse of the Thai baht, could have altered fundamental trading behaviour of investors leading to response distinctions across pre- and post-crisis periods. For example, Choe, Kho and Stulz (1999), investigating the impact of foreigners on equity returns in Korea, documented an increase in all mean and median net buy and net sell order imbalances after the crisis. Therefore, we break up our observation period into three sub-periods and check whether the response coefficients are stable across sub-periods. Our baseline conditional mean equation for specification (6) is re-estimated with the following specification.

$$IS_{it} = \alpha + PRIOR_t \mathbf{x}_t^{u} \mathbf{b}^{PRIOR} + DURING_t \mathbf{x}_t^{u} \mathbf{b}^{DURING} + POST_t \mathbf{x}_t^{u} \mathbf{b}^{POST} + \mathbf{d} + \mathbf{cy} + gz + e_t \quad (9)$$

Where *PRIOR, DURING,* and *POST* are dummy variables for the pre-crisis period (prior to May 1997), during crisis period (May 1997 to August 1998), and after the crisis period (September 1998 to May 2008) respectively.

$PRIOR_t$ = 1 if the time period corresponds to prior to may 1997, and zero otherwise;

$DURING_t$ = 1 if the time period falls within May 1997 and August 1998 period, and zero otherwise

$POST_t$ = 1 if the time period corresponds to after August 1998, and zero otherwise

All the other variables and coefficients are defined similarly as in equation (6). Sub-periods are constructed based on the timeline of events across Asia during the Asian crisis provided from the website: http://www.pbs.org/wgbh/pages/frontline/shows/crash/etc/cron.html. We also utilize Ellis and Lewis (2000) study in identifying the timing of important news during Asia crisis.

4.5 Descriptive statistics

Before beginning the estimation of our multivariate models we also take a quick look at the summary statistics for Buy-sell Imbalance (BSI) measure of different types of investors. Table 4.11 shows summary statistics for full sample as well as, subsamples, announcement and non-announcement days. It is seen in table 4.11 that the mean of BSI on announcement and non-announcement days are strikingly different. For example, the mean BSI for foreign investors on non-announcement days is +0.002516, which shows that they have been net buyer on the average since February 1995, whereas it increases to a value of +0.02816 on announcement days that is equivalent, roughly to ten times, a dramatic increase of 1019%. However, the mean BSI for institutional investors on non-announcement days is -0.01837 which shows that institutions have been net sellers on the average since February 1995. On announcement days the mean BSI for institutional investors decreases to a value of -0.02362 equivalent to 0.286 % decrease in net sales. Similar to foreign investors, the mean BSI for individual investors on non-announcement days is found to be +0.004474 which shows that they have been net buyer on the average since February 1995. However, the mean BSI for individuals turns out to be negative with a value of -0.00923 which shows a high increase in net sales equivalent to 306%.

Accordingly, we also test for the equality of means of the BSI measures of different types of investors across announcement and non-announcement days. It can be seen from table 4.11 that the null hypothesis that the mean of BSI measure on announcement days is equal to non-announcement days are strongly rejected with a p-value of 0.003 and 0.005 for foreign investors and local individual investors respectively. However, the null hypothesis is not rejected for local institutional investors with a p value of 0.69. These differences in the means of BSI between announcement and non-announcement days point to the need of detail investigation in terms of individual announcements.

Table 4.11 Summary statistics for BSI (Buy-Sell imbalance) of different types of investors

A: Full Sample (3249 obs)

	Mean	Minimum	Maximum
Foreigners	0.00429	-0.5555	0.62387
Local institutions	-0.01732	-0.8774	0.88798
Local individuals	0.00365	-0.6529	0.45922

B: Announcement days (318 obs)

	Mean	Minimum	Maximum
Foreigners	0.02816	-0.43326	0.54711
Local institutions	-0.02362	-0.80193	0.69902
Local individuals	-0.00923	-0.35026	0.38489

C: Non-Announcement days (2931 obs)

	Mean	Minimum	Maximum
Foreigners	0.00252	-0.55552	0.623875
Local institutions	-0.01837	-0.81093	0.887987
Local individuals	0.00447	-0.6529	0.384887

Null hypothesis: $\mu_A = \mu_{NA}$

	Foreigners	local institutions	local individuals
F test	8.77	0.158	7.77
Prob	0.003***	0.69	0.005***

This table shows Summary statistics for the BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) measures of Foreign, Local institutional and Local individual investors for the period 01/02/1995 – 30/04/2008. μ_A and μ_{NA} denote mean of BSI on announcement and non-announcement days respectively. The null hypothesis is that the mean of BSI measure on announcement days is equal to non-announcement days .*** indicates significance at the 1 percent level.

We also provide detail summary statistics for all the series used in this empirical chapter. Summary statistics begin with Table 4. 12, which shows all series used in our baseline specification (6). When looking at the Table 4.12 we see that foreign investors, on the average, have been net buyer on the announcement days and on the related first previous days which then they become net seller on the second previous days. In terms of individual investors, while, on the average, they have been net seller on the announcement days they become net buyer on the first and second previous days. However, institutional investors, on the average, have been net seller both on the announcement days and on the related first and second previous days.

The mean of same day local return, on the average, is positive, whereas it is negative on the first previous day. While the means of the announcement surprise series for CPI and TB are positive, it is negative for IP. Standard deviations of these fourteen series look quite closer to each other with respect to their means except for $Indiv_{t-1}$, $Foreign_{t-2}$ and $Return_{t-1}$. These series have a bit high standard deviations compared to their means.

When coming to skewness, ten out of fourteen series are either slightly positively or slightly negatively skewed. Same day and previous day's return series are positively skewed, whereas announcement surprise series for CPI and TB are negatively skewed. Of these two announcement series TB series is highly negatively skewed with the skewness value of 15.

For the kurtosis values, same day and related first and second previous days of BSI series for foreigners and institutions have closer kurtosis values compared to normal distributions, whereas the BSI series on the same day and relative first and second previous days for individuals are leptokurtic. Both same day and previous day's returns and all three

announcement series are highly leptokurtic. It is also worth to mention that TB announcement series are extremely leptokurtic with the value of 253.

Finally, when coming to normality test, Jarque-Bera test statistics show that we can strongly reject the null of normality for ten out of fourteen series at the 1% level. Three out of four series of which we cannot reject the null hypothesis are the three BSI series of institutions and the same day BSI series of foreigners.

Table 4.12 Summary statistics of series (Specification 6)

	Foreign	Inst	Indiv	$Foreign_{t-1}$	$Inst_{t-1}$	$Indiv_{t-1}$	$Foreign_{t-2}$	$Inst_{t-2}$	$Indiv_{t-2}$	Return	$Return_{t-1}$	CPI	IP	TB
Mean	0.0281	-0.0236	-0.0092	0.0113	-0.0121	0.0004	-0.0009	-0.0196	0.0055	0.0024	-0.0002	-0.0525	0.074	-0.04
Maximum	0.5471	0.699	0.3848	0.5692	0.6967	0.3341	0.5692	0.6967	0.3341	0.1124	0.1009	1.351	3.124	1.868
Minimum	-0.4332	-0.8019	-0.3502	-0.3689	-0.694	-0.3502	-0.3536	-0.6545	-0.2411	-0.0456	-0.0485	-1.398	-4.928	-11.927
Std. Dev.	0.1467	0.2325	0.089	0.145	0.2203	0.0869	0.1343	0.2145	0.0781	0.0188	0.0145	0.2554	0.7117	0.7073
Skewness	0.1264	-0.1808	-0.0986	0.4007	-0.0576	0.012	0.3605	0.0313	0.3728	1.6402	1.0002	-1.6214	-0.382	-15.074
Kurtosis	3.578	3.7393	5.4473	4.1272	3.4807	5.7248	3.7083	3.6248	5.497	10.668	11.007	14.207	16.471	253.14
Jarque-Bera	5.2754	8.9765	79.878	25.35	3.239	98.388	13.537	5.225	89.98	921.73	902.64	1803.6	2412.4	841144
Probability	0.0715	0.0112	0	0	0.1979	0	0.0012	0.0733	0	0	0	0	0	0
Observations	318	318	318	318	318	318	318	318	318	318	318	318	318	318

This table shows summary statistics of the series used in specification (6). Foreign, Inst and Indiv denote BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) of foreign investors, local institutions and local individuals respectively. t-1 and t-2 subscripts denote the first and second previous days of BSI of the corresponding investors respectively. Return denotes the same day local return. $Return_{t-1}$ denotes previous days return of the SET. CPI, IP and TB denote the announcement surprise series for consumer price index, industrial production and trade balance respectively.

4.13 Summary Statistics of Macroeconomic Surprise Series Across Economic States

	High growth			medium growth			low growth		
	CPI	IP	TB	CPI	IP	TB	CPI	IP	TB
Mean	0.0002	-0.0440	0.0004	-0.0223	0.0579	-0.0025	-0.030	0.0609	-0.0379
Maximum	1.00506	1.1584	0.1914	1.3510	3.1246	1.868	0.3256	3.0837	0.2855
Minimum	-0.2768	-4.9280	-0.3379	-1.3989	-3.6512	-2.5983	-1.2406	-0.6972	-11.927
Std. Dev.	0.0790	0.380	0.0344	0.1906	0.4709	0.2219	0.1553	0.3700	0.6708
Skewness	6.2130	-8.0799	-2.1183	-2.42	1.0061	-3.0941	-5.0945	5.3288	-17.587
Kurtosis	86.687	94.957	44.684	30.787	27.957	77.639	32.96	35.677	312.21
Jarque-Bera	94844	115505	23261	10541	8306	74324	13270	15653	1283245
Probability	0	0	0	0	0	0	0	0	0
Observations	318	318	318	318	318	318	318	318	318

Table 4.13 shows Summary statistics of the surprise series for CPI, IP and TB in high, medium and low growth periods

Table 4.13 shows Summary statistics of the surprise series for CPI, IP and TB in high, medium and low growth periods. When looking at the Table 4.13 the mean of CPI surprise series is positive in the high growth period while it is negative in the medium and low growth periods. The mean of TB also behaves in a similar vein. While it is positive when the economy is in expansion period it is negative when the economy is in normal and recession periods. However, the mean of IP surprises series behaved oppositely compared to the means of CPI and TB surprises. It is negative in the high growth period, whereas it is positive in the medium and low growth periods.

Standard deviations of these surprise series in three different economic states are quite closer to each other with respect to their means except for the CPI surprise series in the high growth. It has a very high standard deviation with respect to its mean.

In terms of skewness all surprise series are strongly either positively or negatively skewed except for the IP surprise series in the medium growth which is moderately positively skewed.

For the kurtosis values, all announcement surprise series are highly leptokurtic. It is also noteworthy that TB surprise series is extremely leptokurtic with the value of 312.

Finally, based on Jarque-Bera test statistics the null hypothesis of normal distribution is rejected for all series at the 1% level.

4.14 Summary statistics of macroeconomic surprise series across states of the market

	Bull Period			normal period			bear period		
	CPI	IP	TB	CPI	IP	TB	CPI	IP	TB
Mean	-0.0007	0.0586	-0.001	-0.0146	0.0209	-0.0359	-0.0368	-0.0048	-0.0030
Maximum	1.0050	3.1246	0.3038	1.3510	3.121	1.868	0.0658	0.7506	0.3587
Minimum	-0.7381	-3.6512	-0.7667	-1.0689	-4.9280	-11.927	-1.3989	-1.3053	-0.4820
Std. Dev.	0.0990	0.3891	0.0732	0.1551	0.5706	0.7017	0.1807	0.1767	0.0535
Skewness	1.1762	0.4361	-4.3869	0.0319	-0.4624	-15.453	-5.7543	-1.8515	-4.2133
Kurtosis	51.249	44.883	50.21	30.939	29.675	261.7	36.665	25.183	48.752
Jarque-Bera	30919	23253	30553	10342	9439.6	899504	16772	6701.8	28676
Probability	0	0	0	0	0	0	0	0	0
Observations	318	318	318	318	318	318	318	318	318

Table 4.14 shows Summary statistics of the surprise series for CPI, IP and TB in Bull market, normal market and bear market periods.

Table 4.14 shows Summary statistics of the surprise series for CPI, IP and TB in Bull market, normal market and bear market periods. When looking at the Table 4.14 the mean of IP surprise series is positive in the bull market and normal market periods, whereas it is negative in the bear market period. However, the means of CPI and TB surprise series are negative in all periods.

Standard deviations of announcement surprise series in three different economic states are closer to each other compared to their means except for the CPI surprise series in the bull market period. It has a very high standard deviation with respect to its mean compared to other series. In terms of skewness TB surprise series are strongly negatively skewed in all periods. except for the IP surprise series in the medium growth which is moderately positively skewed. For CPI surprise series while it is distributed nearly symmetrical around zero in the normal period it is moderately skewed in the bull market period, whereas it is highly negatively skewed in the bear market period. For IP surprise series while it is slightly positively skewed in the bull period it is slightly negatively skewed in the normal period. However, it is negatively skewed in the bear market periods. For the kurtosis values, all announcement surprise series are highly leptokurtic. Finally, when looking at the Jarque-Bera test statistics we strongly reject the hypothesis of normal distribution for all surprise series in all periods.

Table 4.15 Summary statistics of Macroeconomic surprises across crisis periods

	pre-crisis			crisis period			post-crisis		
	CPI	IP	TB	CPI	IP	TB	CPI	IP	TB
Mean	-0.0023	-0.0535	-0.0015	-0.047	0.0114	-0.0036	-0.0028	0.1168	-0.03
Maximum	0.265	0.7506	0.1914	0	3.0837	0.144	1.351	3.1246	1.868
Minimum	-0.2768	-4.928	-0.3379	-1.3989	-1.315	-0.553	-0.8198	-3.6512	-11.927
Std. Dev.	0.0419	0.365	0.025	0.2018	0.2898	0.05	0.153	0.5273	0.705
Skewness	-1.299	-9.2267	-5.995	-4.7537	5.6987	-7.2109	2.1753	1.4066	-15.242
Kurtosis	28.913	109.9	108.48	25.786	60.158	67.797	30.299	20.68	256.91
Jarque-Bera	8987.1	155944	149348	8077.4	45010	58388	10125	4246.6	866565
Probability	0	0	0	0	0	0	0	0	0
Observations	318	318	318	318	318	318	318	318	318

Table 4.15 shows Summary statistics of the surprise series for CPI, IP and TB in the pre-crisis, crisis and post-crisis periods.

Table 4.15 shows Summary statistics of the surprise series for CPI, IP and TB in the pre-crisis, crisis and post-crisis periods.When looking at the Table 2.11 the mean of IP surprise series is negative in the pre-crisis periods, whereas it is positive in the crisis and post-crisis periods. However, the means of CPI and TB surprise series are negative in all three periods.

Standard deviations of surprise series in three different crisis periods look quite closer to each other compared to their means except for the CPI surprise series in the post-crisis period. It has a relatively high standard deviation with respect to its mean compared to other series.

In terms of skewness, TB surprise series are highly negatively skewed in all periods. For CPI surprise series it is moderately and highly negatively skewed in the pre-crisis and crisis periods respectively while it is positively skewed in the post-crisis period. For IP surprise series it is highly negatively skewed and highly positively skewed in the pre-crisis and crisis periods respectively. However, it is moderately positively skewed in the post-crisis period.

For the kurtosis values, all announcement surprise series are highly leptokurtic. Especially IP and TB surprise series in the pre-crisis periods and TB surprise in the post-crisis periods are extremely leptokurtic.

Finally, when coming to normality test based on the Jarque-Bera test statistics we strongly reject the hypothesis of normal distribution for all surprise series in all periods.

4.6 Empirical Results

4.6.1 Response to macroeconomic announcements

Table 4.16 shows the responses of different types of investors to macroeconomic announcements based on specification (6). The dependent variable is the BSI (Buy Sell Imbalance) of the corresponding investor group. The sample period includes 318 announcement day observations for each investor group from February 1995 to May 2008. CPI, IP, and TB denote consumer price index, industrial production and trade balance respectively. Return $_t$ and Return$_{t-1}$ denote the same day and previous days return of SET respectively. BSI $_{t-1}$ and BSI $_{t-2}$ denote the first and second previous days of BSI (Buy-Sell imbalance) respectively. The parameters of the system are estimated by the non-linear iterated seemingly unrelated regression (SUR) method that accounts for heteroskedasticity, autocorrelation and contemporaneous correlation in the errors across equations.[20] Response coefficients are reported with their respective *t*-statistics in parentheses. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

We now move to test the hypothesis discussed in section 4.2.3. In the hypothesis one, momentum (contrarian) behaviour of investors with respect to past return is translated into a tendency to buy (sell) stocks after good news and sell stocks after bad (good) news around macroeconomic announcements. In this set up, local individual investors are expected to sell after good macroeconomic news and buy after bad macroeconomic news, whereas local institutional and foreign investors are expected to buy on good macroeconomic news and sell on bad macroeconomic news. In this context, we come up with mixed findings, shown in table 4.16, regarding the first set of hypotheses. However, before moving to test the

[20] An estimate of Newey-West covariance matrix is computed to allow for serial correlation up to a moving average of order 4 and the results are qualitatively similar to adding some extra lags.

hypotheses, when taking a quick look at the table 4.16 we see that all investor groups respond similarly to BSI_{t-1} and BSI_{t-2} which show positive autocorrelation up to two lags in BSI for all investor groups. But, there are differences for other variables which will be discussed below.

When interpreting coefficients it is worth noting that when the actual data is higher than the expected one it is good news for IP and TB, but not for inflation. Therefore, while positive coefficients at IP and TB announcements correspond to good news it corresponds to bad news for CPI announcements. A point also worth clarifying here is that we interpret the behaviour of investors taking into account the statistical fact. Statistically speaking, if the response of investor to any of the announcement is not found to be significant it means that the response coefficients are not statistically different from zero hence there is no relationship between the response of investor and announcement. Therefore, reactions of investors in this analysis are not commented if the response coefficients are not statistically significant.

When moving to test the hypotheses for foreign investors, we find a significantly positive relationship between the response of foreign investors and inflation announcements. That is to say, they are found to buy/(sell) stocks after positive/(negative) inflation (CPI) news which is consistent with the momentum trading behaviour with respect to macroeconomic announcements. However, we find opposite behaviour for foreigners around the industrial production announcements. They tend to sell/buy stocks in response to positive/negative surprises about the economy which shows that they pursue contrarian trading strategy around industrial production announcements which is not consistent with the prediction in hypothesis (1a). Unlike foreign investors, when we come to individual investors, we find that they give a significant response only around inflation announcements, opposite to foreigners. They tend to be net sellers/(buyers) around a positive/(negative)

surprise in inflation announcements which shows that they pursue contrarian trading strategy around inflation announcements which is also consistent with what is predicted for local individuals in hypothesis (1c). Similar to local individuals, when we turn to test the behaviour of local institutions around macroeconomic announcements we find that they give a significant response only at trade balance announcements. They are found to be net sellers/buyers around a positive/negative surprise in trade balance announcement suggesting that they engage in a contrarian strategy around TB announcements, which is not in line with the prediction for local individuals in hypothesis (1b).

As a result, it can be suggested that each macroeconomic announcement contains information since we document significant reactions by at least one type of investors around each announcement. It can then be said that inflation announcements attract the attention of both foreigners and local individuals, while industrial production and trade balance announcements attract the attention of only foreign investors and local institutions, respectively.

Finally, apart from results regarding the macroeconomic announcements it is also worth noting that all our control variables are found highly significant which justify the need for using the control variables.

Table 4.16 Responses of different types of investors to macroeconomic announcements from February 1995 through May 2008

	Foreigners	local institutions	local individuals
intercept	0.021	-0.013	-0.005
	(2.9)***	(-1.14)	(-1.37)
BSI $_{t-1}$	0.302	0.405	0.274
	(6.85)***	(10.35)***	(5.79)***
BSI $_{t-2}$	0.141	0.133	0.195
	(2.92)***	(2.31)**	(3.37)***
Return $_{t}$	1.713	Na	-1.201
	(3.81)***	Na	(-5.02)***
Return $_{t-1}$	1.777	1.782	-1.225
	(2.51)**	(1.92)*	(-3.94)***
ANNOUNCEMENTS			
Consumer Price Index (CPI)	-0.039	0.034	0.051
	(-1.66)*	-0.64	(2.43)**
Industrial Production (IP)	-0.022	-0.008	0.009
	(-1.97)**	(-0.64)	-1.43
Trade Balance (TB)	-0.001	-0.01	0.001
	(-0.16)	(-2.18)**	-0.87

Table 4.12 shows the estimation results for specification (6) estimated by non-linear iterated seemingly unrelated regression method that allows for heteroskedasticity, autocorrelation and contemporaneous correlation between residuals. The sample period includes 318 announcement day observations for each investor categories from February 1995 to May 2008. Total system (balanced) observations are 954. Regression coefficients are reported with their respective *t* statistics in parentheses. Return denotes the same day local return. Return$_{t-1}$ denotes previous days return of SET. The dependent variable is the BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) of the corresponding investor group. BSI $_{t-1}$ and BSI $_{t-2}$ denote the first and second previous days of BSI respectively. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively. Na is used for contemporaneous return in the local institutions regression due to having no correlation between local returns and the reaction of local institutions around macroeconomic announcements.

4.6.2 Responses to macroeconomic announcements conditional on states of the economy

Having obtained the results about how different players react to macroeconomic news for the whole sample we now move to test the reaction of different players in subsamples. As mentioned in the hypothesis two, since the same type of macroeconomic news can be

regarded as bad in some states and good in other states as documented in McQueen and Roley (1993) it would be useful to examine whether investors follow a pattern in high and low states of the economy similar to that of normal times. Hence, table 4.17 presents the estimation results for specification (7) that allows the impacts of macroeconomic announcements on investors' trading to vary over different states of the economy. The dependent variable is BSI (Buy Sell Imbalance) of the corresponding investor group. The sample period includes 318 announcement day observations for each investor group and begins from February 1995 and goes through May 2008. CPI, IP, and TB denote consumer price index, industrial production and trade balance respectively. Return $_t$ and Return$_{t-1}$ denote the same day and previous days return of SET. BSI $_{t-1}$ and BSI $_{t-2}$ denote the first and second previous days of BSI (Buy-Sell imbalance). The parameters of the system are estimated by the seemingly unrelated regression (SUR) method that accounts for heteroskedasticity, autocorrelation and contemporaneous correlation in the errors across equations. Response coefficients are reported with their respective *t*-statistics in parentheses. At the bottom of the table, regarding the hypothesis (2a), null hypotheses from H_1 through H_3 test whether foreign investors' response to CPI, IP and TB announcements are different when the economy is in the high state from when the economy is in the low state respectively. Regarding the hypothesis (2b), null hypotheses from H_4 through H_6 test whether local institutional investors' response to CPI, IP and TB announcements are different when the economy is in the high state from when the economy is in the low state respectively. Regarding the hypothesis (2c), null hypotheses from H_7 through H_9 test whether local individual investors' response to CPI, IP and TB announcements are different when the economy is in the high state from when the economy is in the low state, respectively. We now turn to test the hypotheses when the response is conditioned on the state of the economy.

In the high state of the economy, we find significant relationship between the response of foreign investors and the surprise component of the industrial production announcements. Similar to the result obtained for the whole period, foreigners are found to sell/buy stocks following a positive/negative surprise about the economy which shows that they act in a contrarian manner around industrial production announcements which is also not in line with the stated hypothesis since they are expected to behave in a momentum style around macroeconomic announcements. In terms of CPI and TB announcements, we find no significant response for foreigners to these announcements in the high state of the economy. For local institutional investors, we come up with different findings in the high state compared to low or medium state of the economy. For example, unlike the low or medium state of the economy, we find significant reaction to both inflation and IP announcements in the high state. In terms of inflation announcements, they tend to sell/buy stocks in response to an increase/decrease in the inflation index which shows that they tend to follow the contrarian trading strategy with respect to inflation announcements, inconsistent with the prediction of hypothesis (1b). In terms of IP announcements, we find a positive significant response to IP announcements in the high state of the economy. They are found to buy/sell stocks after positive/negative surprises in IP announcements showing that they act in a momentum manner around IP announcements in the high state of the economy. This behaviour is in line with the prediction in hypothesis (1b). Similar to the whole period, local institutions are also found to give significant reactions to TB announcements in the high state of the economy. They tend to buy/(sell) stocks at good/(bad) surprises in TB announcements indicating that they behave in a momentum style around TB announcements which is consistent with the prediction in hypothesis (1b). For local individual investors, we find no statistically significant reaction to any of the announcement in the high state of the economy.

When turning to the low growth period, we find no statistically significant response for foreigners to any type of announcement. For local institutions, similar to the whole period, we document statistically significant reaction around TB announcements. We find that they sell/buy stocks following positive/negative surprises in the trade balance announcements showing that they pursue contrarian trading around TB announcements, which is not in line with the prediction in hypothesis (1b). For local individuals, we document significant negative response to the surprises in inflation announcements. They tend to sell/buy stocks in response to positive surprises about the inflation. This behaviour shows that they pursue contrarian trading style which is consistent with the expectation in hypothesis (1c).

In the medium growth economy, in terms of foreigners, the only significant reaction is found for the inflation announcement, using the baseline specification (6), though less significant. Foreigners are found to buy/sell stocks after positive/negative inflation news showing that they behave in a momentum trading style consistent with the prediction in hypothesis (1a). Similar to foreigners, local individuals are only found to give significant reaction to the surprise component of the inflation news. They tend to sell/buy stocks following good/bad news about inflation which shows that they engage in negative feedback strategy which is also consistent with the prediction in hypothesis (1c). Apart from inflation announcements, we find no significant response for local individuals to IP and TB announcements in the medium state of the economy. Unlike foreigners and local individuals, we find no significant evidence of response for local institutions to any type of announcement in the medium state of the economy.

When moving to test the sub hypotheses from H_1 through H_9 that whether the state dependent coefficients of each investor type for each economic announcement are statistically the same, we cannot reject seven out of nine hypotheses. The only hypothesis which is rejected at the 10% significance level is that the responses of institutional investors to trade balance surprises are the same across high and low states of the economy (H_6). A possible explanation for insignificant results of sub hypotheses can be resulted from having same level of uncertainty in the high and low state of the economy. Since the economy includes higher uncertainty in the high and low states relative to normal states investors may not receive precise signals during these periods as they receive in normal periods. Receiving more mixed signals in these two states of the economy can hinder investors from acting precisely as they behave in the same manner around macroeconomic announcements.

Finally, similar to the results obtained from specification (6), a point worth mentioning here is that all our control variables are also found to be highly significant in response of all types of investors.

Table 4.17 Responses of different types of investors to macroeconomic announcements during high and low states of the economy

	Foreigners	institutions	individuals
intercept	0.018	-0.01	-0.005
	(2.69)***	(-0.85)	(-1.44)
BSI_{t-1}	0.298	0.404	0.265
	(6.65)***	(10.33)***	(5.73)***
BSI_{t-2}	0.144	0.135	0.196
	(2.94)***	(2.28)**	(3.39)***
$Return_t$	1.73	Na	-1.22
	(3.93)***	Na	(-5.18)***
$Return_{t-1}$	1.68	1.683	-1.15
	(2.37)***	(1.78)*	(-3.73)***
Announcements			
high growth (boom)			
Consumer Price Index (CPI)	0.013	0.127	0.008
	(0.15)	(1.67)*	(0.12)
Industrial Production (IP)	-0.053	0.03	0.01
	(-3.31)***	(1.89)*	(0.9)
Trade Balance (TB)	0.08	0.577	-0.21
	(0.42)	(2.67)***	(-1.63)
Low growth (recession)			
Consumer Price Index (CPI)	-0.014	0.03	0.035
	(-0.41)	(0.48)	(1.91)*
Industrial Production (IP)	-0.018	-0.024	0.015
	(-1.09)	(-0.94)	(1.35)
Trade Balance (TB)	0.001	-0.009	0.001
	(0.84)	(-4.05)***	(0.85)
Medium Growth			
Consumer Price Index (CPI)	-0.068	0.023	0.068
	(-2.05)**	(0.27)	(2.1)**
Industrial Production (IP)	-0.003	-0.025	0.006
	(-0.31)	(-1.35)	(1.01)
Trade Balance (TB)	-0.015	-0.035	0.016
	(-0.84)	(-1.1)	(1.39)

Foreigners			Local Institutions			Local Individuals		
	chi-square	Prob		chi-square	Prob		chi-square	Prob
H_1: $b^H=b^L$ for CPI	0.09	0.76	H_4: $b^H=b^L$ for CPI	0.92	0.34	H_7: $b^H=b^L$ for CPI	0.15	0.70
H_2: $b^H=b^L$ for IP	2.17	0.14	H_5: $b^H=b^L$ for IP	2.81	0.10	H_8: $b^H=b^L$ for IP	0.12	0.73
H_3: $b^H=b^L$ for TB	0.17	0.67	H_6: $b^H=b^L$ for TB	7.43	0.00***	H_9: $b^H=b^L$ for TB	2.67	0.10

Table 4.13 shows the estimation results for specification (7) estimated by seemingly unrelated regression method that allows for heteroskedasticity, autocorrelation and contemporaneous correlation in the residuals. The

sample period includes 318 announcement day observations for each investor categories from February 1995 to May 2008. Total system (balanced) observations are 954. Regression coefficients are reported with their respective *t* statistics in parentheses. The dependent variable is the BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) of the corresponding investor group. BSI_{t-1} and BSI_{t-2} denote the first and second lag of BSI respectively. $Return_t$ and $Return_{t-1}$ denote the same day and previous day's return of the SET respectively. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively. At the bottom of the table, null hypotheses from H_1 through H_3 test whether foreign investors' responses to CPI, IP and TB announcements in the high state are different from the responses to CPI, IP, and TB announcements in the low state respectively. Null hypotheses from H_4 through H_6 test whether local institutions' responses to CPI, IP and TB announcements in the high state are different from the responses to CPI, IP, and TB announcements in the low state respectively. Null hypotheses from H_7 through H_9 test whether local individuals' responses to CPI, IP and TB announcements in the high state are different from the responses to CPI, IP, and TB announcements in the low state respectively. Na is used for contemporaneous return in the local institutions regression due to having no correlation between local returns and the reaction of local institutions around macroeconomic announcements.

4.6.3 Responses to macroeconomic announcements conditional on the state of the market

As mentioned in section 4.2.3, recent underlying market conditions (bull/bear markets) were found to have different influences on stock returns. For example, Klein and Rosenfeld (1987) document divergent results for the identical events during bull and bear markets. In this context, it would be useful to examine whether investors exhibit the same type trading behaviours around macroeconomic announcements over different conditions of the stock market. Hence, table 4.18 shows the estimation results for specification (8) that allows the effects of macroeconomic announcements on investor sentiment to vary over different states of the market. The dependent variable is the BSI (Buy Sell Imbalance) of the corresponding investor group. The sample period includes 318 announcement day observations for each investor group and begins from February 1995 and goes through May 2008. CPI, IP, and TB denote consumer price index, industrial production and trade balance respectively. $Return_t$ and $Return_{t-1}$ denote the same day and previous days return of SET respectively. BSI_{t-1} and BSI_{t-2} denote the first and second previous days of BSI (Buy-Sell imbalance) respectively. The parameters of the system are estimated by the non-linear iterated seemingly unrelated regression (SUR) method that accounts for heteroskedasticity,

autocorrelation and contemporaneous correlation in the errors across equations. The response coefficients are reported with their respective *t*-statistics in parentheses. At the bottom of the table, null hypotheses from H_{10} through $H_{12,}$ regarding the hypothesis (3a), test whether foreign investors' responses to CPI, IP and TB announcements in the bull market periods are different from the responses to CPI, IP, and TB announcements in the bear market periods respectively. Null hypotheses from H_{13} through $H_{15,}$ regarding the hypothesis (3b), test whether local institutions' responses to CPI, IP and TB announcements in the bull market periods are different from the responses to CPI, IP, and TB announcements in the bear market periods respectively. Null hypotheses from H_{16} through $H_{18,}$ regarding the hypothesis (3c), test whether local individuals' responses to CPI, IP and TB announcements in the bull market periods are different from the responses to CPI, IP, and TB announcements in the bear market periods respectively.

We now turn to test our hypotheses after conditioning the response on the state of the stock market. In the bull market periods, we find no significant response for any type of investors to any announcement which is not consistent with the predictions, because investors are expected to exhibit more momentum or contrarian behaviour around macroeconomic announcements during bull market periods.

For the bear market periods we come up with significant findings for each investor group. For example, of foreign investors, we document significant reaction to inflation announcements. They tend to buy/sell stocks following good/bad news about the inflation which indicates that they act in a momentum manner with respect to inflation announcements, consistent with the prediction in hypothesis (1a). For local institutions, we document significant response around trade balance announcements. They tend to sell/buy

stocks following good/bad news about the economy which indicates that they pursue contrarian trading strategy around TB announcements in the bear market period which is not in line with the prediction in hypothesis (1b). When turning to local individuals, we find significant response around both inflation and trade balance announcements. They are found to sell/buy stocks in response to good/bad news about inflation which suggests that they pursue a contrarian trading strategy around inflation announcements, consistent with what is predicted by hypothesis (1c). In a similar vein, we find strong evidence of a significant relationship between reaction of local individuals and the surprise component of the trade balance announcement, but in an opposite direction. They are found to buy/sell stocks at good/bad trade balance news which suggests that they engage in a momentum trading strategy which is not in line with the prediction in hypothesis (1c).

When moving to the analysis of normal market periods we come up with interesting findings for foreigners and local individuals, because in our baseline specification (6) both investors are found to give some significant responses to some type of macroeconomic announcements. However, here, in terms of both investors we find no significant reaction to any type of announcement. Unlike the findings for foreigners and local individuals, our findings for local institutions are similar with what is found in our baseline specification (6). In other words, they tend to sell/buy stocks on good/bad TB news showing that they follow contrarian trading strategy with respect to TB announcements which is also not consistent with the prediction in hypothesis (1b).

For testing the sub hypotheses, regarding the hypotheses (3a), 3(b), and (3c), from H_{10} through H_{18} that whether the market state dependent coefficients of each investor type for each economic announcement are statistically same we find that three out of nine hypotheses

can be statistically rejected. The first two hypotheses are rejected for local institutions. First, we find that the hypothesis that the responses of local institutions to CPI announcements in the bull and bear market periods are the same (H_{13}) can be rejected at the 0.05 significance level. Second, the hypothesis that the responses of local institutions to TB announcements in the bull and bear market periods are same (H_{15}) can be rejected at the 0.01 significance level. The third hypothesis is rejected for local individuals. Similar to the finding for local institutions, we find that the hypothesis that the responses of local individuals to CPI announcements in the bull and bear market periods are same (H_{13}) can be rejected at the 0.05 significance level.

Finally, in a similar vein, it is also noteworthy that our control variables are found to be highly significant explanatory variables as are found in specification (6) and specification (7) for each equation in the system.

Table 4.18 Responses of different types of investors to macroeconomic announcements during bull and bear states of the economy.

	Foreigners	Institutions	Individuals
intercept	0.018	-0.017	-0.003
	(2.64)***	(-1.46)	(-0.93)
BSI_{t-1}	0.297	0.405	0.271
	(6.65)***	(10.41)***	(5.92)***
BSI_{t-2}	0.137	0.131	0.195
	(2.71)***	(2.27)**	(3.28)***
$Return_{t}$	1.716	na	-1.14
	(2.39)**		(-3.74)***
$Return_{t-1}$	1.815	1.663	-1.28
	(4.05)***	(1.72)*	(-5.67)***
Announcements			
bull market periods			
Consumer Price Index (CPI)	-0.007	0.143	0.01
	(-0.13)	(1.55)	(0.36)
Industrial Production (IP)	-0.005	0.001	0.001
	(-0.49)	(0.08)	(0.15)
Trade Balance (TB)	-0.02	0.017	0.007
	(-0.56)	(0.22)	(0.29)
bear market periods			
Consumer Price Index (CPI)	-0.069	-0.087	0.095
	(-3.85)***	(-1.24)	(4.47)***
Industrial Production (IP)	-0.063	0.079	-0.006
	(-1.28)	(1.32)	(-0.18)
Trade Balance (TB)	-0.062	-0.512	0.172
	(-0.47)	(-5.06)***	(1.72)*
normal market periods			
Consumer Price Index (CPI)	-0.01	0.149	0.007
	(-0.25)	(1.45)	(0.23)
Industrial Production (IP)	-0.02	-0.015	0.013
	(-1.73)	(-0.92)	(1.61)
Trade Balance (TB)	0.001	-0.008	0.008
	(0.28)	(-2.08)**	(0.63)

Foreigners			Local Institutions			Local Individuals		
chi-square	Prob		chi-square	Prob		chi-square	Prob	
H_{10}: $b^{BE}=b^{BU}$ for CPI	1.14	0.28	H_{13}:$b^{BE}=b^{BU}$for CPI	3.87	0.04**	H_{16}: $b^{BE}=b^{BU}$ for CPI	5.62	0.02**
H_{11}: $b^{BE}=b^{BU}$ for IP	1.36	0.24	H_{14}: $b^{BE}=b^{BU}$ for IP	1.45	0.22	H_{17}: $b^{BE}=b^{BU}$ for IP	0.04	0.83
H_{12}: $b^{BE}=b^{BU}$ for TB	0.06	0.80	H_{15}: $b^{BE}=b^{BU}$ for TB	17.18	0.0***	H_{18}: $b^{BE}=b^{BU}$ for TB	2.55	0.11

Table 4.14 shows the estimation results for specification (8) estimated by seemingly unrelated regression method that allows for heteroskedasticity, autocorrelation and contemporaneous correlation in the residuals. The sample period includes 318 announcement day observations for each investor categories from February 1995 to May 2008. Total system (balanced) observations are 954. Regression coefficients are reported with their

respective *t* statistics in parentheses. The dependent variable is the BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) of the corresponding investor group. BSI_{t-1} and BSI_{t-2} denote the first and second lag of BSI. $Return_t$ and $Return_{t-1}$ denote the same day and previous day's return of SET respectively. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively. At the bottom of the table, null hypotheses from H_{10} through H_{13} test whether foreign investors' responses to CPI, IP and TB announcements in the bear state are different from the responses to CPI, IP, and TB announcements in the bull state respectively. Null hypotheses from H_{14} through H_{16} test whether local institutions' responses to CPI, IP and TB announcements in the bear state are different from the responses to CPI, IP, and TB announcements in the bull state respectively. Null hypotheses from H_{17} through H_{19} test whether local individuals' responses to CPI, IP and TB announcements in the bear state are different from the responses to CPI, IP, and TB announcements in the bull state respectively. Na is used for contemporaneous return in the local institutions regression due to having no correlation between local returns and the reaction of local institutions around macroeconomic announcements.

4.6.4 Responses to economic announcements across sub-periods

There was a pervasive financial crisis in Pacific-Asia region during our observation period, which started in Thailand on 2 July 1997. As mentioned previously, if investors lose money by engaging in a specific strategy their trading patterns are not expected to continue persistently, since investors are expected to learn from their trading experiences. In this context, the Asia crisis could have altered fundamental trading behaviour of investors which can lead to different responses across pre- and post-crisis periods. Therefore regarding the hypotheses (4a), (4b), and (4c), we now test whether investors continue to exhibit same trading behaviours around macroeconomic announcements in the post-crisis period as were found in the pre-crisis period.

Table 4.19 shows estimation results under specification (9) that allows the effects of macroeconomic announcements on investor sentiment to vary over different sub-periods of the crisis to see whether our inferences change through our observation period. The dependent variable is the BSI (Buy Sell Imbalance) of the corresponding investor group. The sample period includes 318 announcement day observations for each investor group and begins from February 1995 and goes through May 2008. CPI, IP, and TB denote consumer

price index, industrial production and trade balance respectively. Return $_t$ and Return$_{t-1}$ denote the same day and previous days return of SET respectively. BSI $_{t-1}$ and BSI $_{t-2}$ denote the first and second previous days of BSI (Buy-Sell imbalance), respectively. The parameters of the system are estimated by the seemingly unrelated regression (SUR) method that accounts for heteroskedasticity, autocorrelation and contemporaneous correlation in the errors across equations. Response coefficients are reported with their respective *t*-statistics in parentheses. At the bottom of the table, null hypotheses from H_{19} through H_{21}, regarding the hypothesis 4a, test whether foreign investors' responses to CPI, IP and TB announcements in the pre-crisis periods are different from the responses to CPI, IP, and TB announcements in the post-crisis periods respectively. Null hypotheses from H_{22} through $H_{24,}$ regarding the hypothesis 4b, test whether local institutions' responses to CPI, IP and TB announcements in the pre-crisis periods are different from the responses to CPI, IP, and TB announcements in the post-crisis periods respectively. Null hypotheses from H_{25} through $H_{27,}$ regarding the hypothesis 4c, test whether local individuals' responses to CPI, IP and TB announcements in the pre-crisis periods are different from the responses to CPI, IP, and TB announcements in the post-crisis periods respectively. We now move to test the hypotheses mentioned in section 4.2. 3.

In the pre-crisis period, unlike the whole period, we find no significant response for any type of investor around inflation announcements. However, all players are found to give significant response around IP and TB announcements. For example, foreigners are found to sell/buy on good/bad IP news while both local institutions and local individuals are found to have opposite reaction to the same IP news in the pre-crisis period. This finding suggests that while foreigners tend to pursue a contrarian trading strategy local institutions and local

individuals are found to follow a momentum trading strategy around inflation announcements.

However, when we look at the post-crisis period we find no significant response from foreigners and local individuals to any type of announcement. It is rather interesting since it is the longest period including 72 % of the all observations. However, for local institutions, similar to the findings in baseline specification (6), we find significant response around trade balance announcements. They tend to sell/buy stocks after good/bad trade balance news which shows that they behave in a contrarian manner with respect to TB announcements in the post-crisis period which is not consistent with the stated hypothesis in (1b).

Finally, we move to the crisis period and find that inflation surprises have significant effect on the trading behaviour of foreign investors. They are found to buy/sell stocks on good/bad inflation news which suggests that they tend to follow momentum trading strategy which is consistent with the prediction in hypothesis (1a). In terms of IP and TB announcements they are not found to have significant affect on the sentiment of foreign investors. Similar to foreign investors, we also find significant response of local individuals to inflation announcements as well. They tend to sell on good inflation news and buy on bad inflation news which shows that they behave in a contrarian manner, and is in line with the stated hypothesis in (1c). Furthermore, local individuals are also found to react significantly to TB announcements in the crisis period. They buy/sell stocks on good/bad trade balance news showing an evidence of momentum trading strategy which is not consistent with the predictions. As a last, similar to local individuals, we also find significant evidence of response of local institutions to TB announcements, but with opposite sign in the crisis period. They tend to sell/buy stocks after good/bad TB news which shows that they act in a

contrarian manner with respect to TB announcements which is not in line with what is predicted in hypothesis (1b).

Finally, when we turn to test the sub hypotheses, regarding the hypothesis (4a), (4b), and (4c), from H_{19} through H_{27} we come up with interesting findings especially in terms of IP and TB announcements. We find that all three types of investors change their behaviours around IP and TB announcements in the post-crisis period compared to pre-crisis period. However, in terms of inflation announcements their responses are not found to change across the pre- and post-crisis periods.

Finally, it is also worth noting that all our control variables are found highly significant in each equation in the system as under previous specifications. Therefore, it is not likely to obtain unbiased estimates of the impact of the macroeconomic news in the absence of our control variables.

Table 4.19 Responses of different types of investors to macroeconomic announcements across sub-periods

	Foreigners	Institutions	Individuals
intercept	0.014	-0.011	-0.003
	(2.2)**	(-0.91)	(-0.92)
BS_{t-1}	0.295	0.41	0.262
	(6.91)***	(11.02)***	(5.8)***
BS_{t-2}	0.135	0.137	0.187
	(2.81)***	(2.34)**	(3.26)***
$Return_{t}$	1.69	Na	-1.12
	(2.4)**		(-3.56)***
$Return_{t-1}$	1.71	1.49	-1.212
	(3.18)***	(1.66)*	(-4.54)***
Announcements			
pre-crisis periods			
Consumer Price Index (CPI)	-0.182	0.127	0.114
	(-0.9)	(0.54)	(0.72)
Industrial Production (IP)	-0.06	0.025	0.015
	(-4.69)***	(1.81)*	(2.49)**
Trade Balance (TB)	0.301	0.74	-0.415
	(1.69)*	(2.62)***	(-4.62)***
post-crisis periods			
Consumer Price Index (CPI)	0.02	0.026	0.008
	(0.52)	(0.36)	(0.4)
Industrial Production (IP)	-0.003	-0.012	0.002
	(-0.36)	(-0.93)	(0.57)
Trade Balance (TB)	0.001	-0.007	0.001
	(0.19)	(-2.12)**	(0.72)
crisis periods			
Consumer Price Index (CPI)	-0.073	0.036	0.07
	(-2.54)**	(0.47)	(2.65)***
Industrial Production (IP)	-0.01	-0.022	0.018
	(-0.72)	(-0.56)	(0.94)
Trade Balance (TB)	-0.13	-0.592	0.161
	(-1.41)	(-4.73)***	(2.34)**

Foreigners			Local Institutions			Local Individuals		
	chi-square	Prob		chi-square	Prob		chi-square	Prob
H_{19}: $b^{PRE}=b^{POST}$ for CPI	0.98	0.32	H_{22}: $b^{PRE}=b^{POST}$ for CPI	0.17	0.67	H_{25}:$b^{PRE}=b^{POST}$ for CPI	0.44	0.50
H_{20}:$b^{PRE}=b^{POST}$ for IP	13.66	0.00***	H_{23}: $b^{PRE}=b^{POST}$ for IP	3.3	0.06*	H_{26}: $b^{PRE}=b^{POST}$ for IP	2.82	0.09*
H_{21}:$b^{PRE}=b^{POST}$ for TB	2.85	0.09*	H_{24}:$b^{PRE}=b^{POST}$ for TB	7.01	0.00***	H_{27}:$b^{PRE}=b^{POST}$ for TB	21.42	0.00***

Table 4.15 shows the estimation results for specification (9) estimated by seemingly unrelated regression method that allows for heteroskedasticity, autocorrelation and contemporaneous correlation. The sample period includes 318 announcement day observations for each investor categories from February 1995 to May 2008. Total system (balanced) observations are 954. Regression coefficients are reported with their respective *t* statistics in parentheses. The dependent variable is the BSI (Buy-Sell Imbalance $= \frac{(BUY-SELL)}{(BUY+SELL)}$) of the corresponding investor group. BSI_{t-1} and BSI_{t-2} denote the first and second lags of BSI respectively. $Return_t$ and $return_{t-1}$ denote the same day and previous day's return in SET respectively. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively. At the bottom of the table, null hypotheses from H_{19} through H_{21} test whether foreign investors' responses to CPI, IP and TB announcements in the pre-crisis period are different from the responses to CPI, IP, and TB announcements in the post-crisis period respectively. Null hypotheses from H_{22} through H_{24} test whether local institutions' responses to CPI, IP and TB announcements in the pre-crisis period are different from the responses to CPI, IP, and TB announcements in the post-crisis period respectively. Null hypotheses from H_{25} through H_{27} test whether local individuals' responses to CPI, IP and TB announcements in the pre-crisis period are different from the responses to CPI, IP, and TB announcements in the post-crisis period respectively.

4.6.5 Responses variation of investors to same economic announcements

As a complementary, we now move to analyse whether the responses of investors are different from each other around same macroeconomic announcements, because in order to evaluate the issue from a comparative viewpoint, investors' behaviours should be examined simultaneously in the system rather than looking at their individual coefficients. Table 4.20 summarizes the results of the hypotheses that test whether there are statistically response distinctions among different types of investors to same macroeconomic announcements. Panel A shows the results that the responses of foreigners and local institutions to corresponding macroeconomic announcement are same. CPI, IP, TB denote consumer price index, industrial production and trade balance respectively. This study has investigated the investor sentiment around macroeconomic announcements with four different specifications. The first one is the base line specification including the whole sample and other ones are the state-dependent specifications each of which includes three subsamples. Therefore, investor sentiment around macroeconomic announcements has been examined from ten different perspectives. Accordingly, in each panel in table 4.16, the left column represents these perspectives. The rest three columns show the results for the corresponding announcements

namely CPI, IP and TB. For example, in panel A, the hypothesis that the responses of foreigners and local institutions to industrial production announcements are same in the whole period is rejected with a p-value of 0.03. Other results are interpreted similarly. Panels B and C show the results of the tests for foreigners and local individuals and for local institutions and local individuals, respectively, in the same manner. In order to test these kinds of hypotheses we have to put restrictions on coefficients across equations since there are three separate equations for each of the investor's type. The parameters of the system are estimated by seemingly unrelated regression (SUR) method that accounts for heteroskedasticity, autocorrelation and contemporaneous correlation in the errors across equations.

Having described the table 4.20, we now turn to interpret the results. As previously mentioned in all specifications, foreigners and local institutions are found to pursue momentum trading strategies, whereas local individuals pursue contrarian trading strategy with respect to past returns. In this set up, having followed Vieru, Perttunen, and Schadewitz, (2006), we translate momentum (contrarian) behaviour into a tendency to buy (sell) stocks on good news and sell (buy) stocks on bad news. Given the above, accordingly, foreigners and local institutions are expected to behave in the same manner, whereas the local individual's behaviour is expected to differ from them around macroeconomic announcements for all specifications.

When turning to the panel A, in nine out of thirty cases, we find statistical response distinction between foreigners and local institutions. In other words, for twenty one of the thirty cases in panel A, our results are consistent with the prediction. Statistical response distinctions are found for industrial production announcement observed in the high state of

the economy and the pre-crisis period. For trade balance announcement the response distinction is observed in the whole period, high and low states of the economy, bear and normal market periods and in the post- and crisis periods.

In the panel B, we find that the responses of foreigners and local individuals are statistically different from each other in ten out of thirty cases. Or, put differently, in ten out of thirty cases our results are in line with what is predicted. In four out of these ten cases a response distinction is found for CPI news which is observed in the whole period, medium growth, bear market period, and crisis period. In the second four out of ten cases we find that the responses of foreigners and local individuals are different from each other for IP announcements observed in the whole period, high growth, normal market period and pre-crisis period, and in the last two out of these ten cases, a response distinction is also found for TB news observed in the pre-crisis and crisis period.

Finally, in panel C, for nine out of thirty cases we find significant response distinctions between local institutions and local individuals. That is to say, for nine out of thirty cases our findings are consistent with the predictions. The first response difference is found for inflation announcements which is observed in the bear market period, and the other eight response differences are found for TB announcements observed in the whole period, high growth period, low growth period, bear market period, normal market period, pre-crisis period, post-crisis and the crisis period.

Table 4.20 Summary statistics of the response distinctions among investors around macroeconomic announcements

Panel A	Foreigners vs Institutions		
	CPI	IP	TB
Whole period (6)	0.17	0.42	0.03**
High growth (boom)(7)	0.21	0.00***	0.09*
Low growth (recesssion)(7)	0.55	0.88	0.00***
Medium growth (7)	0.30	0.29	0.59
Bull market period(8)	0.22	0.77	0.67
Bear market period(8)	0.81	0.11	0.00***
Normal market period(8)	0.18	0.67	0.05**
Pre-crisis period(9)	0.22	0.00***	0.31
Post-crisis period(9)	0.94	0.60	0.06*
Crisis period(9)	0.17	0.17	0.00***
Panel B	Foreigners vs Individuals		
	CPI	IP	TB
Whole period (6)	0.03**	0.06*	0.63
High growth (boom)(7)	0.97	0.01	0.34
Low growth (recesssion)(7)	0.32	0.19	0.92
Medium growth (7)	0.02**	0.54	0.27
Bull market period(8)	0.82	0.69	0.62
Bear market period(8)	0.00***	0.46	0.30
Normal market period(8)	0.79	0.07	0.91
Pre-crisis period(9)	0.38	0.00***	0.00***
Post-crisis period(9)	0.82	0.65	0.83
Crisis period(9)	0.00***	0.38	0.06*
Panel C	Institutions vs Individuals		
	CPI	IP	TB
Whole period (6)	0.80	0.27	0.05**
High growth (boom)(7)	0.33	0.39	0.00***
Low growth (recesssion)(7)	0.96	0.19	0.00***
Medium growth (7)	0.66	0.15	0.18
Bull market period(8)	0.17	0.97	0.89
Bear market period(8)	0.03**	0.26	0.00***
Normal market period(8)	0.24	0.16	0.05**
Pre-crisis period(9)	0.97	0.54	0.00***
Post-crisis period(9)	0.83	0.31	0.04**
Crisis period(9)	0.68	0.82	0.00***

Table 4.16 provides the p-values of the hypotheses for the response distinctions among investors of the corresponding macroeconomic announcement. CPI, IP, TB denote consumer price index, industrial production and trade balance respectively. Panel A shows the results of the hypotheses that the responses of foreigners and local institutions to corresponding macroeconomic announcement are same. Panel B shows the results of the hypotheses that the responses of foreigners and local individuals to corresponding macroeconomic announcement are same. Panel C shows the results of the hypotheses that the responses of local institutions and

local individuals to corresponding macroeconomic announcement are same. The number in brackets represents the specifications as mentioned in methodology section. *, **, and *** indicate significance at the 10, 5 and 1 percent levels, respectively.

4.7 Discussion

One may argue that using dummy variables rather than market expectations would be more appropriate in analyzing the trading behaviour of market participants. However, it seems that using dummy variables in this kind of analysis has more disadvantages if there are more than one announcement releases at the same time. For example, in our case, the trade balance and industrial production data are released at the same time by the Bank of Thailand. Therefore, it would be impossible to separate the effects of those announcements if we used dummy variables in place of the surprise parts of these macroeconomic announcements. Additionally, according to the market efficiency hypothesis, only new and unpredictable component of information is expected to move asset prices. The role of "new information" in the test of market efficiency and in the formation of asset prices has strong intuitive appeal. However, to explore this some references have to be created to capture the unexpected component of the news. By its very nature, market participants are not always have the same forecast for a particular variable and all surveys are made with only very few members of market participants. We have no way of knowing which market participants have lower, higher or exactly the same forecast compared to the market expected value for that particular variable before the release of that announcement.

It is worth noting that the median of analysts' expectations for a particular variable is mostly known in advance by the market participants. Because, market professionals are usually demanded to speak to media about market expectations regarding particular forthcoming macroeconomic announcement. These market professionals are also subscribers

of economic survey organizations that produce these market expectations. Therefore, this median of analysts' expectations is generally released to the public before the release of particular announcement. From that point onwards, this median of analysts' expectation value becomes market expected value de facto accepted by the market participants. Hence, after the announcement is made the question then is whether market participants have the same knowledge or beliefs about how such "new information" (the difference between the actual data and the median of analysts' expectations) will affect the opportunity set available. The more the market participants have divergent beliefs about the implications of the new information the more will be the increase in trading volume, because market participants try to understand each others' beliefs while forming their own beliefs. Trading volume jumps as different market participants rebalance their portfolios in response to their own beliefs and their perception of others about the implication of the new information on asset prices which then leads to changes in the levels to re-establish equilibrium pricing (Keem and Sheen, 2000).

In the light of the above discussion, there is a strong case for taking the median of analysts' expectations as a reference point, rather than using dummy variables. Thus, our study is the first to suggest and employ the median of analysts' expectations as an explanatory variable in the regression, while explaining the behaviour of different types of investors around news releases.

4.8 Conclusion

This study has investigated the reactions of different types of investors to macroeconomic announcements in the stock exchange of Thailand. Previous studies (e.g.,

Grinblat and Keloharju, 2000, Kim and Wei, 2002, Dahlquist and Robertson, 2004, Griffin, Nardari, and Stulz, 2004, and Richard 2005) documented a number of empirical evidences showing that foreign and local institutional investors act as momentum traders, whereas individual investors act in a contrarian manner with respect to past returns. In this study, following Vieru, Perttunen, and Schadewitz (2006), momentum (contrarian) behaviour is translated into a tendency to buy (sell) stocks following good news and sell (buy) following bad news around macroeconomic announcements. Based on this finding, we analyze whether the responses of investors to economic announcements are in line with their stylized facts documented with respect to past returns.

This study begins with analyzing investor's reaction for the whole period as a base line specification. We find that, on average, foreign investors buy stocks on good inflation news and sell stocks on bad inflation news, which is consistent with the momentum investment style. However, the same foreigners are found to behave in a different style around IP announcements. We document that they tend to buy/sell on bad/good IP news, indicating that they act in a contrarian manner around IP announcements which is not in line with the prediction. In terms of local individuals, we document opposite behaviour compared to foreigners around inflation announcements. We find that they sell/(buy) stocks after good/(bad) inflation news suggesting evidence of negative feedback trading which is consistent with what is predicted. Unlike foreigners and local individuals, when turning to the reaction of local institutions we find no significant responses of them to inflation and IP announcements, but trade balance. They are found to sell/(buy) stocks in response to positive/(negative) news about trade balance which shows that they engage in a negative feedback trading strategy around TB announcements.

However, when the investor response is conditioned on different states of the economy, in contrast to the findings for the whole period, local institutions are now found to give positive response to TB announcements in the high state of the economy. This indicates that they act in a momentum manner with respect to TB news in the high state of the economy which is consistent with the predictions. Besides TB news we also find significant response for local institutions to both inflation and industrial production announcements in the high state of the economy. They tend to buy/(sell) stocks on good/bad IP news which shows that they pursue momentum trading strategy around IP announcements which is consistent with the predictions. With respect to inflation announcements, local institutions are found to behave oppositely compared to other two announcements. We find that they sell/(buy) stocks following good/bad news about the inflation. When turning to foreign investors, we find that they react significantly to only IP news in the high state of the economy. They tend to sell/buy stocks on bad/(good) news about the economy indicating that they behave in a contrarian investment style which is not consistent with what is predicted for them. This finding is also similar to the finding found for the whole period. Unlike both investors, we find no significant response of local individuals to any type of announcement in the high state of the economy.

In the recession period, we come up with interesting findings for local institutions, as they react completely opposite to IP and TB announcements compared to high state of the economy. They tend to sell/(buy) stocks on good/bad news about IP and TB which shows that they engage in a momentum investment style around these two announcements. It is worth noting that dividing the whole period into sub-periods as high/low/medium is important, because sometimes reactions of investors in one period can be concealed by their behaviours in other periods, as is for local institutions in our case, by means of lowering the average

significance level. In terms of local individuals, we only find significant reaction to inflation announcements as found for the whole period and in the boom period. They sell/(buy) stocks following good/bad news about inflation showing that they act in a contrarian manner which is in line with the predictions. For foreigners, we find no significant response to any type of announcement in the recession period.

When we condition the responses of investors over different states of the stock market, in contrast to the findings for the whole period, we find no significant reaction for any type of investors to any announcement in the bull market periods which is in contrast to the prediction since investors are expected to exhibit more momentum or contrarian behaviour around macroeconomic announcements during the bull market period.

In the bear market period, local individuals give significant responses to inflation and trade balance announcements. We find that they tend to sell/buy stocks following good/bad inflation news in the bear market period, which shows that they engage in a contrarian trading strategy, consistent with what is predicted. Local individuals also buy/(sell) stocks after positive/negative TB news indicating that they act in a momentum manner with respect to TB announcements which is not in line with the prediction. In the bear market period, unlike the results for the whole period, foreigners are found to give significant response to only inflation announcements. Similar to the findings found for the whole period they also pursue a momentum trading strategy around inflation announcements. In a similar vein, local institutions are also found to give significant reactions to TB announcements as is found for the whole period. They tend to sell/(buy) stocks on good/(bad) TB news indicating that they act in a contrarian manner which is not in line with the predictions in hypothesis (1b).

When the investor response is made conditional on crisis sub-periods to see whether their behaviours have changed through time, we come up with some interesting results. For example, unlike the results for the whole period, for local individuals we find significant responses to IP and TB announcements in the pre-crisis period. They tend to buy/(sell) stocks on bad/(good) IP news which shows that they behave as momentum traders around IP announcements as predicted in the pre-crisis period, whereas they act in an opposite manner around TB announcements indicating an evidence of contrarian trading which is not in line with the prediction. For foreigners and local institutions, we find that both groups of investors give significant reactions to IP and TB announcements in the pre-crisis period. On the IP announcement days, foreigners sell/buy stocks on good IP news while local institutions react oppositely. On the TB announcement days, both are found to react similarly i.e. they both buy/sell stocks on good/bad TB news indicating that both pursue a momentum trading investment style around TB announcements.

In the post-crisis period, the results are quite interesting. We find no significant responses of foreigners and local individuals to any type of announcement. However, it is here useful to mention that this period is the longest period which includes 72 % of all observations. The only significant reaction is found for local institutions in this period, which is similar to the findings for the whole period. That is, local institutions tend to sell/(buy) stocks on good/(bad) TB news, suggesting that they engage in contrarian investment trading in the post-crisis period, which is not consistent with what is expected for local institutions.

In the crisis period, the results for all players are completely similar to the findings for the bear market period. That is, foreigners tend to buy/(sell) stocks on good/(bad) inflation news showing adaptation of a momentum trading strategy around inflation announcements.

Local institutions are found to sell/(buy) stocks following good/(bad) TB news indicating a contrarian trading strategy around TB announcements. Lastly, local individuals tend to sell/buy stocks on good/bad inflation news showing a contrarian investment style around inflation announcements while they buy/(sell) stocks following good/(bad) TB news indicating a momentum investment style around TB announcements.

Having analyzed the behaviours of investors in sub-periods we test whether the behaviours of investors in responding to the same economic announcements differ across these sub-periods. When testing the differences in investor's behaviour in high and low states of the economy, we find that the reactions of local institutions to trade balance announcements in the high and low states of the market are significantly different. In terms of states of the stock market, the responses of local institutions to inflation news in the bear and bull markets are significantly different from each other and their responses to TB news in the bear and bull market periods are also statistically different. Furthermore, we find that the reactions of local individuals to inflation news in the bear and bull markets are significantly different as well.

As a last analysis, in the crisis sub-period, we come up with interesting results in terms of IP and TB announcements. All three groups of players are found to change their investment styles around IP and TB announcements in the post-crisis period compared to pre-crisis period. However, in terms of inflation announcements their responses do not change across pre- and post-crisis periods.

Finally, in order to summarize investor behaviours from a practical and comparative perspective we also test whether the responses of investors are statistically different from

each other around the same macroeconomic announcements. We find that in nine out of thirty cases the responses of foreign investors are statistically different from the responses of local institutions which mean that in twenty one of thirty cases, our findings are in accordance with the predictions. We find response distinctions at industrial production announcements observed in the high state of the economy and pre-crisis period, at TB announcements observed in the whole period, high and low states of the economy, bear and normal market periods and in the post-crisis and crisis periods. When looking at the responses of foreigners and local individuals, we find that in ten out of thirty cases their reactions are statistically different from each other as predicted. In four out of ten cases we find the behaviour differences in responding to inflation news observed in the whole period, medium growth, bear market period and crisis period. In the second four out of ten cases, the response distinction between foreigners and local individuals is found at IP announcements for the whole period, high growth period, normal market period and pre-crisis period. For the remaining cases, the statistical behaviour difference between foreigners and local individuals is founded at TB announcements for the pre-crisis period and crisis period.

Lastly, when looking at the responses of local institutions and local individuals we document only nine significant response distinction cases out of thirty. The first response distinction is found at inflation announcements observed in the bear market period and the other eight are found at TB announcements in the whole period, high growth period, low growth period, bear market period, normal market period, pre-crisis period, post-crisis and the crisis period.

It is worth mentioning that our study is the first to apply the SUR approach when investigating the reaction of different players in the market. Our study is also the first to take

the endogeneity issue, i.e. mutual dependency between same day local return and investor purchases, into consideration which all types of previous announcement studies, irrespective of the type of the announcement, have suffered from.

Appendix A4

A4.1 Converting Analysts' Expectations Frequency

Our market expectations are obtained from Consensus Economics: Asia Pacific Consensus Forecasts. To our knowledge, Consensus Economics is the only international economic survey organization that provides forecasts about principal macroeconomic indicators for emerging countries in Asia Pacific region. The forecasts are made on a monthly basis but reported on a year-on-year growth rate. This creates problem in computing monthly surprises for each announcement. We follow Wongswan (2003) methodology and assumption to convert year-on-year growth rate expectations to monthly expectations.

In this appendix, year-on-year growth rate expectations of economists' will be converted into monthly growth rate expectations. Consensus Economics defines average year-on-year growth rate as growth rate of year average. Year average is defined as the mean of monthly index of that year. Computation method is demonstrated in the table A4.1 below using Thailand monthly consumer price index that begins from January 1999 goes through December 2000.

Table A4.1: Thailand consumer price index

Year	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
1999	96.5	96.6	96.4	96.1	95.7	95.6	95.8	96.2	96.3	96.4	96.5	96.8
2000	97.1	97.5	97.5	97.2	97.3	97.5	97.6	98.2	98.6	98.1	98.2	98.2

This table shows the Thailand monthly consumer price index that begins from January 1999 goes through December 2000.

The mean monthly index, the year averages, for 1999 and 2000 are 96.2 and 97.7, respectively. The average year-on-year growth rate is $\frac{97.7-96.2}{96.2}$ x 100 = 1.56%. Analysts' expectations are assumed to be distributed equally across all months in converting expectations frequency. In Wongswan (2003) methodology, monthly growth rate expectations are computed in four steps. In the first step, monthly averages are computed across all years from historical data up to the sample in which the monthly expectation is computed. Second, implied year average is computed from actual indices in the previous year and analysts' average year-on-year growth rate expectation for that year. Third, following the assumption of equally distribution of analysts' expectations across all months, monthly expectation is computed using the implied year information. Finally, the implied sum of indices for each month is computed using the information on three steps. Following this methodology, analysts' average year-on-year growth rate expectations are converted to monthly growth rate expectations.

Summary statistics for monthly growth rate expectations that are converted from year-on-year growth rate expectations are shown in table A4.2. Conversion methodology is evaluated by testing for unbiasedness and efficiency of analysts' expectations. Even though median of analysts' expectations are used, the test for unbiasedness is conducive to testing for

the validity of the conversion methodology. Analysts' expectations predictability is tested by running a first order autoregressive regression. Low regression R-square shows that there is no Analysts' expectations predictability. For efficiency of the monthly converted forecasts each variable is tested whether $c_{i,1} = c_{i,2} = c_{i.3} = 0$ for the below equation.

$$A_{i,t} - F_{i,t} = c_{i,0} + c_{i,1}A_{i,t-1} + c_{i,2}A_{i,t-2} + c_{i,t-3}A_{i,t-3} + e_{i,t}$$

Where $A_{i,t}$ and $F_{i,t}$ are actual and forecast values, respectively. The probability value for each forecast is shown in the last column and is evidence that all monthly forecasts pass the efficiency test at both %5 and %1 levels.

Table A4.2: Summary statistics of monthly macroeconomic surprises

Macro variable	Mean	St.Dev	Min	Max	R-Square	Prob (F stat)
Consumer Price Index	-0.007	0.041	-0.489	0.055	0.0043	0.97
Trade Balance	-0.588	7.935	-94.64	14.82	0.0008	0.86
Industrial Production	0.018	0.127	-0.629	0.399	0.056	0.33

This table shows the summary statistics for monthly growth rate expectations that are converted from year-on-year growth rate expectations. Regression R-square shows whether Analysts' expectations have predictive power.

A4.2 Seemingly unrelated regressions (SUR)

A4.2.1 SUR model

Following Greene (2008), the seemingly unrelated regressions (SUR) model is specified as:

$$\mathbf{y_i} = \mathbf{X_i}\beta_i + \mathbf{u_i}, \qquad i = 1,.....,N, \qquad \text{(A1)}$$

Where, $\mathbf{u} = [\mathbf{u_1'}, \mathbf{u_2'}, ..., \mathbf{u_N'}]'$

$$E[\mathbf{u}|\mathbf{X_1},\mathbf{X_2},.....,\mathbf{X_N}] = \mathbf{0},$$

$$E[\mathbf{u_n}\mathbf{u_n'}|\mathbf{X_1},\mathbf{X_2},.....,\mathbf{X_N}] = \sigma_{nn}\mathbf{I}_T$$

When the disturbances are assumed to be uncorrelated across observations but contemporaneously correlated across equations then we have that:

$$E[\mathbf{u_i}\mathbf{u_k'}\mid \mathbf{X_1},\mathbf{X_2},..,\mathbf{X_N}] = \sigma_{ik},$$

Or

$$E[\mathbf{u_i}\mathbf{u_k'}\mid \mathbf{X_1},\mathbf{X_2},..,\mathbf{X_N}] = \mathbf{V} = \begin{bmatrix} \sigma_{11}\mathbf{I} & \sigma_{12}\mathbf{I}\cdots & \sigma_{1N}\mathbf{I} \\ \sigma_{21}\mathbf{I} & \sigma_{22}\mathbf{I}\cdots & \sigma_{2N}\mathbf{I} \\ & \vdots & \\ \sigma_{N1}\mathbf{I} & \sigma_{N2}\mathbf{I}\cdots & \sigma_{NN}\mathbf{I} \end{bmatrix} \qquad \text{(A2)}$$

σ_{ik} is the covariance of the disturbances between the i^{th} and k^{th} equations (the only link between i^{th} and k^{th} equations).

A4.2.2 Generalized least squares

Equation (A1) can be written as stacked model

$$\begin{bmatrix} \mathbf{y_1} \\ \mathbf{y_2} \\ \vdots \\ \mathbf{y_N} \end{bmatrix} = \begin{bmatrix} \mathbf{X_1} & \mathbf{0} & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{X_2} & \cdots & \mathbf{0} \\ & & \vdots & \\ \mathbf{0} & \mathbf{0} & \cdots & \mathbf{X_N} \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_N \end{bmatrix} + \begin{bmatrix} \mathbf{u_1} \\ \mathbf{u_2} \\ \vdots \\ \mathbf{u_N} \end{bmatrix} = \mathbf{X}\beta + \mathbf{u}. \qquad \text{(A3)}$$

For the t^{th} observation, the N **x** N covariance matrix of the disturbances is:

$$\mathbf{V} = \begin{bmatrix} \sigma_{11} & \sigma_{22} & \cdots & \sigma_{1N} \\ \sigma_{21} & \sigma_{22} & \cdots & \sigma_{2N} \\ & \vdots & & \\ \sigma_{N1} & \sigma_{N2} & \cdots & \sigma_{NN} \end{bmatrix}, \qquad \text{(A4)}$$

So, in equation (A2), if the disturbances are heteroskedastic and contemporaneously correlated:

$$\mathbf{V} = \mathbf{\Omega} \otimes \mathbf{I}$$

and

$$\mathbf{V}^{-1} = \mathbf{\Omega}^{-1} \otimes \mathbf{I}.$$

denoting the $i\ k^{th}$ element of Ω^{-1} by σ^{ij}, the **GLS** (generalized least square) estimator is found that:

$$\tilde{\boldsymbol{\beta}} = [\,\mathbf{X}'\mathbf{V}^{-1}\mathbf{X}\,]^{-1}\mathbf{X}'\mathbf{V}^{-1}\mathbf{y}$$

$$= [\,\mathbf{X}'(\mathbf{\Omega}^{-1} \otimes \mathbf{I}\,)^{-1}\mathbf{X}'(\mathbf{\Omega}^{-1} \otimes \mathbf{I}\,)\,\mathbf{y}.$$

Finally, as a more general level, when the residuals are autocorrelated, heteroskedastic and contemporaneously correlated then variance matrix of disturbances may be written:

$$V = \begin{bmatrix} \sigma_{11}\Omega_{11} & \sigma_{12}\Omega_{12} \cdots \sigma_{1N}\Omega_{1N} \\ \sigma_{21}\Omega_{22} & \sigma_{22}\Omega_{22} \\ & \ddots \\ \sigma_{N1}\Omega_{N1} \cdots & \sigma_{NN}\Omega_{NN} \end{bmatrix} \qquad \text{(A5)}$$

Where Ω_{kj} is an autocorrelation matrix for the *k*-th and *j*-th equations.

Chapter 5: Concluding Remarks

5.1 Motivations and contributions

Liberalization of emerging equity markets has transformed the global asset allocation process by providing new unique opportunities for international investors. This liberalization has started in the early 1990s and was characterised by relaxation of the restrictions on foreign ownership and economic and trade reforms. However, despite a promising start of this process, many emerging countries have experienced severe financial setbacks due to sudden capital outflows from their markets. As a result, in the recent years academic research investigating this subject has increased gradually in order to shed light on what policy makers may do in their attempts to stabilize markets.

In order to provide empirical evidence of these discussed subjects from a broader perspective, our research delves into the relationship between global capital flows and its impact on emerging markets three-fold:

In the first stage, our analysis considers three main strands of the existing literature. First we discuss the dynamic interaction between equity flows and local returns. Initially the question of interest is whether equity flows are determined by local past returns, in other words, whether international investors are feedback traders in local emerging markets. Previous studies examining this relationship find strong evidence of positive correlation between current foreign flows and lagged local equity returns, suggesting that international investors follow a momentum trading strategy. The finding of positive feedback trading by foreigners seems to be a pervasive, with few exceptions, irrespective of the frequency of data used.

The second question of interest is the impact of these equity flows on local returns. Previous studies find that foreigners' net buying increases stock prices. However, then the question of whether the effect is temporary or permanent arises. If the price increase is temporary, it may reflect pure price pressure. On the other hand, if it is permanent, it may be a reflection of risk sharing benefits of stock market liberalization, i.e. base-broadening or information revelation. The existing literature reports inconclusive results employing data of various frequencies, and thus leaves an important gap in financial research.

The third question of concern is whether foreigners' trades contain private or superior information, or whether foreigners' trades have predictive power. While some studies hypothesize that foreigners have an informational disadvantage in emerging markets, the others suggest foreigners may have a better information network and processing abilities, hence have an advantage instead. Further complicating the issue, previous empirical evidence of this matter is not conclusive either.

In order to provide an answer towards to this third issue, this thesis sets up a new approach to test the predictive content of foreign flows in individual stocks. Our analysis employs the VAR methodology and uses returns and net flows defined in relative terms. Thus, the approach employed in this thesis provides a more efficient procedure to detect informed trading by an investor group in individual stocks.

Given the importance of the three questions, it is interesting to see that the EEMENA (Eastern Europe, Middle East, North Africa) region has been surprisingly neglected in the existing literature. Characteristically, the region hosts emerging economies that are the most dependent on foreign capital inflows for fostering their economies. Moreover, an empirical

characterization of the interaction between foreign flows and emerging stock market returns would not be general enough without including emerging economies with large current account deficits in the EEMENA region. The Istanbul Stock Exchange (ISE), the largest and deepest stock market within the region, would therefore be an interesting avenue to add to this literature.

Furthermore, regarding the first question mentioned above some studies such as Griffin *et al* (2004) and Richards (2005) also consider to what extent the equity flows are determined by global factors, since foreign investors' demand for local emerging market stocks might be affected after a shock in broad markets due to their rebalancing of equity portfolios across markets (Kodres and Pritsker, 2002) and find that, besides local market returns, lagged returns in mature markets, in particular on the S&P500, are useful in explaining equity flows towards emerging markets.

Given the above, this thesis focuses on an intriguing factor, which has not been studied before, as a potential push factor that may affect foreigners' demand for stocks in emerging markets. Previously, no study in this line of research has studied the effects of global risk appetite on equity flows to emerging markets, whereas it is of central importance in the literature that investigates the factors affecting emerging market bond spreads. This is an interesting point as portfolios of international investors not only consist of emerging market bonds but also emerging market stocks. Therefore, this factor is also of potential importance for the stock markets in developing countries, especially given the recent ongoing credit crisis or subprime panic started in the USA, which gives rise to money outflow from emerging stock markets. In view of this, this thesis investigates whether global risk appetite has an effect on equity flows, in addition to US market returns.

Two further innovations are to be highlighted. First, our study looks at whether foreigners follow the same trading strategies (with respect to local returns) across different global risk appetite levels. Secondly, in terms of local conditions, this thesis investigates whether foreigners engage in the same trading strategies (with respect to local return) across different states of the local economy. In particular, it seeks to document whether or not foreigners chase recent local returns irrespective of economic conditions in the emerging country.

Apart from the above literature this thesis is also related to another literature that investigates the trading behaviour of different types of investors around different types of news releases. Although there are many studies that analyze the reaction of various types of investors to various types of news, two of them have diverged from all by analyzing the impact of macroeconomic news on investor behaviour. Both studies have analyzed the *differential* impacts of macroeconomic news on different groups of investors. The first one, Nofsinger (2001), looked at the reaction of institutional and individual investors around macroeconomic news releases for NYSE stocks, while the second study (Erenburg, Kurov, and Lasser, 2006) looked at impacts of macroeconomic news on the trading behaviour of locals and off-exchange traders. However, both studies have shortcomings in their methodology and are needed to be extended in other ways. In order to resolve these shortcomings, this thesis distinguishes itself from these two, in two important ways.

First, Nofsinger (2001) uses a very short sample period (three months from November 1990 to January 1991) and a sample of only 144 NYSE stocks. He also uses a single dummy variable that aggregates information for 17 different macroeconomic types of news release. He is not therefore able to resolve which macroeconomic news releases has a significant

effect on which types of investors. Furthermore, he decides whether the macroeconomic news is good or bad by calculating the adjusted returns. Because of this, he cannot determine whether a specific macro announcement is good or bad if it is released at the same time as other announcements. These three weaknesses obviously create an important gap in the literature. In order to overcome these weaknesses, this thesis uses forecast data from an international economic survey organization which enables us to evaluate both the impact of the surprises and distinguish the effects of macroeconomic news announced simultaneously.

Second, this thesis solves the endogeneity problem that affects both Nofsinger (2001) and Erenburg *et al* (2006). Previous studies of emerging markets have found significant evidence of correlation between net purchases (as a proxy for investor sentiment) and contemporaneous local market returns. However, if the market returns are influenced by macroeconomic announcements, and macroeconomic announcements affect net purchases (investor sentiment) of investors, this apparent correlation could be spurious, due to picking up the correlation between net purchases (investor sentiment) and domestic return. Any model not taking this endogeneity problem into account would be inadequate. This thesis tests for endogeneity in same-day returns to decide whether we need to use instrumental variables or GMM estimation method. It turns out that local returns are exogenous, and this thesis, therefore, includes it as a control variable in order to get unbiased estimates of the impact of macroeconomic news.

In addition to the discussion above, there are two further innovations related to this issue. First, many studies have shown investors' net purchases to be affected by other independent variables, such as lagged market returns and lagged net purchases (Richards, 2005). This thesis includes these as control variables to get unbiased estimates of the effect of

macroeconomic news. Second, many studies such as McQueen and Roley (1993) and Li and Hu (1998), have investigated the response of stock prices over different stages of the business cycle, since investors can consider the same type of news to be bad in some stages of the business cycle and good in others. Reflecting these arguments, this thesis takes different states of the economy into consideration, to see whether the reactions of investors to macroeconomic news are different at different points in the business cycle. In addition to the states of the macroeconomic conditions, this thesis also takes different states of the stock market into account, as well (Hardouvelis and Theodossiou, 2002) since studies such as Goldberg and Vora (1981) and Klein and Rosenfeld (1987) find an evidence of stock return variation with the direction of stock market returns.

5.2 Summary of the Results

The empirical analyse of the thesis are presented in chapters 2, 3 and 4. Each chapter starts with a review of related literature, and then discusses main shortcomings in previous studies and contributions to be made. Building on the related literature, chapter 2 analyzes the interaction between foreigners' trading and stock returns, mainly addressing the following three questions: i) Do foreign investors pursue momentum or positive feedback trading strategies? ii) What is the magnitude of the impact of foreign flows on domestic stock returns? and whether the contemporaneous impact is the result of the price pressure or information? In other words, is the impact temporary or permanent? iii) Does foreigners' trading reflects superior information, i.e., higher predictive value?

Previous empirical studies in this field have provided evidence that foreign investors are positive feedback traders. These results have been used to support the argument that

foreign portfolio flows may destabilize local markets. Using monthly data of foreign flows on the Istanbul Stock Exchange (ISE) and employing a structural VAR model, Chapter 2 reports results that are in contrast with that in the existing literature suggesting that foreigners are negative feedback (contrarian) traders on the ISE. The finding of negative feedback trading is robust to sub-sample variations, though we observe a moderation in the degree of contrarian behaviour post 2003, when stability of economic and financial conditions in Turkey has significantly improved. Our interpretation is that extremely volatile economic conditions dictated negative feedback trading. In addition, our results also suggest that foreigners as a group are sufficiently sophisticated to alter their style in line with the changing degree of stability in fundamentals.

These intriguing results motivated us to perform further explorations. We find that contrarian trading is asymmetrically driven by up-markets only. The logical interpretation of the result is that foreign investors take advantage of extreme bullish sentiment among domestic investors. This interpretation is supported by the fact that the post-2003 period is characterized by less participation by domestic individual investors, while the tendency of negative feedback trading by foreigners moderated. Both inflows and outflows respond positively to past local returns, while net flows respond negatively because outflows are much more responsive to positive returns than are inflows. This suggests that while the majority of foreign investors act as contrarian profit takers, some of them may be positive feedback buyers. Chapter 2 estimates the price impact of foreign net flows to be higher at monthly frequency than that for Mexico and Sweden, two countries examined in the previous studies. The chapter confirms that the impact of surprise flows is more significant than that of expected flows. However, our results provided no evidence that prices return to their previous levels. Therefore, our findings do not support the price pressure hypothesis; instead the price

impact is permanent supporting the base-broadening and information hypotheses. The analysis of individual stocks suggests no evidence of informed trading, suggesting that foreigners have no particular advantage in terms of domestic information.

In sum, Chapter 2 shows that the previous empirical literature suggesting that foreign investors are positive feedback traders may not necessarily represent a general phenomenon. On the contrary, they can rationally adopt a contrarian style should the market conditions require. In addition, by doing so, they may curb extreme sentiment fluctuations among domestic investors. These findings as a whole raise serious doubts about the previously widespread stereo-typing of foreigners as uninformed positive feedback traders and the justification of policies to restrict their trading (including the so-called "smart restrictions").

In Chapter 3, this thesis focuses on mainly global risk appetite as a potential push factor in explaining equity flows to emerging markets. Employing daily trading data from five emerging stock markets, namely the Jakarta Stock Exchange, Korea Stock Exchange (KOSPI), Stock Exchange of Thailand, Taiwan Stock Exchange, and Kosdaq Stock Market, Chapter 3 investigates the dynamic interaction of local returns and equity flows, while taking the global risk appetite into consideration. Local exchange rates are also included in the analyses as a control variable.

The results show that in four out of five markets global risk appetite is found to affect equity flows to emerging markets, which is consistent with our hypothesis. Our explanation for this finding is that since their risk appetite is changing, international investors continuously try to balance their portfolios in order to meet their risk tolerance. In this set up, they want to shift their portfolio to a more conservative allocation following a decrease in

their risk tolerance levels. In our research the question of interest is whether the trading of international investors in emerging markets is affected by the developments in global risk appetite even on a daily basis and the findings show that it is. This is an important finding, because it is generally believed that international investors revise their portfolios annually or quarterly rather than on a daily basis. Inevitably the above mentioned general belief ignores the impact of global risk appetite on the formation of portfolios on a daily basis. Our results reveal a different story about the formation and management of international portfolios under the influence of changing global risk appetite.

Examining the responses of net inflows following a change in the exchange rate, the results provide rather puzzling outcome. We find that in general terms, a positive exchange rate shock, which corresponds to a depreciation of the local currency, causes foreigners' outflow from the local exchange. While in Thailand and Taiwan the responses are both negative and statistically significant, in the Kospi and Kosdaq markets the responses are again negative, but this time not statistically significant. Only in Indonesia is the response positive, though not significant. These results may seem at first glance somewhat puzzling, since they are not consistent with the original hypothesis. However, instead of a direct rejection, a more in depth analysis suggests that more factors might be at work. In principal, these investors are equity investors. Therefore, it may be more reasonable for them to focus on stock prices specifically, instead of the impact of foreign exchange rate fluctuations on stock values. On this basis, one possible explanation for this response is foreign investors' perceptions on the stability of the local economy. In an environment where foreigners are at a relative informational disadvantage to domestic investors, they may use the exchange rate as a proxy for local macroeconomic fundamentals in their buy/sell decisions. In this set up, a

depreciation of the local currency may be regarded as a negative proxy about the macroeconomic conditions, leading foreigners to selling stocks.

As a second innovation, Chapter 3 also investigates the interaction between foreign flows and emerging stock market returns across varying global risk appetites. More specifically, it examines how foreigners behave with respect to local returns at different levels of risk appetite. Our results regarding this issue are also rather interesting. First, we find different responses of foreign inflows across high and low risk appetite levels in Indonesia, Kosdaq and the Kospi markets. For example, on Kosdaq, we find that foreigners behave in a momentum style with respect to local returns at the time when the global risk appetite is low and in a contrarian style at the time when the global risk appetite is high. Given this finding, a possible explanation for this behavioural difference in the Kosdaq market is that foreigners use recent local returns as information signals only at times when they have a low appetite for risk, whereas they use other information sources as information signals for expected return of the local market at times when they have a high appetite for risk. The reason for this kind of behaviour can lie in an ambition to earn money when they have a high appetite for risk. Thus, they may prefer to use other information sources rather than just chasing recent returns.

Similar behaviour is also found for foreigners in Kospi, although this time insignificant. On the other hand, in Indonesia we document completely the opposite behaviour of foreigners. The cumulative impulse response is positive at high risk appetite levels with borderline significance, whereas it is negative at low risk appetite levels, though insignificant. One possible explanation for the negative feedback trading in Indonesia when foreigners are risk averse may result from foreign investors' perceptions on valuations. When

foreigners are more risk averse they may be more sensitive about pricing the assets and they may have weaker extrapolative expectations for that local market than those they have when they are less risk averse. That may be why foreigners are positive feedback traders when they are less risk averse since they have stronger extrapolative expectations for that local market than those they have when they are more risk averse. However, in terms of foreign investors, a question still remains as to what makes Indonesia different from Kospi and Kosdaq. One possible explanation for this difference is that since Korea is nearly five times as big as Indonesia in terms of market capitalization global institutional investors may prefer to invest more in Korea compared to Indonesia, and it is also plausible that global institutional investors can invest in information sources, thanks to their size, global experience, talent and resources which renders them to be at an informational advantage relative to locals. Therefore, foreigners in Korea may not be more sensitive about pricing the local assets when global risk appetite is low compared to foreign investors in Indonesia. In this scenario, foreigners in Korea may even have advantages in analyzing push factors, especially at times when domestic markets are highly influenced by global factors, in other words when the global risk appetite is high, compared to foreigners in Indonesia.

Finally, as a third innovation, Chapter 3 analyzes foreigners' trading with respect to local returns under different states of the local economy. The chapter finds that the cumulative impulse responses of foreign flows to a shock in local returns are different across two states in KOSPI and the SET. In Kospi the cumulative response is found to be positive and significant in low states of the economy, whereas it is negative and insignificant in the high states of the economy. The responses are found to be opposite when looking at the Thailand market, that is to say that the cumulative responses are found to be negative in the

low state of the economy, and positive in the high state of the economy, though both responses are insignificant.

The results of our VAR model for these two markets are contradictory to the model of Brennan and Cao (1997) which suggests that foreign investors exposed to an informational disadvantage in emerging markets use recent returns as information signals about the expected returns of the local markets. On the contrary, our results regarding these two markets suggest that foreigners do not follow positive feedback trading strategies irrespective of the local economic conditions.

Chapter 4 focuses on the behaviour of three different groups of investors – local private investors, local institutions and foreigners – in the Thailand stock market around regular macroeconomic news announcements. Many previous studies have reported that local individual investors act in a contrarian manner with respect to past returns, but both local and foreign institutional investors act as momentum traders. There has been a parallel literature looking at the response of investors to various types of macroeconomic news. Several types of macroeconomic news have been shown to affect stock and bond returns. However, to our knowledge there have only been two papers (Nofsinger, 2001 and Erenburg, Kurov and Lasser, 2006) that combine the two literatures to look at how macroeconomic announcements affect the trading behaviour of different groups of investors. As it has been shown in chapter 4, the econometric problems in doing this are formidable, and both these recent papers have been affected by econometric issues.

Chapter 4 addresses these serious econometric issues that have affected other papers in this area. Under this improved model, our results show a much more complex story than

other authors have portrayed. Over our whole period, local individuals display a contrarian response with respect to news on inflation, buying more when inflation is unexpectedly up. However, when we divide into sub-periods, we find that this contrarian response stems entirely from their trading response during 'bad states of the world': recession, a bear stock market, or during the 16 months of the 1997-8 crisis. Local institutions show a significant response only to trade balance news, but this is momentum-based during good states of the world (booms, pre-crisis) and contrarian during bad states (recession, bear market, or during the crisis). Foreigners showed quite the opposite response to local individual investors for inflation news. Overall, they were momentum traders towards inflation, but this tended to be concentrated during bad states of the world (bear market or during the crisis). For CPI news at least, it is clear that the reaction of foreigners will tend to dampen any volatility caused by individual local investors. Foreigners were also contrarian with regard to industrial production news, but this was concentrated in good states (boom times or pre-crisis).

5.3 Implications

The empirical evidence documented in this thesis may provide useful insights for researchers, policy makers, and investors.

5.3.1 Researchers

In chapter 2, this thesis provides a new approach for testing the predictive content of foreign flows in individual stocks. By employing VAR methodology using returns and net flows defined in relative terms for the first time in the literature, the approach presented in this thesis provides more efficient procedure to detect informed trading by an investor group in individual stocks.

In chapter 3, the thesis provides the first evidence about the effect of global risk appetite on the net purchases of foreign investors in emerging stock markets. In a similar vein, it also provides the first evidence about whether foreigners engage in different trading strategies with respect to local return across different global risk appetite levels and across different states of the local economy.

In chapter 4, this thesis is the first to investigate the reaction of different types of investors to macroeconomic announcements in an emerging market. Whether foreigners react differently than local individuals or local institutions to macroeconomic news should be of great importance to market regulators as well as academics. If they show the opposite response to locals, it could mean that foreigners are making the market more stable, rather than destabilizing it with their huge investment flows.

Furthermore, this thesis also addresses some serious econometric issues that have affected other papers in this area. To this end, the thesis improved the previous models.

5.3.2 Policymakers

The empirical evidence documented in this thesis is of relevance to policymakers. For example, regarding chapter 3, from a policy perspective, they are of great importance since all previous studies uniformly documented that foreigners engage in positive feedback trading strategies with respect to local returns, and positive feedback trading is also known to have the potential to push prices away from fundamentals. Therefore, if foreigners are found to pursue different trading strategies at different global risk appetite levels and at different economic states regulators can benefit from this information and introduce different measures

at different times to enhance market stability and to attract capital equity flows to their emerging markets.

Furthermore, regarding chapter 4, whether foreigners react differently than local individuals or local institutions to macroeconomic news should also be of great importance to regulators. If foreigners often show the opposite response to locals, it could mean that foreigners are making the market more stable, rather than destabilizing it with their huge investment flows. In view of this, policy makers of the related markets can benefit from this thesis' findings to decide whether taxing the foreign equity flows in order to sustain stability of their stock markets.

5.3.3 Investors

The empirical evidence documented in this thesis is important not only to researchers and policy makers but also to local investors as well. As mentioned before foreign investors are thought to engage in positive feedback trading strategies with respect to local returns in emerging markets since they are believed to be at an informational disadvantage relative to local investors in these markets. If local investors (mostly on the ISE) follow a trading strategy based on this conventional wisdom they may lose money since it may not necessarily be a general phenomenon as is documented in chapter 2. This thesis, using monthly data of foreign flows on Istanbul Stock Exchange (ISE) and employing a structural VAR model, shows that foreign investors act in a contrarian manner with respect to past local returns in the ISE. Furthermore, if local investors on the ISE engage in any trading strategy based on the belief that foreigners have superior ability than others at choosing the best stocks and overestimate their ability they may lose money since chapter 2 suggests no evidence of

informed trading by foreigners in individual stocks, suggesting that foreigners have no particular advantage in terms of local information.

5.4. Future Research

The comprehensive exploration presented in chapter 2 challenges some well established findings towards a general characterization of foreign investors' trading behaviour. Since this study is so far the only major analysis of this type from the EEMENA region which, in contrast to many Asian markets or Sweden, is highly dependent on foreign inflows, several intriguing questions arise: Is foreigners' negative feedback trading confined to Turkey or common to all high external deficit economies in the EEMENA region? That is, is it driven by unique characteristics of Turkey such as high degree of instability and local investors being excessively vulnerable to bullish sentiment, or solely by large external deficits? Answers to these questions in order to reach a generalized theory of interaction between foreigners' trading and returns in emerging markets and more appropriate policy guidelines with regard to regulation of foreign portfolio flows ("hot money") are left to future studies on more EEMENA emerging markets.

In a similar vein, regarding chapter 3, analyzing emerging markets in different regions will shed light on the issue of whether the impact of global risk appetite is confined to Asia-Pacific region or common to all emerging markets.

For chapter 4, the trading data of each investor type for each firm are not available for Thailand stock market. If the data are found, it will be very useful to investigate the same issues at the individual firm level. For example, McQueen *et al* (1996) propose that investors

respond quickly to bad news releases by selling all types of firms but respond quickly to good news releases only by purchasing large firms. The delayed reaction for buying small firms on good news causes the correlation between small firm returns and lagged large firm returns. On this basis, if this correlation exists in any market, by analyzing the trading data of different types of investors in each firm we can test which type of investor appear to be net buyers in large firms on good announcements days and which type of investors appear to be net buyers in small firms on the day after the announcement and may offer different answers to this matter.

Bibliography

Adabag, C., J. Ornelas, and V. Sarfatti, 2004. Behaviour and Effects of Foreign Investors on Istanbul Stock Exchange, SSRN working Paper, http://ssrn.com/abstract=656442

Adams, G., G. McQueen, and R. Wood, 2004. The Effects of Inflation News on High Frequency Stock Returns, *The Journal of Business* 77, 547-574.

Aggarwal, R., and D. Schirm, 1992. Balance of trade announcements and asset prices: Influence on equity prices, exchange rates, and interest rates, *Journal of International Money and Finance* 11, 80-95.

Agudelo, D., 2006. Do Local or Foreign traders know more in an emerging market? A possible solution to the puzzle, Working paper, Indiana University.

Äijö, J., 2008. Impact of US and UK macroeconomic news announcements on the return distribution implied by FTSE-100 index options, *International Review of Financial Analysis* 17, 242-258.

Akar, C., 2008. Yabancılar Türkiye'de Pozitif Geri Besleme Sürecine Uygun Davranışlar Gösterirler mi? *İMKB Dergisi* 39, 61-67.

Albuquerque, R., G. Bauer, and M. Schneider, 2005. International equity flows and returns: a quantitative equilibrium approach, SSRN working Paper, http://ssrn.com/abstract=472424.

Altonji, J., and L. Segal, 1996. Small-sample bias in GMM estimation of covariance structures, *Journal of Business & Economic Statistics* 14, 353-366.

Lemanni, B., and J. Ornelas, 2007. Behavior and Effects of Equity Foreign Investors on Emerging Markets, SSRN working Paper, http://ssrn.com/abstract=1105719.

Almeida, A., C. Goodhart, and R. Payne, 1998. The effects of macroeconomic news on high frequency exchange rate behaviour, *The Journal of Financial and Quantitative Analysis* 33, 383-408.

Andersen, T., and T. Bollerslev, 1998. Deutsche mark-dollar volatility: Intraday activity patterns, macroeconomic announcements, and longer run dependencies, *The Journal of Finance* 53, 219-265.

Andersen, T., T. Bollerslev, F. Diebold, and C. Vega, 2007. Real-time price discovery in global stock, bond and foreign exchange markets, *Journal of International Economics* 73, 251-277.

Anderson, K., J. Harris, and E. So, 2007. Opinion Divergence and the Post-Earnings Announcement Drift, SSRN working Paper, http://ssrn.com/abstract=969736.

Andritzky, J., G. Bannister, and N. Tamirisa, 2007. The impact of macroeconomic announcements on emerging market bonds, *Emerging Markets Review* 8, 20-37.

Aragon, G., R. Bildik, M. Yavuz, I. Exchange, I. Borsasi, and I. Turkey, 2007. Do Institutional Investors Have an Information Advantage? Working paper, Arizona State University.

Ayers, B., O. Li, and E. Yeung, 2009. Investor Trading and the Post Earnings Announcement Drift, SSRN working paper, http://ssrn.com/abstract=1270811.

Badrinath, S., and S. Wahal, 2002. Momentum trading by institutions, *The Journal of Finance* 57, 2449-2478.

Bae, K., K. Ito, and T. Yamada, 2002. How Do Foreigners Profit from Local Investors? Evidence from Trades in the Japanese Stock Market, SSRN working Paper, http://ssrn.com/abstract=283184.

Bae, K., T. Yamada, and K. Ito, 2008. Interaction of investor trades and market volatility: Evidence from the Tokyo Stock Exchange, *Pacific-Basin Finance Journal* 16, 370-388.

Bailey, W., C. Mao, and K. Sirodom, 2007. Investment restrictions and the cross-border flow of information: Some empirical evidence, *Journal of International Money and Finance* 26, 1-25.

Balduzzi, P., E. Elton, and T. Green, 2001. Economic News and Bond Prices: Evidence from the US Treasury Market, *Journal of Financial and quantitative Analysis* 36.

Ball, R., and S. Kothari, 1991. Security returns around earnings announcements, *Accounting Review*, 718-738.

Bamber, L., O. Barron, and T. Stober, 1999. Differential interpretations and trading volume, *Journal of Financial and quantitative Analysis* 34, 369-386.

Barber, B., and T. Odean, 2008. All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors, *Review of Financial Studies* 21, 785.

Barron, J., and J. Ni, 2008. Endogenous asymmetric information and international equity home bias: The effects of portfolio size and information costs, *Journal of International Money and Finance* 27, 617-635.

Barth, M., and X. Zhang, 1999. Foreign equity flows and the Asian financial crisis, *Financial Markets and Development: The Crisis in Emerging Markets (Washington, Brookings Institution)*.

Bartolini, L., L. Goldberg, and A. Sacarny, 2008. How Economic News Moves Markets, *Current Issues in Economics and Finance* 14.

Batra, A., 2003. The Dynamics of foreign portfolio inflows and equity returns in India, *Indian Council For Research On International Economic Relations, Working Paper* 109.

Baum, C. F., M. E. Schaffer, and S. Stillman, 2003. Instrumental variables and GMM: Estimation and testing, *Stata Jour*nal 3, 1–31.

Baum, C. F., 2007. Enhanced routines for instrumental variables/GMM estimation and testing, Boston college economics working paper no: 667.

Beaver, W., 1968. The information content of annual earnings announcements, *Journal of Accounting Research* 6, 67-92.

Beber, A., and M. Brandt, 2006. The effect of macroeconomic news on beliefs and preferences: Evidence from the options market, *Journal of Monetary Economics* 53, 1997-2039.

Becker, K., J. Finnerty, and K. Kopecky, 1993. Economic news and intraday volatility in international bond markets, *Financial Analysts Journal* 49.

Bekaert, G., 1995. Market integration and investment barriers in emerging equity markets, *the world bank economic review* 9, 75.

Bekaert, G., and C. Harvey, 1995. Time-varying world market integration, *The Journal of Finance* 50, 403-444.

Bekaert, G., and C. Harvey, 1998. Capital flows and the behavior of emerging market equity returns, *NBER Working Paper*.

Bekaert, G., and C. Harvey, 2000. Foreign speculators and emerging equity markets, *The Journal of Finance* 55, 565-613.

Bekaert, G., and C. Harvey, 2002. Research in emerging markets finance: looking to the future, *Emerging Markets Review* 3, 429-448.

Bekaert, G., and C. Harvey, 2003. Emerging markets finance, *Journal of Empirical Finance* 10, 3-56.

Bekaert, G., C. Harvey, and R. Lumsdaine, 2002. The dynamics of emerging market equity flows, *Journal of International Money and Finance* 21, 295-350.

Bekaert, G., C. Harvey, C. Lundblad, and C. Harvey, 2002. Equity market liberalization in emerging markets, SSRN working paper, http://ssrn.com/abstract=795345.

Bernard, V., K. Lakonishok, S. Penman, J. Ritter, T. Shevlin, and T. Stober, 1992. Stock price reactions to earnings announcements: A summary of recent anomalous evidence and possible explanations, Working paper No.703, The University of Michigan.

Bernard, V., and J. Thomas, 1989. Post-earnings-announcement drift: delayed price response or risk premium? *Journal of Accounting Research* 27, 1-36.

Bikhchandani, S., and S. Sharma, 2000. Herd behavior in financial markets, *IMF Staff papers* 47, 279-310.

Bohl, M., and J. Brzeszczy ski, 2006. Do Institutional Investors Destabilize Stock Prices? Emerging Market's Evidence Against a Popular Belief, *Journal of International Financial Markets, Institutions& Money* 16, 370-383.

Bohl, M., and P. Siklos, 2008. Empirical evidence on feedback trading in mature and emerging stock markets, *Applied Financial Economics* 18, 1379-1389.

Bohn, H., and L. Tesar, 1996. Portfolio rebalancing or return chasing, *American Economic Review* 86, 77-81.

Bollerslev, T., J. Cai, and F. Song, 2000. Intraday periodicity, long memory volatility, and macroeconomic announcement effects in the US Treasury bond market, *Journal of Empirical Finance* 7, 37-55.

Bonser-Neal, C., S. Jones, D. Linnan, and R. Neal, 2002. Herding and feedback trading by foreign investors: The case of Indonesia during the Asian financial crisis, Working paper, Indiana University Kelley School of Business

Borensztein, E., and R. Gelos, 2003. Leaders and followers: emerging market fund behavior during tranquil and turbulent times, *Emerging Markets Review* 4, 25-38.

Borensztein, E., and R. Gelos, 2003. A Panic-Prone Pack? the Behavior of Emerging Market Mutual Funds, *IMF Staff papers* 50, 43-64.

Bowe, M., and D. Domuta, 2004. Investor herding during financial crisis: A clinical study of the Jakarta Stock Exchange, *Pacific-Basin Finance Journal* 12, 387-418.

Bowman, G. R., A. J. Robin, and J. Weintrop, 1995. The robustness of event study methodologies to varying market conditions, Working paper, Auckland University, New Zealand.

Boyd, J., J. Hu, and R. Jagannathan, 2005. The stock market's reaction to unemployment news: Why bad news is usually good for stocks, *The Journal of Finance* 60, 649-672.

Brennan, M., and H. Cao, 1997. International portfolio investment flows, *The Journal of Finance* 52, 1851-1880.

Brenner, M., P. Pasquariello, and M. Subrahmanyam, 2009. On the volatility and comovement of US financial markets around macroeconomic news announcements, *Journal of Financial and Quantitative Analysis, forthcoming*.

Brooks, R., A. Patel, and T. Su, 2003. How the Equity Market Responds to Unanticipated Events*, *The Journal of Business* 76, 109-133.

Bruckner, R., P. Bawag, and Q. Solutions, 2006. On the Stability of Financial Markets and the Role of the Rational International Investor, SSRN working paper, http://ssrn.com/abstract=910180.

Burch, T., and B. Swaminathan, 2002. Earnings news and institutional trading, SSRN working paper, http://ssrn.com/abstract=355380.

Calvo, G., 1998. Capital flows and capital-market crises: the simple economics of sudden stops, *Journal of applied Economics* 1, 35-54.

Calvo, G., L. Leiderman, and C. Reinhart, 1996. Inflows of Capital to Developing Countries in the 1990s, *The Journal of Economic Perspectives* 10, 123-139.

Campbell, J., T. Ramadorai, and A. Schwartz, 2009. Caught on tape: Institutional trading, stock returns, and earnings announcements, *Journal of Financial Economics* 92, 66-91.

Canto, B., and R. Kräussl, 2006. Stock market interactions and the impact of macroeconomic news: evidence from high frequency data of European futures markets, SSRN working paper, http://ssrn.com/abstract=925180.

Chaboud, A., S. Chernenko, E. Howorka, R. Iyer, D. Liu, and J. Wright, 2004. The high-frequency effects of US macroeconomic data releases on prices and trading activity in the global interdealer foreign exchange market, *Board of Governors of the Federal Reserve System International Finance Discussion Papers* 823.

Chaboud, A., S. Chernenko, and J. Wright, 2008. Trading activity and macroeconomic announcements in high-frequency exchange rate data, *Journal of the European Economic Association* 6, 589-596.

Chae, J., and J. Lewellen, 2005. Herding, Feedback Trading, and Stock Returns: Evidence from Korea, Working Paper, Dartmouth College.

Chambers, A., and S. Penman, 1984. Timeliness of reporting and the stock price reaction to earnings announcements, *Journal of Accounting Research* 22, 21-47.

Chan, K., A. Menkveld, and Z. Yang, 2007. The informativeness of domestic and foreign investors' stock trades: Evidence from the perfectly segmented Chinese market, *Journal of Financial Markets* 10, 391-415.

Chan, W., 2003. Stock price reaction to news and no-news: Drift and reversal after headlines, *Journal of Financial Economics* 70, 223-260.

Chan, Y., A. Chui, and C. Kwok, 2001. The impact of salient political and economic news on the trading activity, *Pacific-Basin Finance Journal* 9, 195-217.

Chang, C., 2009. Herding and the role of foreign institutions in emerging equity markets, *Pacific-Basin Finance Journal*.

Chao, C., and Y. Lu, 2009. The Effect of Market Information on the Trading Behavior of Institutional Investors and Individual Investors, *Institutional investor* 186, 253.

Chen, G., K. Kim, J. Nofsinger, and O. Rui, 2004. Behavior and performance of emerging market investors: Evidence from China, unpublished Washington State University Working paper (January).

Chen, Y., C. Wang, and F. Lin, 2008. Do Qualified Foreign Institutional Investors Herd in Taiwan's Securities Market?, *Emerging Markets Finance and Trade* 44, 62-74.

Choe, H., B. Kho, and R. Stulz, 1999. Do foreign investors destabilize stock markets? The Korean experience in 1997, *Journal of Financial Economics* 54, 227-264.

Choe, H., B. Kho, R. Stulz, and K. Sinlim-Dong, 2001. Do domestic investors have more valuable information about individual stocks than foreign investors? *NBER Working Paper*.

Chuhan, P., S. Claessens, and N. Mamingi, 1993. Equity and bond flows to Latin America and Asia: the role of external and domestic factors, *Policy Research Working Paper* 1160.

Chuhan, P., S. Claessens, and N. Mamingi, 1998. Equity and bond flows to Latin America and Asia: the role of global and country factors, *Journal of Development Economics* 55, 439-463.

Ciarlone, A., P. Piselli, and G. Trebeschi, 2009. Emerging markets' spreads and global financial conditions, *Journal of International Financial Markets, Institutions & Money* 19, 222-239.

Claessens, S., 1995. The emergence of equity investment in developing countries: overview, *the world bank economic review* 9, 1.

Clare, A., and R. Courtenay, 2001. Assessing the impact of macroeconomic news announcements on securities prices under different monetary policy regimes, *Working paper series-bank of England*.

Clark, J., and E. Berko, 1997. Foreign investment fluctuations and emerging market stock returns, *Federal Reserve Bank of New York Staff Papers* 24.

Click, R., R. Moreno, and M. Spiegel, 2001. Financial crises in emerging markets, *Financial crises in emerging markets*, 1.

Cohen, R., P. Gompers, and T. Vuolteenaho, 2002. Who underreacts to cash-flow news? Evidence from trading between individuals and institutions, *Journal of Financial Economics* 66, 409-462.

Comerton-Forde, C., and J. Yao, 2007. Investor Responses to Earnings Announcements a Comparison of Chinese A and B Stock Markets, SSRN working paper, http://ssrn.com/abstract=1009442.

Covrig, V., S. Lau, and L. Ng, 2006. Do domestic and foreign fund managers have similar preferences for stock characteristics? A cross-country analysis, *Journal of International Business Studies* 37, 407-429.

Cragg, J. G., and S. G. Donald. 1993. Testing identifiability and specification in instrumental variables models, *Econometric Theory* 9, 222–240.

Cumby, R. E., and J. Huizinga. 1992. Testing the autocorrelation structure of disturbances in ordinary least squares and instrumental variables regressions, *Econometrica* 60(1), 185-195

Cushman, D., and T. Zha, 1997. Identifying monetary policy in a small open economy under flexible exchange rates, *Journal of Monetary Economics* 39, 433-448.

Dahlquist, M., and G. Robertsson, 2004. A note on foreigners' trading and price effects across firms, *Journal of Banking and Finance* 28, 615-632.

Damodaran, A., 1989. The weekend effect in information releases: A study of earnings and dividend announcements, *The Review of Financial Studies* 2, 607-623.

Dey, M., and B. Radhakrishna, 2007. Who trades around earnings announcements? Evidence from TORQ data, *Journal of Business Finance and Accounting* 34, 269.

Docking, D., and P. Koch, 2005. Sensitivity of investor reaction to market direction and volatility: dividend change announcements, *Journal of Financial Research* 28, 21-40.

Donohue, J., and K. Froot, 2002. The persistence of emerging market equity flows, *NBER Working Paper*.

Dvorak, T., 2005. Do domestic investors have an information advantage? Evidence from Indonesia, *The Journal of Finance* 60, 817-839.

Dvorák, T., 2001. Does foreign trading destabilize local stock markets, manuscript, Williams College.

Edelen, R., and J. Warner, 2001. Aggregate price effects of institutional trading: A study of mutual fund flow and market returns, *Journal of Financial Economics* 59, 195-220.

Ederington, L., and J. Lee, 1993. How markets process information: News releases and volatility, *The Journal of Finance* 48, 1161-1191.

Edison, H., and F. Warnock, 2008. Cross-border listings, capital controls, and equity flows to emerging markets, *Journal of International Money and Finance* 27, 1013-1027.

Erenburg, G., A. Kurov, and D. Lasser, 2006. Trading around macroeconomic announcements: Are all traders created equal?, *Journal of Financial Intermediation* 15, 470-493.

Ersoy-Bozcuk, A., M. Lasfer, and F. Crescent, 2001. The trading behaviour of UK institutional investors, SSRN working paper, http://ssrn.com/abstract=269736.

Etter, E., L. Rees, and J. Lukawitz, 1999. The usefulness to individual and institutional investors of annual earnings announcements and SEC filings by non-US companies, *Journal of International Accounting, Auditing and Taxation* 8, 109-131.

Fama, F. Eugene, 1965. The Behaviour of Stock-Market Prices**,** Journal of Business**,** 38(1), pp. 34-105.

Ferrucci, G., F. am Main Germany, J. Cruces, and M. Buscaglia, 2003. Empirical determinants of emerging market economies' sovereign bond spreads, SSRN working paper, http://ssrn.com/abstract=597422.

Flannery, M., and A. Protopapadakis, 2002. Macroeconomic factors do influence aggregate stock returns, *Review of Financial Studies* 15, 751.

Fleming, M., and E. Remolona, 1999. Price formation and liquidity in the US Treasury market: The response to public information, *journal of finance*, 1901-1915.

Foster, G., C. Olsen, and T. Shevlin, 1984. Earnings releases, anomalies, and the behavior of security returns, *The Accounting Review* 59, 574-603.

Francis, J., D. Pagach, and J. Stephan, 1992. The stock market response to earnings announcements released during trading versus nontrading periods, *Journal of Accounting Research* 30, 165-184.

Frenkel, M., and L. Menkhoff, 2002. Private capital flows to emerging markets, *Finanzierung von Entwicklung*, 45-68.

Froot, K., and J. Donohue, 2004. Decomposing the persistence of international equity flows, *Finance Research Letters* 1, 154-170.

Froot, K., P. O'Connell, and M. Seasholes, 2001. The portfolio flows of international investors, *Journal of Financial Economics* 59, 151-193.

Froot, K., and T. Ramadorai, 2001. The information content of international portfolio flows, *NBER working Paper 8472, National Bureau of Economic Research*.

Froot, K., and T. Ramadorai, 2008. Institutional portfolio flows and international investments, *Review of Financial Studies* 21, 937.

Froot, K., and J. Tjornhom Donohue, 2002. The persistence of emerging market equity flows, *Emerging Markets Review* 3, 338-364.

Ganapolsky, E., and S. Schmukler, 1998. The impact of policy announcements and news on capital markets: crisis management in Argentina during the tequila effect, *POLICY RESEARCH WORKING PAPERS-WORLD BANK WPS*.

Gazioglu, S., 2003. Capital flows to an emerging financial market in Turkey, *International Advances in Economic Research* 9, 189-195.

Gelos, R., 2004. Contagion and the Behavior of International Equity Funds, *Sovereign risk and financial crises*, 143.

Genesove, D., and C. Mayer, 2001. Loss Aversion and Seller Behavior: Evidence from the Housing Market*, *Quarterly Journal of Economics* 116, 1233-1260.

Gervais, S., and T. Odean, 2001. Learning to be overconfident, *Review of Financial Studies* 14, 1.

Goetzmann, W., and M. Massa, 2002. Daily momentum and contrarian behavior of index fund investors, *Journal of Financial and quantitative Analysis* 37, 375-389.

Goldberg, M. A., and a. Vora, 1981. the inconsistency of the relationship between security and market returns, *Journal of Economics and Business* 33, 97-107.

Graham, M., J. Nikkinen, and P. Sahlström, 2003. Relative importance of scheduled macroeconomic news for stock market investors, *Journal of Economics and Finance* 27, 153-165.

Green, T., 2004. Economic news and the impact of trading on bond prices, *journal of finance*, 1201-1233.

Griffin, J., J. Harris, and S. Topaloglu, 2003. The dynamics of institutional and individual trading, *The Journal of Finance* 58, 2285-2320.

Griffin, J., F. Nardari, and R. Stulz, 2004. Are daily cross-border equity flows pushed or pulled?, *Review of Economics and Statistics* 86, 641-657.

Grinblatt, M., and M. Keloharju, 2000. The investment behavior and performance of various investor types: a study of Finland's unique data set, *Journal of Financial Economics* 55, 43-67.

Grinblatt, M., and M. Keloharju, 2001. What makes investors trade?, *The Journal of Finance* 56, 589-616.

Gutierrez, R., and C. Prinsky, 2007. Momentum, reversal, and the trading behaviors of institutions, *Journal of Financial Markets* 10, 48-75.

Hamao, Y., and J. Mei, 2001. Living with the" enemy": an analysis of foreign investment in the Japanese equity market, *Journal of International Money and Finance* 20, 715-735.

Han Kim, E., and V. Singal, 2000. Stock Market Openings: Experience of Emerging Economies, *The Journal of Business* 73, 25-66.

Hanousek, J., E. Ko enda, and A. Kutan, 2009. The reaction of asset prices to macroeconomic announcements in new EU markets: Evidence from intraday data, *Journal of Financial Stability* 5, 199-219.

Hardouvelis, G., 1987. Macroeconomic information and stock prices, *Journal of Economics and Business* 39, 131-140.

Hardouvelis, G., and P. Theodossiou, 2002. The asymmetric relation between initial margin requirements and stock market volatility across bull and bear markets, *Review of Financial Studies* 15, 1525.

Hau, H., and Rey. H, 2004. Can Portfolio Rebalancing Explain the Dynamics of Equity Returns, Equity Flows, and Exchange Rates? *The American Economic Review* 94, 126-133.

Heath, C., S. Huddart, and M. Lang, 1999. Psychological Factors and Stock Option Exercise*, *Quarterly Journal of Economics* 114, 601-627.

Heisler, J., 1994. Loss aversion in a futures market: An empirical test, *Review of Futures Markets* 13, 793-826.

Henry, P., 2000. Stock market liberalization, economic reform, and emerging market equity prices, *The Journal of Finance* 55, 529-564.

Herrero, A., and A. Ortiz, 2005. The role of global risk aversion in explaining Latin American sovereign spreads, *International Finance* 503005.

Hirshleifer, D., J. Myers, L. Myers, and S. Teoh, 2008. Do individual investors cause post-earnings announcement drift? Direct evidence from personal trades, *The Accounting Review* 83, 1521.

Hirshleifer, D., J. Myers, L. Myers, and S. Teoh, 2008. Do individual investors cause post-earnings announcement drift? Direct evidence from personal trades, *The Accounting Review* 83, 1521.

Iihara, Y., H. Kato, and T. Tokunaga, 2001. Investors' Herding on the Tokyo Stock Exchange, *International Review of Finance* 2, 71-98.

Jackson, A., and B. Investors, 2003. The aggregate behaviour of individual investors, SSRN working paper, http://ssrn.com/abstract=536942.

Jain, P., 1988. Response of hourly stock prices and trading volume to economic news, *Journal of Business*, 219-231.

Jennings, R., and L. Starks, 1986. Earnings announcements, stock price adjustment, and the existence of option markets, *journal of finance*, 107-125.

Jiang, Y., 2006. *INTERNATIONAL EQUITY FLOWS AND MARI (ET RETURNS: A CASE STUDY OF JAPANESE MARKET*(SIMON FRASER UNIVERSITY).

Jo, G., 2002. Foreign Equity Investment in Korea, *for presentation at the Association of Korean Economic Studies*.

Jones, C., O. Lamont, and R. Lumsdaine, 1998. Macroeconomic news and bond market volatility, *Journal of Financial Economics* 47, 315-337.

Kadiyala, P., and P. Rau, 2004. Investor Reaction to Corporate Event Announcements: Underreaction or Overreaction? *The Journal of Business* 77, 357-386.

Kalev, P., A. Nguyen, and N. Oh, 2008. Foreign versus local investors: Who knows more? Who makes more?, *Journal of Banking and Finance* 32, 2376-2389.

Kallunki, J., 1996. Stock returns and earnings announcements in Finland, *European Accounting Review* 5, 199-216.

Kallunki, J., and T. Martikainen, 1997. Trading patterns of small and large traders: Implications for the weekend effect in Finland, *Applied Economics Letters* 4, 595.

Kamesaka, A., J. Nofsinger, and H. Kawakita, 2003. Investment patterns and performance of investor groups in Japan, *Pacific-Basin Finance Journal* 11, 1-22.

Kaminsky, G., R. Lyons, and S. Schmukler, 2001. Mutual fund investment in emerging markets: An overview, *the world bank economic review* 15, 315.

Kaminsky, G., R. Lyons, and S. Schmukler, 2004. Managers, investors, and crises: mutual fund strategies in emerging markets, *Journal of International Economics* 64, 113-134.

Kandel, E., and N. Pearson, 1995. Differential interpretation of public signals and trade in speculative markets, *The Journal of Political Economy* 103, 831-872.

Kang, J., and R. Stulz, 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan, *Journal of Financial Economics* 46, 3-28.

Kang, J., and R. Stulz, 1997. Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan, *Journal of Financial Economics* 46, 3-28.

Kaniel, R., S. Liu, G. Saar, and S. Titman, 2008. Individual Investor Trading and Return Patterns around Earnings Announcements, SSRN working paper, http://ssrn.com/abstract=1342471.

Karataş, A., Dönmez Ç.A, and F. Kiraz, 2004. Performance analysis of foreign portfolio investors in Istanbul Stock Exchange, *İktisat İşletme ve Finans* 19.

Karolyi, G., 2002. Did the Asian financial crisis scare foreign investors out of Japan?, *Pacific-Basin Finance Journal* 10, 411-442.

Karpoff, J., 1987. The relation between price changes and trading volume: A survey, *Journal of Financial and quantitative Analysis*, 109-126.

Ke, B., and S. Ramalingegowda, 2005. Do institutional investors exploit the post-earnings announcement drift? *Journal of Accounting and Economics* 39, 25-53.

Kim, E., and V. Singal, 1997. Are Open Markets Good for Foreign Investors and Emerging Nations? *Journal of Applied Corporate Finance* 10, 18-32.

Kim, K., and J. Nofsinger, 2003. The behavior and performance of individual investors in Japan, *Pacific Basin Finance Journal* 11, 1-22.

Kim, O., and R. Verrecchia, 1997. Pre-announcement and event-period private information, *Journal of Accounting and Economics* 24, 395-419.

Kim, S., 1999. Do macro-economic news announcements a ect the volatility of foreign exchange rates? Some evidence from Australia, *Applied Economics* 31, 1511-1521.

Kim, S., and F. In, 2002. The influence of foreign stock markets and macroeconomic news announcements on Australian financial markets, *Pacific-Basin Finance Journal* 10, 571-582.

Kim, S., M. McKenzie, and R. Faff, 2004. Macroeconomic news announcements and the role of expectations: evidence for US bond, stock and foreign exchange markets, *Journal of Multinational Financial Management* 14, 217-232.

Kim, S., and J. Sheen, 2000. International linkages and macroeconomic news effects on interest rate volatility—Australia and the US, *Pacific-Basin Finance Journal* 8, 85-113.

Kim, W., and S. Wei, 1999. Offshore investment funds: monsters in emerging markets?, *NBER Working Paper*.

Kim, W., and S. Wei, 2002. Foreign portfolio investors before and during a crisis, *Journal of International Economics* 56, 77-96.

Kleibergen, F., and R. Paap. 2006. Generalized reduced rank tests using the singular value decomposition, *Journal of Econome*trics 127(1): 97–126.

Klein, A., and J. Rosenfeld, 1987. The influence of market conditions on event-study residuals, *The Journal of Financial and Quantitative Analysis* 22, 345-351.

Ko, K., K. Kim, and S. Cho, 2004. Performance of institutional and foreign investors in the Japanese and Korean stock markets, Unpublished working paper, Korea Securities Research Institute, Seoul, Korea.

Ko, K., K. Kim, and S. Cho, 2007. Characteristics and performance of institutional and foreign investors in Japanese and Korean stock markets, *Journal of the Japanese and International Economies* 21, 195-213.

Kodres, L., and M. Pritsker, 2002. A rational expectations model of financial contagion, *The Journal of Finance* 57, 769-799.

Kothari, S., J. Lewellen, and J. Warner, 2006. Stock returns, aggregate earnings surprises, and behavioral finance, *Journal of Financial Economics* 79, 537-568.

Kumar, A., and C. Lee, 2006. Retail investor sentiment and return comovements, *Journal of finance,* 61, 2451.

Kutan, A., and T. Aksoy, 2004. Public Information Arrival and Emerging Markets Returns and Volatility, *Multinational Finance Journal* 8, 227–245.

Kyle, A., 1985. Continuous auctions and insider trading, *Econometrica* 53, 1315-1335.
Kyrolainen, P., and J. Perttunen, 2003. Investors' Activity and Trading Behaviour, SSRN working paper, http://ssrn.com/abstract=302685.

Lai, H., and C. Chao, 2009. On the effect of public announcements in the trading patterns of investors: Evidence of Taiwan, SSRN working paper, http://ssrn.com/abstract=1459038.

Lakonishok, J., A. Shleifer, and R. W. Vishny, 1994. Contrarian investment, extrapolation, and risk *journal of finance* 49, 1541-1578.

Lee, B., W. Li, and S. Wang, 2009. The dynamics of individual and institutional trading on the Shanghai Stock Exchange, *Pacific-Basin Finance Journal*.

Lee, B., W. Li, and S. Wang, 2009. The dynamics of individual and institutional trading on the Shanghai Stock Exchange, *Pacific-Basin Finance Journal*.

Lee, C., 1992. Earnings news and small traders, *Journal of Accounting and Economics* 15, 265-302.

Lee, Y., J. Lin, and Y. Liu, 1999. Trading patterns of big versus small players in an emerging market: An empirical analysis, *Journal of Banking and Finance* 23, 701-725.

Lehmann, E.L., 1986. Testing Statistical Hypotheses, New York: Wiley.

Li, L., and Z. Hu, 1998. Response of the Stock Market to Macroeconomic Announcements Across Economic States, SSRN working paper, http://ssrn.com/abstract=882366.

Li, W., G. Rhee, and S. Wang, 2009. Differences in herding: Individual vs. institutional investors in china, SSRN working paper, http://ssrn.com/abstract=1342209.

Lin, A., 2006. Has the Asian crisis changed the role of foreign investors in emerging equity markets: Taiwan's experience, *International Review of Economics and Finance* 15, 364-382.

Lin, A., and C. Chen, 2006. The Impact of Qualified Foreign Institutional Investors on Taiwan’s Stock Market, *Web Journal of Chinese Management Review* 9, 1.
Lin, A., and P. Swanson, 2003. The Behavior and Performance of Foreign Investors in Emerging Equity Markets: Evidence from Taiwan, *International Review of Finance* 4, 189-210.

Lin, A., and P. Swanson, 2008. Foreigners’ perceptions of US markets: Do foreigners exhibit herding tendencies?, *Journal of Economics and Business* 60, 179-203.

Locke, P., and S. Mann, 2000. Do professional traders exhibit loss realization aversion, working paper, The George Washington University

MacKinlay, A., 1997. Event studies in economics and finance, *Journal of Economic Literature* 35, 13-39.

Malmendier, U., and D. Shanthikumar, 2007. Are small investors naive about incentives?, *Journal of Financial Economics* 85, 457-489.

MÄNTTÄRI, H., 2005. Short-Term Price Behaviour and the Effect of Foreign Investors in Finnish Equity Markets (Helsingfors).

McGuire, P., and M. Schrijvers, 2003. Common factors in emerging market spreads, *BIS Quarterly Review*, 65–78.

McQueen, G., and V. Roley, 1993. Stock prices, news, and business conditions, *The Review of Financial Studies* 6, 683-707.

Menkhoff, L., and M. Frenkel. Are Foreign Institutional Investors Good for Emerging Markets?

Min, H., D. Lee, C. Nam, M. Park, and S. Nam, 2003. Determinants of emerging-market bond spreads: Cross-country evidence, *Global Finance Journal* 14, 271-286.

Mitchell, M., and J. Mulherin, 1994. The impact of public information on the stock market, *journal of finance*, 923-950.

Mody, A., M. Taylor, and J. Kim, 2001. Modelling fundamentals for forecasting capital flows to emerging markets, *International Journal of Finance & Economics* 6, 201-216.

Ng, L., and F. Wu, 2007. The trading behavior of institutions and individuals in Chinese equity markets, *Journal of Banking and Finance* 31, 2695-2710.

Nikkinen, J., M. Omran, P. Sahlström, and J. Äijö, 2006. Global stock market reactions to scheduled US macroeconomic news announcements, *Global Finance Journal* 17, 92-104.

Nikkinen, J., and P. Sahlström, 2004. Scheduled domestic and US macroeconomic news and stock valuation in Europe, *Journal of Multinational Financial Management* 14, 201-215.

Nofsinger, J., 2001. The impact of public information on investors, *Journal of Banking & Finance* 25, 1339-1366.

Nofsinger, J., and R. Sias, 1999. Herding and feedback trading by institutional and individual investors, *The Journal of Finance* 54, 2263-2295.

Odabasi, A., 1998. Security returns' reactions to earnings announcements: a case study on the Istanbul Stock Exchange, *Review of Social, Economic and Administrative Studies* 12, 3-19.

Odean, T., 1998. Are investors reluctant to realize their losses?, *The Journal of Finance* 53, 1775-1798.

Oh, N., and J. Parwada, 2007. Relations between mutual fund flows and stock market returns in Korea, *Journal of International Financial Markets, Institutions & Money* 17, 140-151.

Oh, N., J. Parwada, and T. Walter, 2008. Investors' trading behavior and performance: online versus non-online equity trading in Korea, *Pacific-Basin Finance Journal* 16, 26-43.

Pagan, A. R., and D. Hall. 1983. Diagnostic tests as residual analysis, *Econometric Reviews* 2(2): 159–218.

Park, Y., and I. Park, 2003. Who Destabilized the Korean Stock Market?, *International Capital Flows in Calm and Turbulent Times: The Need for New International Architecture*, 195.

Patell, J., and M. Wolfson, 1984. The intraday speed of adjustment of stock prices to earnings and dividend announcements* 1, *Journal of Financial Economics* 13, 223-252.

Pavabutr, P., and H. Yan, 2007. The impact of foreign portfolio flows on emerging market volatility: evidence from Thailand, *Australian Journal of Management* 32, 345.

Pearce, D., and V. Roley, 1985. Stock prices and economic news, *Journal of Business*, 49-67.

Peress, J., 2008. Media coverage and Investors' Attention to Earnings Announcements, Working paper, London School of Economics.

Pfleiderer, P., 1984. The volume of trade and the variability of prices: A framework for analysis in noisy rational expectations equilibria, *Manuscript, Graduate School of Business Stanford University*.

Phylaktis, K., 2006. Emerging markets finance: Overview of the special issue, *Journal of International Money and Finance* 25, 349-357.

Pirinsky, C., 2001. The investment performance and trading behaviour of institutional investors (The Ohio State University).

Portes, R., and H. Rey, 2005. The determinants of cross-border equity flows, *Journal of International Economics* 65, 269-296.

Portes, R., and H. Rey, 2005. The determinants of cross-border equity flows, *Journal of International Economics* 65, 269-296.

Ramchander, S., M. Simpson, and M. Chaudhry, 2005. The influence of macroeconomic news on term and quality spreads, *Quarterly Review of Economics and Finance* 45, 84-102.

Ramchander, S., M. Simpson, and H. Thiewes, 2008. The effect of macroeconomic news on German closed-end funds, *Quarterly Review of Economics and Finance* 48, 708-724.

Ramnath, S., 2002. Investor and analyst reactions to earnings announcements of related firms: An empirical analysis, *Journal of Accounting Research* 40, 1351-1376.

Returns, E., 2010. Herding by Foreign Investors and Emerging Market Equity Returns: Evidence from Korea, Working paper.

Richards, A., 2005. Big fish in small ponds: The trading behavior and price impact of foreign investors in Asian emerging equity markets, *Journal of Financial and quantitative Analysis* 40, 1–27.

Robitaille, P., and J. Roush, 2005. How do Brazilian Yield Spreads and Stock Prices Respond to FOMC Actions and US Macroeconomic Data Announcements (Mimeo, Board of Governors of the Federal Reserve System).

Robitaille, P., and J. Roush, 2006. How do FOMC actions and US macroeconomic data announcements move Brazilian sovereign yield spreads and stock prices?, *International Finance Discussion Papers* 868.

ROC, R., 2008. Foreigner Investors and Stock Volatility: Evidence from Taiwan, *Information and Management* 19, 315-328.

Rozada, M., and E. L. Yeyati, 2008. Global Factors and Emerging Market Spreads, *The Economic Journal* 118, 533.

Rubinstein, A., 1993. On price recognition and computational complexity in a monopolistic model, *The Journal of Political Economy* 101, 473-484.

Sack, B., and E. Swanson, 2005. The sensitivity of long-term interest rates to economic news: Evidence and implications for macroeconomic models, *The American Economic Review* 95, 425-436.

Samal, K., 1997. Emerging Equity Market in India: Role of Foreign Institutional Investors, *Economic and Political Weekly*, 2729-2732.

Schmitz, P., 2007. Market and individual investors reactions to corporate news in the media, SSRN working paper, http://ssrn.com/abstract=1004488.

Schuppli, M., and M. Bohl, 2009. Do foreign institutional investors destabilize China's A-share markets?, *Journal of International Financial Markets, Institutions and Money*.

Seasholes, M., 2000. Smart foreign traders in emerging markets, unpublished Harvard Business School working paper.

Shanthikumar, D., 2003. Small trader reactions to consecutive earnings surprises, *Working paper*.

Shapira, Z., and I. Venezia, 1998. Patterns of behavior of professionally managed and independent investors, Working paper series-Newyork university, Salamon centers.

Shapira, Z., and I. Venezia, 2001. Patterns of behavior of professionally managed and independent investors, *Journal of Banking and Finance* 25, 1573-1587.

Shefrin, H., and M. Statman, 1985. The disposition to sell winners too early and ride losers too long: Theory and evidence, *The Journal of Finance* 40, 777-790.

Shu, T., 2008. Does Positive-Feedback Trading by Institutions Contribute to Stock Return Momentum?, SSRN working paper, http://ssrn.com/abstract=831364.

Simpson, M., and S. Ramchander, 2004. An examination of the impact of macroeconomic news on the spot and futures treasuries markets, *Journal of Futures Markets* 24, 453-478.

Sims, C., 1980. Macroeconomics and reality, *Econometrica* 48, 1-48.

Sims, C., and T. Zha, 1999. Error bands for impulse responses, *Econometrica* 67, 1113-1155.

Stock, J. H., J. H. Wright, and M. Yogo. 2002. A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments, *Journal of Business & Economic Statistics* 20(4), 518–29.

Stock, J. H., and M. Yogo. 2005. Testing for Weak Instruments in Linear IV Regression. In Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, ed. D.W. Andrews and J. H. Stock, 80–108. Cambridge University Press.

Stoffman, N., 2007. Who Trades With Whom? Individuals, Institutions, and Returns, SSRN working paper, http://ssrn.com/abstract=1029626.

Stulz, R., 1998. Equity Flows, Banks, and Asia, *NBER Reporter, Winter* 1999, 20-24.

Stulz, R., 1999. International portfolio flows and security markets, *National Bureau of Economic Research*.

Summers, L., 2000. International financial crises: causes, prevention, and cures, *The American Economic Review* 90, 1-16.

Swanson, P., and A. Lin, 2003. The role of US Investors in international equity market inflows, outflows, and net flows for selected emerging asian markets, *Journal of Economics and Finance* 27, 300-320.

Swanson, P., and A. Lin, 2005. Trading behavior and investment performance of US investors in global equity markets, *Journal of Multinational Financial Management* 15, 99-115.

Taechapiroontong, N., and P. Suecharoenkit, 2008. Trading performance of individual, institutional, and foreign investors: Evidence from the Stock Exchange of Thailand, SSRN working paper, http://ssrn.com/abstract=1254044.

Talpsepp, T., 2009. Reverse Disposition Effect of Foreign Investors, SSRN working paper, http://ssrn.com/abstract=1428405.

Tauchen, G., 1986. Statistical properties of generalized method-of-moments estimators of structural parameters obtained from financial market data, *Journal of Business & Economic Statistics* 4, 397-416.

Taylor, M., and L. Sarno, 1997. Capital flows to developing countries: long-and short-term determinants, *the world bank economic review* 11, 451.

Vega, C., 2006. Stock price reaction to public and private information, *Journal of Financial Economics* 82, 103-133.

Vieru, M., 2000. Essays on investors' trading policy around interim earnings announcements in a thinly traded securities market (University of Oulu).

Vieru, M., J. Perttunen, and H. Schadewitz, 2005. Impact of Investors' Trading Activity to Post-earnings Announcement Drift, SSRN working paper, http://ssrn.com/abstract=691163.

Vieru, M., J. Perttunen, and H. Schadewitz, 2006. How investors trade around interim earnings announcements, *Journal of Business Finance & Accounting* 33, 145-178.

Wang, J., 2007. Foreign equity trading and emerging market volatility: Evidence from Indonesia and Thailand, *Journal of Development Economics* 84, 798-811.

Wang, J., S. Australia, W. Meckling, and M. Jensen, 2000. Foreign trading and market volatility in Indonesia, SSRN working paper, http://ssrn.com/abstract=258773.

Warther, V., 1995. Aggregate mutual fund flows and security returns, *Journal of Financial Economics* 39, 209-235.

Welker, M., and H. Sparks, 2001. Individual, institutional, and specialist trade patterns before and after disclosure, *Journal of Financial Research* 24, 261.

Wermers, R., 1999. Mutual fund herding and the impact on stock prices, *The Journal of Finance* 54, 581-622.

Wongswan, J., 2003. Transmission of information across international equity markets, *working paper, Division of International Finance, Board of Governors of the Federal Reserve System*.

Wongswan, J., 2006. Transmission of information across international equity markets, *Review of Financial Studies* 19, 1157.

Wooldridge, J. M, 2002. Econometric Analysis of Cross Section and Panel Data. 1st ed. Cambridge, MA: MIT Press.

Wooldridge, J. M, 2003. Introductory Econometrics: A Modern Approach. 2nd ed. New York: Thomson Learning.

Yang, J., 2002. The information spillover between stock returns and institutional investors' trading behavior in Taiwan, *International Review of Financial Analysis* 11, 533-547.

Yuan, Y., 2007. Attention and trading, SSRN working paper, http://ssrn.com/abstract=1105532.

Zha, T., 1999. Block recursion and structural vector autoregressions, *Journal of Econometrics* 90, 291-316.

Ziliak, J., 1997. Efficient estimation with panel data when instruments are predetermined: an empirical comparison of moment-condition estimators, *Journal of Business & Economic Statistics* 15, 419-431.