THE ROLE OF FOREIGN INVESTORS IN THE ISTANBUL STOCK EXCHANGE

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ABSTRACT

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This master thesis examines the role of foreign investors in the Istanbul Stock Exchange in three dimensions: differences among sectors and subsectors in terms of foreign trading activity, the effect of November 2000 – February 2001 crisis on returns and foreign trading activity, and the relationship between return and foreign trading activity. Data used in this thesis covers 72 months between January 1997 and December 2002. Significant differences among sectors and subsectors in terms of foreign trading activity is found. On the other hand, there is no statistically significant difference in the mean values and variances of returns on the overall market, national sector and most subsector indices before and after the crisis period of November 2000 – February 2001. However, foreign trading activity has decreased in interest-sensitive and cyclical industries and increased in

defensive industries during the recession that follows the crisis. The relationship between return and net foreign trading volume relative to the total trading volume is statistically significant for the overall market and national sectors. Furthermore, we find that the effect of net foreign trading volume relative to the total trading volume on return is larger for stocks included in the ISE-30 index. The mean returns on stocks associated with negative NFV and positive NFV are statistically significantly different from each other. We further find that it is more likely to observe positive (negative) return on a stock when net foreign trading volume in that stock is positive (negative).

Keywords: Foreign Investors, Foreign Portfolio Investments, Foreign Trading Activity, Istanbul Stock Exchange, ISE

ÖZ

YABANCI YATIRIMCILARIN İSTANBUL MENKUL KIYMETLER BORSASI'NDAKİ ROLÜ

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Bu yüksek lisans tezi yabancı yatırımcıların İstanbul Menkul Kıymetler Borsası'ndaki rolünü üç değişik açıdan incelemektedir: sektörler arasında ve altsektörler arasında yabancı işlem yoğunluğu açısından farklılıklar, Kasım 2000 – Şubat 2001 krizinin getirilere ve yabancı işlem yoğunluğuna etkisi, ve getiri ile yabancı işlem yoğunluğu arasındaki ilişki. Bu tezde kullanılan veriler Ocak 1997 ve Aralık 2002 arasındaki 72 aylık süreyi kapsamaktadır. Yabancı işlem yoğunluğu açısından sektörler arasında ve altsektörler arasında istatistiki olarak anlamlı farklılıklar bulunmuştur. Diğer yandan, pazar endeksi, ulusal sektör endeksleri ve çoğu altsektör endeksi getirilerinin ortalama degerlerinde ve varyanslarında Kasım 2000 – Şubat 2001 krizi öncesi ve sonrası arasında istatistiki olarak anlamlı bir farklılık saptanmamıştır. Ancak, yabancı işlem

yoğunluğu krizi takip eden dönemde yaşanan ekonomik durgunluk sırasında faiz oranlarındaki değişikliklere karşı hassas olan endüstriler ve döngüsel endüstrilerde azalırken savunucu endüstrilerde artmıştır. Getiri ve net yabancı işlem yoğunluğunun toplam işlem yoğunluğuna oranı arasındaki ilişki pazar ve ulusal sektörler için istatistiki olarak anlamlıdır. Bunun yanında, net yabancı işlem yoğunluğunun toplam işlem yoğunluğuna oranının getiri üzerindeki etkisinin İMKB-30 endeksinde yer alan hisseler için daha büyük olduğu bulunmuştur. Negatif net yabancı işlemlerinin gerçekleştiği hisselerin getiri ortalaması ve pozitif net yabancı işlemlerinin gerçekleştiği hisselerin getiri ortalaması arasında istatistiki olarak anlamlı bir farklılık vardır. Bir hisse senedinde gerçekleşen yabancı işlemlerinin pozitif (negatif) olduğu durumda o hissenin getirisinin de pozitif (negatif) olmasının daha olası olduğu da bulunmuştur.

Anahtar kelimeler: Yabancı Yatırımcılar, Yabancı Portföy Yatırımları, Yabancı İşlem Yoğunluğu, İstanbul Menkul Kıymetler Borsası, İMKB

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CHAPTER 1

INTRODUCTION

The aim of this master thesis is to analyze the characteristics and the effects of transactions by foreign investors in the Istanbul Stock Exchange on three dimensions: the differences in terms of foreign trading activity among sectors and subsectors, the influence of February 2001 crisis on the foreign trading activity and the relationship between the level of foreign participation in the total trading activity and the returns. The Istanbul Stock Exchange is important for foreign investors because as an emerging market it provides diversification benefits to foreign investors. The foreign participation in the trading of stocks listed on the ISE is important for domestic investors, because foreign activity might influence the price level in the market and domestic investors' transaction decisions. Due to these reasons, the role of foreign participation in the Istanbul Stock Exchange is worth analyzing.

The liberalization movement affecting the overall Turkish economy in the 80s and 90s changed the structure and the regulation of financial markets in Turkey. One important reform was made possible by enacting the Decree No.32 in August 1989. This change in the regulations allowed overseas institutional and individual investors to invest in securities listed on the Istanbul Stock Exchange and

removed all restrictions on the repatriation of capital and profits by foreign investors. Equity investments by foreign investors have increased from $1,936 million in December 1995 to its historically highest level of $15,358 million in December 1999[1] while the market capitalization of the ISE has increased from $20,782 million in 1995 to $114,281 million in 1999[2]. Hence, foreign holdings of Turkish stocks have increased from 9.3% of the market capitalization of the Istanbul Stock Exchange in December 1995 to 13.4% in December 1999.

The liberalization of the Istanbul Stock Exchange has been an important development for both foreign and domestic investors. For foreign investors, the Istanbul Stock Exchange emerged as a new investment alternative that allowed them to benefit from diversification and valuation gaps. Sarkar and Li (2002) find that investing in developed markets provide international investors with less diversification benefits than investing in emerging market stocks. The average cross-country correlation between 17 developed markets is 41 percent (Harvey, 1991). On the other hand, the overall average correlation between emerging markets and developed markets is only 14 percent and ranges between –9 percent for Venezuela and 44 percent for Malaysia (Harvey, 1995). On the other hand, the average cross-correlation between the Turkish market and developed markets is 10 percent. Therefore, including Turkish stocks in internationally diversified portfolios might provide a higher reduction in risk than including stocks traded in major foreign developed markets.

[1] ISE web site, Foreign Portfolio Investments in Turkey, http://www.ise.org/foreign/portfolio.htm, viewed on 15 April 2003.
[2] ISE web site, ISE Monthly Bulletin, February 2002, http://www.imkb.gov.tr/aylikbulten/subatbulten.htm, viewed on 29 April 2003

In addition to diversification benefits, investing in foreign stocks that are undervalued relative to domestic stocks during certain time periods can mean higher return opportunities. According to Karabıyık (1998), the stock markets of developing countries are less efficient than those of developed countries and the prices of assets traded in inefficient markets may not reflect the risk-return characteristics appropriate for those assets. Therefore, the probability of finding undervalued stocks might be higher in emerging markets than in developed markets.

Bank Credit Analyst Group's December 2002 special report called "Emerging Markets Strategy" states that in December 2002 emerging markets were up to 40% undervalued, with a price-to-book value ratio of only 1.5 (22% below the historical norm and 45% cheaper than the U.S. equities). Merrill Lynch's October 2001 report called "Istanbullettin: The Market is Talking, is the IMF Listening?" makes suggestions about buying some Turkish stocks due to their extremely depressed values. In Semi-Annual Report 2002 of Pictet Funds that held Turkish stocks as 3.3% and 13.6% of the total asset sizes of its Global Emerging Market Fund and Eastern European Fund respectively by June 2002, it is stated, "Turkish stocks are extremely cheap and if we were not already overweight we would be buying industrials aggressively" (pp. 4). The Istanbul Stock Exchange with no time restrictions on buying and selling of Turkish stocks by foreign investors allows them to profit from such valuation gaps when available.

The foreign investor activity in the Istanbul Stock Exchange might be influencing domestic investors' investment decisions. It is shown that rumors of purchases by foreigners affect the prices of stocks listed on the ISE (Kıymaz, 2001). This reaction of the market might be based on the way market participants perceive the facts about the total asset size of the foreign investors' portfolios and the size of the market. The total capitalization of the Istanbul Stock Exchange is low compared to the total capitalization of the developed foreign markets and most of the emerging markets. In the year 1999, when its total capitalization peaked at $114 billion in value, the ISE was ranked sixth among the nine major emerging markets (Argentina, Brazil, Chile, Mexico, South Korea, Thailand, Hong Kong, Singapore and Turkey) according to market capitalization values provided by Sarkar and Lee (2002). Since the market capitalization of ISE is relatively low, the foreign institutional investors such as mutual and pension funds that manage very large amount of assets and that can quickly include Turkish stocks in or exclude them from their portfolios might influence the stock prices if they do this by bringing or taking out large amounts of money at the same time[3].

Kwan and Reyes (1997) list "an increased susceptibility to speculation and economic or political storms abroad" (p.511) as a difficulty that liberalized stock markets face. The authors suggest that this "makes the country vulnerable to international capital flight where large chunks of funds can rush in and out of the

[3] Based on the booklet "Private Capital Flows to Developing Countries" by World Bank and Lipper Analytical Services data, Hargis(1998) states that the international investments by pension funds worldwide amount to $790 billion in 1994, and there are 1,254 funds dedicated to emerging markets with $109 billion in assets in 1995 while there were only 26 of them with $1.8 billion in assets in 1986. Based on these numbers, it can be concluded that the funds invested in emerging markets are growing at a fast rate.

economy for reasons not linked to its own performance or policies." (p. 512). Choe et al. (1999) find evidence of foreign investors engaging in positive feedback trading and herding in the Korean stock market. Since the Istanbul Stock Exchange is also an emerging market like the Korean stock market, herding behavior of foreign investors might prevail and foreign investors by mimicking each other's behavior may bring in and take out large amounts of money at the same time influencing the price level of stocks listed on the ISE.

Another reason why domestic investors follow foreign investors' trading activities might be based on the informational asymmetry between foreign and domestic investors. Research by Frankel and Schmukler (1996, 2000) finds that there are informational asymmetries between foreign and domestic investors investing in the same market and argue that domestic investors have more information about domestic assets than foreign investors do. Based on their differing information sets, domestic and foreign investors who invest in the same market might tend to follow different trading patterns. The Turkish media frequently informs domestic investors about foreign trading activity in the ISE securities. The economy pages of major newspapers often publish articles informing the public about the foreign investor activity and the major investment assistance portals such as www.analiz.com include database query systems that aid investors in following transactions by foreign investors. The media coverage of foreign investor activity might be leading domestic investors in Turkey to believe that foreign investors can affect the market trends.

Given the importance of the Istanbul Stock Exchange as an emerging market for foreign investors and the possible impact of foreign investor activity on the trading activity of domestic investors and the general level of the market, the role of foreign participation in the Istanbul Stock Exchange is worth analyzing. The outline of the remaining chapters of this master thesis is as follows: In chapter 2, a literature review examining the phenomenon of foreign portfolio investment is given. In the following chapter, the properties of data used in the analysis are described. The methods used in analyses are explained in Chapter 4. The results of empirical analyses are presented in Chapter 5. Finally, conclusions based on empirical analyses are presented in the last chapter of this master thesis.

CHAPTER 2

LITERATURE REVIEW

Foreign portfolio investment is a phenomenon that has been researched in many dimensions. Some authors investigate its effect on the development of financial markets and the effect of liberalization on the volatility of stock returns, while others evaluate the subject from the foreign portfolio investors' point of view examining benefits from international diversification and the effects of the integration of world markets on the level of diversification benefits. In addition, there are studies investigating the foreign portfolio investments' impact on a single emerging market (foreign investors' trading patterns, the destabilizing effect of foreign trading activity and informational effects of foreign investor transactions on the market) or analyzing the characteristics and the change in the level of foreign portfolio investment in a stock market. There is also research related to the methodology used in this master thesis. Literature review is presented in following sections according to research subject.

2.1 The effect of liberalization on stock market and economic development

Liberalization of emerging markets attracts foreign portfolio investors and these investors might contribute to the development of such markets. Stulz (1999) argues that liberalization of the securities market in a country has four consequences: foreign investors buy domestic securities, valuations of domestic

assets increase, cost of capital falls and growth rate of the economy increases. Stulz (1999) summarizes research that evaluates these consequences. The research findings summarized in this subsection are based on Stulz (1999). Kim and Signal (1993, as referenced in Stulz (1999)) report that net capital flows are negative for a short period after liberalization and following that short period net capital flows turn positive and become large. However, net capital inflows to liberalized emerging markets may not happen as rapidly as expected due to home bias that prevent investors from taking full advantage of international diversification. French and Poterba (1991, as referenced in Stulz (1999)) demonstrate that holdings of foreign securities are small within portfolios held by investors in developed countries. They suggest that this may be due to the fact that investors rationally or irrationally expect to have higher returns for securities traded in the markets of their home countries.

Stulz (1999) argues that net capital inflows indicating purchases of securities traded at the liberalized markets might push asset values up. Empirical research was conducted to see whether net capital inflows actually lead to an increase in values. The real value of emerging market equity has increased by 202 percent from December 1984 to December 1994 whereas the S&P 500 increased by only 93.5 percent over the same time period. However, the valuations might be due to not only the net capital inflows from foreign investors but also other factors such as improvements in macroeconomic conditions that stock market performance depends on (Stulz, 1999). Henry (1997a, as referenced in Stulz (1999)) measures the increase in stock market valuation due to liberalization in twelve emerging

markets by controlling for other factors such as macroeconomic conditions and important economic events that affect these economies. The author finds that initial and subsequent liberalizations in these markets cause on average a 37 percent increase in stock market values after adjusting for world market equity returns.

The effect of increase in asset values on the cost of capital due to liberalization of emerging markets is also examined in empirical studies. Bekaert and Harvey (1997, as referenced in Stulz (1999)) suggest that the ratio of dividends distributed to the share price is a good proxy for the cost of capital. In order to determine the effect of liberalization on the cost of capital they investigate how this proxy changes as the country liberalizes. They find that liberalization decreases the cost of capital by a small amount. Stulz (1999) argues that the small impact of liberalization on the cost of capital may be due to home bias that limits the net capital inflows to emerging markets following the liberalization of these markets.

The fall in the cost of capital should lead to economic growth, as investment projects that are not profitable before liberalization are now profitable due to lower cost of capital. Henry (1997b, as referenced in Stulz (1999)) presents evidence on this. He shows that an increase of 23 percent in private investment occurs in the year following the liberalization and an increase of 24 percent occurs the year after that. As a result of the empirical findings mentioned above, Stulz (1999) concludes that international portfolio flows has a beneficial effect on

countries that liberalize their markets, because permanent positive effects occur on valuations and cost of capital falls.

Hargis (1998) examines the effect of liberalization on Latin American stock markets. The author argues that opening of these markets to foreign investors will make them more liquid due to greater participation. Furthermore, diversification benefits within the market increase as new companies will be willing to issue securities in a market with more participants. Taking the increases in market capitalization, volume of trading and turnover ratio as indicators of stock market development, this study concludes that liberalization of Latin American stock markets led to their development. The author also finds a sharp increase in the price-to-earnings ratios of stocks traded in Latin American stock markets after liberalization of these markets.

2.2 The effect of liberalization on the volatility of stock markets

There are studies examining the effect of liberalization on the volatility of stock markets. Stulz (1999) summarizes empirical evidence on volatility of stock returns and liberalization. His summary of this line of research and other studies are presented in this subsection. Different approaches were used by different authors to examine this issue. Kim and Signal (1993, as referenced in Stulz (1999)) examine if volatility has changed after liberalization for a sample of 16 emerging markets. They conclude that there does not exist a statistically significant difference between the volatility of stock returns during the 12 months prior to liberalization and the volatility of stock returns during the first 12 months

following liberalization. They find that after the first 12 months average volatility falls significantly. However, they also show that 3 countries (Argentina, Chile and Mexico) in their sample experience significant increases in their stock market volatility during the first 12 months following the liberalizations of their markets. Richards (1996, as referenced in Stulz (1999)) uses weekly data to estimate volatility in emerging markets and concludes that "the period 1992-1995, which saw foreign institutional investors playing a more significant role in emerging markets, has been characterized by volatility that is marginally lower than the remainder of the sample period (1975 to 1992)." (p.473).

Bekaert and Harvey (1997, as referenced in Stulz (1999)) examine stock market volatility before and after liberalization in 20 emerging markets including Turkey. They find that on average liberalization causes a decrease in volatility. For all emerging markets in their sample, they compute the ratio of average conditional variance of returns two years after liberalization to average conditional variance of return two years before liberalization. They suggest that if no effect on volatility has occurred, the ratios calculated for emerging markets should be equal to or close to 1. They find that only Pakistan's conditional volatility has largely increased whereas the volatilities for Brazil, Mexico, Taiwan and Portugal have dramatically decreased. The ratio of conditional volatility after liberalization to conditional volatility before liberalization for the remaining countries including Turkey is close to 1 meaning that liberalization did not significantly change the volatility of these markets. Based on the evidence provided by studies that are

summarized above, Stulz (1999) concludes that empirical evidence does not support the claim that liberalization increases volatility.

A study that is conducted for Taiwan stock market also supports the conclusion of Stulz (1999). Kwan and Reyes (1997) analyze the impact of stock market liberalization on the return and volatility of the Taiwan Weighted Index. GARCH methodology is used to investigate the distribution of weekly stock returns in a time window of eight years surrounding the month that liberalization measures are in effect (January 1991). The findings of this study suggest that the liberalization measures in Taiwan change the dynamics of stock returns. After the liberalization of the stock market, volatility of stock returns decreases, efficiency in processing information improves, and the impact of recent news on current stock prices increases whereas the lingering effect of old news decreases in the Taiwan stock exchange.

Hargis (1998) examines the effect of liberalization on Latin American stock markets. The author finds a decrease in the monthly standard deviation of the market indices after liberalization of these markets. This finding indicates that liberalization decrease the volatility of Latin American stock markets and is consistent with the findings of Kwan and Reyes (1997) for the Taiwanese stock market.

Yüce (1997) examines if the Decree No32 (August 1989) that removed all restrictions on the foreign investment in stocks quoted on the Istanbul Stock

Exchange has affected the distributional characteristics of Turkish stock returns. The study compares two periods: the period before liberalization (January 1988 to August 1989) and the period after liberalization (August 1989 to July 1992). The important findings of this study are that the return series do not have a normal distribution in both of these time periods, and there is no statistically significant change in average stock returns. However, the return variances of most stocks have significantly changed after the liberalization of the Istanbul Stock Exchange. In this study, it is reported that the average standard deviation of stock returns in the period after the opening up of the ISE to foreign investors is higher than that in the period before. It might be concluded that the foreign activity destabilized the Istanbul Stock Exchange. The findings of this study are contrary to the findings of Bekaert and Harvey (1997). This contradiction might be due to differences in time periods covered and/or methodologies used in these studies.

2.3 Diversification benefits provided to international investors by emerging markets

One of the reasons for foreign portfolio investors to be attracted to emerging markets is the benefit from international diversification. Sarkar and Li (2002) investigate the benefits of diversification for the U.S. investors investing in developed and emerging world markets taking into account the restriction on short selling in some markets. The study finds that benefits of investing in developed countries' markets are small to begin with and do disappear when short sales are banned, while investments in emerging market stocks continue to offer important diversification benefits even under a ban on short sales. The study further finds

that the integration of emerging markets with the world markets does decrease but not completely eliminate the diversification benefits of investing in emerging markets.

The diversification benefits of investing in a market decrease as the level of integration of the market with world markets increases. According to Akdeniz, Altay-Salih and Aydoğan (2000), "since opening up to foreign investors following the financial liberalization of the 1980s, the Turkish market has gone a long way towards integration with the global capital markets." (p. 23). The authors also discuss that most of the foreign investors are institutions that try to diversify internationally and follow similar indicators across different markets, contributing to the integration process. Nevertheless, Gökçen and Öztürkmen (1996) examine the level of integration of the Istanbul Stock Exchange with the world markets and conclude that the Istanbul Stock Exchange is completely segmented from the developed world markets. This study finds that the ISE returns can be explained by local factors, and the local factor that has the most explanatory power is the return of the previous month. However, the volatility of the ISE returns cannot be explained by world factors such as the return on a world index. As the changes in the ISE returns are independent of the changes in the returns of world markets, investing in the stocks listed on the ISE provides greater diversification benefits to international portfolio investors.

Another study supporting that the Istanbul Stock Exchange provides important diversification benefits to foreign investors is conducted by Meriç and Meriç

(1999) who investigates the co-movements of Turkish equity market with American and European equity markets. The study covers a period of 8 years between January 1989 and December 1996. The correlation coefficients between monthly U.S. dollar index returns of Turkish, the U.S. and twelve European markets (Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the U.K.) are calculated over this time period. The correlation coefficients of Turkish market with the twelve European markets are quite low with the exception of the Austrian market (r=0.39). Turkish market's correlation coefficients with Dutch and British equity markets are both equal to zero (r=0.00) and its correlation with the U.S. equity market is even negative (r=-0.13). In addition, average correlation coefficients for the fourteen equity markets are calculated by finding the average of each equity market's correlation coefficient with the remaining thirteen equity markets. Turkey has the lowest average correlation (r=0.09) among the fourteen countries. The results indicate that Turkey provides the best international diversification opportunities among the markets included in this study.

2.4 Trading patterns of foreign investors and destabilizing effect of foreign trading activity on stock markets

The trading patterns of foreign investors and the destabilizing effect of foreign trading activity has been another concern for researchers. Using daily or intraday data that include prices and trades by foreign and domestic investor groups, Choe, Kho and Stulz (1997) investigate the course of positive feedback trading and herding by foreign investors before and during the Korean crisis in 1997. The

authors calculate the proportion of foreign investors buying a stock on a given day among all foreign investors trading that stock on that day. Using this proportion they estimate a daily herding measure for each stock in their sample. Their herding measures indicate that foreign investors herd before the Korean crisis. In order to check if foreign investors engage in positive feedback trading, the authors examine the trading patterns of foreign investors following positive and negative market returns. They report evidence that foreign investors buy following a positive market return and sell following a negative market return. They conclude that foreign investors engage in positive feedback trading before the Korean crisis. However, they also report much weaker evidence of positive feedback trading and some evidence of herding being less important during the period of crisis.

In the same study, Choe, Kho and Stulz (1999) examine whether the foreign investor activity destabilizes prices in the Korean stock market. They suggest that destabilizing effect of foreign trading exists if large foreign trades are followed by additional price movements in the same direction as the price impact of the trades. Hence, they investigate price changes following large buy and sell transactions by foreign investors in the Korean market. They find that large buy and sell trades are accompanied by significantly positive and negative returns, respectively; in the periods these trades occur. However, neither significant positive returns are observed in the periods following large buy trades nor significant negative returns are observed in the periods following large sell trades. Based on this evidence, the authors conclude that foreign investor activity does not have a destabilizing effect on the Korean stock market.

In another study related to the Korean market, Kim and Wei (2002) examine foreign investors' trading patterns. The authors argue that heterogeneity among foreign investors should be taken into account and that lumping all foreign investors together to investigate their trading patterns can lead to misleading conclusions. Due to the characteristics of their data, Kim and Wei are able to divide foreign investors into four groups (resident institutional investors such as branches/subsidies of foreign institutions, non-resident institutional investors, resident individual investors and non-resident individual investors) and examine each group's trading pattern in comparison to others. The study finds that resident institutional and individual investors are less likely to engage in positive feedback trading and herding than their non-resident counterparts. The herding patterns confirm the informational asymmetry hypothesis suggesting that parties with more difficult access to information herd more. Hence, foreign investors who have informational disadvantage relative to domestic investors might move together and bring in or take out large amounts of money at the same time, thereby influencing the prices in the domestic market.

2.5 Foreign investor activity in the Istanbul Stock Exchange

Some aspects of foreign investor activity in the ISE are examined in the following studies. Kıymaz (2001) investigates the impact of various types of stock market rumors including rumors about foreign purchases on stock prices. For all rumors, he finds positive significant abnormal returns in each of the four days prior to the publication date and negative insignificant abnormal returns after the publication

of rumors. The author argues that the results suggest possible dissemination of information prior to the publication. In order to analyze the differences in stock price reactions with respect to the contents of rumors, the author classifies rumors into subgroups and documents that rumors about purchases by foreign investors and earning expectations generate greater impact on stock prices than other rumors. The positive significant abnormal returns related to purchases by foreign investors rumors might be a direct effect of purchases by foreign investors. However, this abnormal return might also be partly due to domestic investors following the information related to the transactions by foreign investors and buying stocks purchased by foreigners.

Yılmaz and Yılmaz (1999) examine the foreign investor participation in the Istanbul Stock Exchange. Since this study is quite relevant to the subject of this thesis, it will be reviewed in detail here. Firstly, the authors investigate the change in the level of net portfolio investments over a time period between January 1993 and September 1998 using monthly net portfolio investments data obtained from the Central Bank of Turkey's Balance of Payments. The authors report capital outflows after Turkish political crisis on February 28 1997 and Asian economic crisis in October 1997. The trend of capital outflows is reversed in the months following the end of each crisis and capital inflows are observed then. They also report that the distribution of foreign investments between Turkish fixed income securities and Turkish equities has started to shift largely in favor of fixed income securities since 1995 due to government's economic policies that resulted in high real interest rates.

Secondly, Yılmaz and Yılmaz (1999) examine the change in the level of foreign share in the total trading volume over a time period between January 1995 and September 1998. They report that the ratio of buy transactions to sell transactions is fairly stable around 1. However, in the 3-month period after the Asian economic crisis in October 1997 and in the second half of 1998 when the global economic slowdown starts, the same ratio is continuously less than 1. Therefore, in the Istanbul Stock Exchange, the sell transactions by foreigners exceed buy transactions by foreigners in periods of economic crisis that affect world economies.

The authors also investigate the contemporaneous change in the levels of foreign holdings of Turkish stocks and net foreign transactions over time. It is expected that increases (decreases) in the foreign holdings of Turkish stocks be accompanied by positive (negative) net foreign transactions. However, they observe that the change of these two variables over time does not follow the expected pattern. Based on this, they conclude that net foreign transactions in the ISE may be partly in the form of transfers between investor accounts and may not necessarily mean a significant inflow to or outflow from the market. When authors examine the share of transactions by foreigners in the total transaction volume of the market, they conclude that transactions by foreigners constitute a low share of the total transaction volume of the market compared to the level of foreign holdings of Turkish stocks. Thus, the authors conclude that the high transaction volume observed in the ISE is not due to the transactions by foreign

investors, because the average share of transactions by foreign investors in the total transaction volume of the ISE is quite low. The work of Yılmaz and Yılmaz (1999) further shows that the percentage of transactions by foreigners in the total trading volume decreases during periods of crisis.

Finally, Yılmaz and Yılmaz (1999) compare the foreign share in the total transaction volume of stocks included in the ISE-30 index and the foreign share in the total transaction volume of stocks not included in the ISE-30 index. They demonstrate that the average percentage share of the foreign investors' transactions in the total transaction volume is higher for stocks in the ISE-30 index than for all stocks in the market. Due to this, the authors suggest that foreign activity might be able to affect both the level and the volatility of the ISE-30 index.

2.6 Research related to the methodology of this master thesis

In addition to the studies mentioned above, there is a line of research related to the methodology used in this master thesis. As will be explained in detail in the following chapters, the relationship between returns and the share of foreign trading volume in the total trading volume is examined in this thesis. This relationship is based on the implication of a correlation between returns and trading volume. Previous research indicates a positive correlation between trading volume and the absolute value of price change in stock markets (Crouch, 1970; Epps and Epps, 1976; Westerfield, 1977; Wood, McInish and Ord, 1985; Harris, 1986). There are also research findings that imply a positive correlation between

trading volume and price change per se (Epps, 1977; Hanna, 1978; Smirlock and Starks, 1985; Jain and Joh, 1988; Harris, 1986)[4].

Epps (1975) suggest a theoretical framework that implies a relationship between volume and price change on individual transactions. The theoretical framework developed in this study is based on assumptions related to factors such as the demand function of individual investors, a model of investor behavior and implications about market behavior. The theory developed in this study implies that "number of shares exchanged on a transaction in which price rises exceeds the volume accompanying a price decline of the same magnitude." (p. 592). The ratio of trading volume to the absolute value of return is greater for transactions in which the price increases than for transactions in which the price decreases. In this study, the theoretical model is tested using a sample of 20 corporate bonds and the results support the theoretical proposition about the asymmetry in the relationship between volume of trading and price change.

Epps (1977) tests the same predicted relationship using a sample of 20 stocks randomly selected from all common stocks listed on the NYSE. The study demonstrates that volume per unit of price change is larger for positive than for negative price changes for volumes and price changes measured over both individual transactions and trading days. The results of this study shows that the theoretical proposition about the asymmetry in the relationship between volume of trading and price change holds not only for bonds but also for stocks.

[4] Karpoff (1987) summarizes research on the relationship between price change and trading volume.

Güner (2001) suggests that the characteristics of volume-price change relationship observed in developed markets might not be same as the characteristics of volume-price change relationship observed in emerging markets. Thus, the author examines the relationship between volume and price change in the Istanbul Stock Exchange that is an emerging market. This study shows that both price change and absolute value of price change are positively correlated with trading volume and that positive price change is positively correlated with trading volume whereas negative price change is negatively correlated with trading volume. In addition, the trading volume associated with positive price change is higher than the trading volume associated with negative price change. This finding of this study is consistent with the findings of Epps (1977) and demonstrates that the asymmetry in the relationship of volume and returns based on the sign of price change also holds for the stocks listed on the Istanbul Stock Exchange.

In this master thesis, the relationship between foreign trading activity and returns is examined for the Istanbul Stock Exchange. The findings of Clark and Berko (1997) support the existence of such a relationship. The authors investigate the relationship between foreign investment fluctuations and market returns for securities listed on the Mexican stock exchange. They find a statistically significant correlation between monthly foreign purchases of Mexican stocks and the returns on these stocks. They report that a 1 percentage point increase in unexpected foreign inflows as a percentage of market capitalization is associated with a 13 percent increase in Mexican stock prices. The authors try to explain the

reason behind this correlation by doing tests to check the validity of some explanations such as base-broadening hypothesis, price pressures, correlations with other factors affecting returns, and positive feedback trading strategies followed by foreigners. They conclude that the available evidence is consistent with the base-broadening hypothesis proposing that permanent reductions in conditional expected returns result from the expansion of the investor base that causes an increase in risk sharing along with a decrease in the risk premium for country specific volatility.

This thesis examines the differences in the level of foreign trading activity among sectors, the effects of the February 2001 crisis on the level of foreign trading activity, and the relationship between foreign trading activity and returns. Different from the studies reviewed in this chapter, this thesis takes into account differences in foreign trading activity across sectors. In this sense, it is a new contribution to the literature regarding foreign portfolio investments. Breakdown of foreign investors' transactions across different sectors in terms of volume of trading in 2001 shows that 59% of the foreign volume of trading occurred in financial institutions stocks whereas the total market value of financial institutions stocks is 45.7% of the total capitalization of the Istanbul Stock Exchange in the same year[5]. Therefore, volume of trading by foreign investors does not seem to be distributed in proportion to the share of the total capitalization of each sector in the total market capitalization of the ISE. Hence, examining differences across sectors in terms of foreign trading activity may become even more important.

[5] ISE Web Site, ISE Annual Report, 2001, http://www.imkb.gov.tr/donemselbulten/yillikrapor.htm, viewed on 29 April 2003

In addition to examining the distribution of foreign trading activity among different sectors of the ISE, this thesis studies the impact of February 2001 crisis on risk-return trade off for the ISE and activities of foreign investors in this market. This issue has not been researched yet. This analysis might help us to understand the behavior of foreign investors in times of crisis. The relationship between return and the foreign trading volume relative to the total trading volume is also examined in this master thesis. To the knowledge of the author, the ratio of foreign trading volume to the total trading volume has not been used as a variable explaining stock returns. This analysis might help us see whether activities of foreign investors can affect returns on the ISE securities. Hence, this thesis is a valuable addition to the literature on foreign investor behavior and their role in determining return characteristics of an emerging market.

CHAPTER 3

DATA

Three data sets that are obtained for a period of 72 months from January 1997 to December 2002 are used in this thesis. The first data set is composed of returns on individual stocks and the ISE indices, the second data set contains variables that represent foreign trading activity in the Istanbul Stock Exchange and the third data set consists of total trading volume in the Istanbul Stock Exchange.

3.1 Returns on individual stocks and ISE indices

Prices of individual stocks and index levels that are obtained from the Istanbul Stock Exchange are used in order to calculate monthly returns. It is checked if prices and index levels contain irregularities that may result in wrong return values. Changes in the calculation methods of index levels could affect monthly returns on indices. However, the calculation method of none of the indices used in the analyses included in this thesis has changed during the time period covered[6]. In addition, stock prices are corrected for stock splits and dividends in order to eliminate the effect of stock splits and dividends on returns. The adjusted stock prices used in the calculation of returns provide us with correct return values.

The following formula is used while calculating individual stock returns:

$Return_t = (Price_t - Price_{t-1})/Price_{t-1}$

$Price_t$: The closing price of the stock at the end of month t

$Price_{t-1}$: The closing price of the stock at the end of month t-1

The following formula is used while calculating index returns:

$Return_t = (Index\ Level_t - Index\ Level_{t-1})/ Index\ Level_{t-1}$

$Index\ Level_t$: The index level at the end of month t

$Index\ Level_{t-1}$: The index level at the end of month t-1

3.2 Foreign Trading Volume Data

The total monthly transactions by foreign investors for each stock and the monthly balance of total equity investments by foreign investors in the ISE are available on the Istanbul Stock Exchange's web site[7]. The total monthly purchase and sell transactions completed by foreign investors in each stock are reported in terms of nominal, TL and USD values of these transactions. Variables that represent foreign trading volume relative to the total trading volume in the market is used in the analyses of this thesis. Since total trading volume is available only in TL values, TL values of foreign transactions are used in the analyses so that foreign trading volume values are comparable with total trading volume values.

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[6] ISE web site, IMKB Hisse Senetleri Piyasası Endeksleri, http://www.imkb.gov.tr/endeksler/hissex.htm, viewed on 30 July 2002

[7] ISE web site, Türkiye'ye Yönelik Portföy Yatırımları, http://www.imkb.gov.tr/yabanci/portfoy.htm, viewed on 12 February 2003

Since analyses conducted in this thesis include comparison of foreign trading activity across sectors and subsectors, foreign transactions that are reported for individual stocks has to be summed in order to find the total foreign transactions that took place in each sector and subsector. In the Istanbul Stock Exchange, there are 4 national sectors (industrials, services, financials and technology) and each sector has a number of subsectors. The lists of stocks that belong to sectors and subsectors are collected from "*Sectorial Breakdown of Basic Ratios of Companies Traded on the ISE"* tables available in the ISE monthly bulletins. The total monthly foreign transaction volumes for each sector or subsector are calculated by summing up the transaction volumes of each stock that belongs to that sector or subsector.

The analyses conducted in this thesis include a comparison of foreign trading activity in the stocks included in the ISE-30 index and foreign trading activity in the stocks not included in the ISE-30 index. The names of stocks that are included in the ISE-30 index over time is needed in order to obtain foreign trading and return values associated to them in months they are included in the index. The lists of stocks that are included in the ISE-30 index are collected from "*Weights of Stocks in ISE National-100, National-50 and National-30"* tables available in the ISE monthly bulletins. Since these tables are available in the ISE monthly bulletins starting from January 1999, data used in the analyses regarding the ISE-30 index covers a period of 48 months from January 1999 to December 2002.

3.3 Total trading volume data

Total trading volume includes all transactions regardless of which investors are involved in it. Therefore, total trading volume includes transactions conducted by both foreign and domestic investors and it is a measure of overall trading activity in the market. Daily total trading volume for each stock is obtained from the Istanbul Stock Exchange. Monthly total trading volume for each stock is calculated as a sum of daily total trading volumes that took place in the trading days of a given month. The monthly total trading volume for each sector or subsector are calculated by summing up the monthly total trading volume of each stock that belongs to that sector or subsector.

CHAPTER 4

METHODOLOGY

In the following subsections, methodologies used to examine the differences among sectors and subsectors in terms of foreign trading activity, the effect of November 2000 – February 2001 crisis on returns as well as foreign trading activity, and the relationship between return and foreign trading activity are summarized. Before going into the details of specific methodologies used in this master thesis, calculation of variables needed for the analyses is explained. Values for the following variables and ratios are calculated for the overall market, each sector, each subsector and individual stocks.

- Foreign Transactions Volume (FV) = Total monthly TL value of shares bought by foreign investors + Total monthly TL value of shares sold by foreign investors
- Net Foreign Transactions Volume (NFV) = Total monthly TL value of shares bought by foreign investors - Total monthly TL value of shares sold by foreign investors
- Total Transaction Volume (TV) = TL value of the total monthly transaction volume
- Ratio 1 = FV/TV

- Ratio 2 = NFV/TV

The ratios using these variables are calculated in order to be used in analyses for the following reason. Using ratios rather than the volume values in TL or USD enables us to draw more meaningful conclusions from statistical test results. The ratios indicate the level of foreign trading activity relative to the overall trading activity in the market. For example, knowing that $1 million foreign trading volume took place in Sector A has different meanings in cases where the overall trading volume (that includes both domestic and foreign investors' transactions) in that sector is $2 million or $10 million. The foreign participation in the overall trading level is 50% in the first case while it is only 10% in the second. It might be concluded that the foreign investors may have more influence on the determination of prices in the first case than in the second case. The comparison among sectors is also more meaningful when the ratios are used. Ratios demonstrate the share of transactions by foreign investors in each sector's total trading volume and allow us to draw conclusions for similarities and differences in terms of foreign interest among these sectors by taking into account the differences in the total trading volume of each.

Before carrying out the analyses of this thesis, level of monthly foreign holdings of Turkish stocks, FV/TV and NFV/TV is examined over time with the help of graphs. This examination allows us to evaluate the effects of major economic events on foreign trading activity. Furthermore, it helps us to observe the relationship between return and foreign trading activity. After these analyses,

three issues analyzed in this thesis are examined by using the techniques explained in the following subsections of this chapter.

4.1 The differences in foreign trading activity among sectors and subsectors

Correlation coefficients of ratios across sectors and subsectors are calculated in order to observe and compare the extent of correlation of foreign trading activity in different sectors and subsectors. Correlation coefficients of ratios belonging to 4 national sectors and correlation coefficients of ratios belonging to subsectors of each sector are calculated and examined separately. Based on the assumption that foreign investors make investment decisions according to fundamental analysis, it is expected that correlations among sectors and among subsectors in a sector in terms of both net and total foreign trading activity are statistically significant and positive if the economic indicators of these sectors and subsectors are similar during the period of analysis.

In addition, FV/TV and NFV/TV are examined to see whether the trading activity of foreign investors differs among sectors and subsectors. The equality of mean FV/TV and NFV/TV values belonging to each sector and subsector is tested using one-way ANOVA analysis. Ratios here are calculated by dividing sum of the total or net foreign transaction volume for all stocks in the sector or subsector at the time of transaction by sum of the total transaction volume for all stocks in the sector or subsector at the time of transaction. ANOVA analysis is used once for 4

national sectors and the following hypothesis is tested for FV/TV and NFV/TV values:

Hypothesis 1: The ratio does not differ among sectors.

H_0: $\mu_{F\ (sector\ 1)} = \mu_{F\ (sector\ 2)} = \mu_{F\ (sector\ 3)} = \mu_{F\ (sector\ 4)}$

H_a: The mean for at least one sector is different from the mean for other sectors

As the technology sector is younger than other national sectors, the test for 4 national sectors spans a shorter time period. Therefore, the same hypothesis is tested for only industrials, services and financial sectors once again for a period of 6 years. Therefore, this test might provide information regarding long-term differences among sectors in terms of foreign trading activity. Since the data used in the test for 4 national sectors and the data used in the test for 3 national sectors cover different time periods, two tests might provide different results.

Each of the 4 sectors has subsectors. ANOVA analysis is used four times separately for subsectors in each sector and the following hypothesis is tested for FV/TV and NFV/TV.

Hypothesis 2: The ratio does not differ among subsectors of each national sector. Each national sector has n subsectors.

H_0: $\mu_{F\ (subsector\ 1)} = \mu_{F\ (subsector\ 2)} = \mu_{F\ (subsector\ 3)} = \ldots\ldots\ldots = \mu_{F\ (subsector\ n)}$

H_a: The mean for at least one subsector is different from the mean for other subsectors

A post-hoc procedure that is chosen according to whether the assumption of equality of variances is valid is used to determine where the differences among sectors occur. Foreign investors might be following economic indicators of each sector and subsector, and making investments accordingly. Thus, the capital flows into or out of each sector and subsector might differ as long as the economic indicators of these sectors and subsectors also do. Therefore, it is expected that both of hypotheses 1 and 2 be rejected.

4.2 The influence of November 2000 – February 2001 crisis on return and foreign trading activity

A currency crisis whose first sign was observed in November 2000 occurred in February 2001 in Turkey. This currency crisis was followed by a contraction period in Turkey (Turkish economy contracted by 9.4% in 2001 according to State Institute of Statistics). Using a time window of 48 months (22 months before and 22 months after November 2000 – February 2001 crisis period), the change in the distributional characteristics of returns, FV/TV and NFV/TV is examined for each sector, subsector and the overall market. The first period includes the months between January 1999 and October 2000 while the second covers the months between March 2001 and December 2002. Economic crises might affect stock markets adversely. Therefore, it is expected that return on the market index and returns on most sector and subsector indices decrease after the crisis. In order to check for this, the following hypotheses are tested for the returns on all sector and subsector indices and the return on the market index:

Hypothesis 3: The mean return did not change after the crisis period. This hypothesis is tested for all sectors, all subsectors and the overall market.

H_0: $\mu_{R,1} = \mu_{R,2}$

H_a: $\mu_{R,1} \neq \mu_{R,2}$

$\mu_{R,1}$ is the mean value of return on the sector, subsector or market indices in the before-crisis period and $\mu_{R,2}$ the mean value of return on the sector, the subsector or the market index in the after-crisis period.

Hypothesis 4: The variance of the return did not change after the crisis period. This hypothesis is tested for all sectors, all subsectors and the overall market.

H_0: $\sigma^2_{R,1} = \sigma^2_{R,2}$

H_a: $\sigma^2_{R,1} \neq \sigma^2_{R,2}$

$\sigma^2_{R,1}$ is the variance of return on the sector, subsector or market index in the before-crisis period and $\sigma^2_{R,2}$ is the variance of return on the sector, subsector or market index in the after-crisis period.

After determining the change in risk-return characteristics of the ISE sectors and subsectors around the November 2000 – February 2001 crisis, changes in foreign trading activity are examined. A change in risk-return characteristics of a sector or subsector might justify a change in foreign trading activity in that sector or

subsector. However, if a change in foreign trading activity in a sector or a subsector is not accompanied by a change in the risk-return characteristics of that sector or subsector, there might be some other factors such as a change in the economic indicators of that sector or subsector or a change in political risk of the country causing a change in trading activity of foreign investors.

Furthermore, the trading patterns of foreign investors in a stock market might be affected by economic conditions of the country that the stock market is located in. Foreign interest in the ISE and certain sectors and subsectors in the ISE might have varied after the recent economic crisis in Turkey. In order to determine these changes in foreign interest, the following hypotheses are tested twice using FV/TV and NFV/TV for each sector and subsector. Ratios here are calculated by dividing sum of the total or net foreign transaction volume for all stocks in the sector or subsector at the time of transaction by sum of the total transaction volume for all stocks in the sector or subsector at the time of transaction.

Hypothesis 5: The mean of the ratio did not change after the crisis period for sector i or subsector j.

H_0: $\mu_{F,1} = \mu_{F,2}$ (for sector i or subsector j)

H_a: $\mu_{F,1} \neq \mu_{F,2}$ (for sector i or subsector j)

$\mu_{F,1}$ is the mean foreign trading activity ratio for a sector or a subsector before the crisis, whereas $\mu_{F,2}$ is the mean foreign trading activity ratio for the same sector or subsector after the crisis.

Hypothesis 6: The variance of the ratio did not change after the crisis period for sector i or subsector j.

H_0: $\sigma^2_{F,1} = \sigma^2_{F,2}$ (for sector i or subsector j)

H_a: $\sigma^2_{F,1} \neq \sigma^2_{F,2}$ (for sector i or subsector j)

$\sigma^2_{F,1}$ is the variance of the foreign trading activity ratio for a sector or a subsector before the crisis, whereas $\sigma^2_{F,2}$ is the variance of the foreign trading activity ratio for the same sector or subsector after the crisis.

Hypotheses 5 and 6 are also tested for the overall market using the total foreign transactions volume and total transaction volume that took place in the market to calculate ratios. The rejection of these null hypotheses will mean that the interest of foreign investors in that sector, subsector or the market has varied after the November 2000 - February 2001 crisis period. It is expected that the level of foreign trading activity in the market has decreased after the crisis, since foreign investors would be less interested in trading stocks listed on the stock market of a country whose economic risk has increased after a currency crisis.

Currency crises and contraction periods in economy affect different sectors in different ways. Since foreign investors might be making investment decisions based on fundamental analysis, it is expected that foreign trading activity change in sectors and subsectors that are expected to perform poorly or well during contraction periods. Foreign investors might less actively trade in the stocks of sectors and subsectors that are expected to perform poorly during contraction

periods, because they might choose to postpone their purchases or sales of these stocks if they already own them. Therefore, FV/TV might decrease and NFV/TV might not change in sectors or subsectors that are expected to perform poorly during crisis. However, if they chose to exit from such sectors or subsectors, the mean NFV/TV for these sectors or subsectors might decrease and even become negative. In this case, the mean FV/TV for these sectors might increase due to high level of selling by foreign investors. Furthermore, the mean FV/TV and the mean NFV/TV values of sectors or subsectors that are expected to perform well during contraction periods are expected to increase. Foreign investors might choose to buy these stocks causing an increase in NFV/TV of firms in such sectors. FV/TV in these sectors might also increase due to high level of buying by foreign investors.

4.3 The relationship between the level of foreign participation in total trading activity and the returns

4.3.1 The relationship between returns on the ISE-TUM and ISE national sector indices and foreign trading activity:

Linear regression is used to check if the level of foreign activity in total trading volume is a predictor of the returns on the ISE indices. Following regressions are run for this purpose:

$$|R| = b_o + b_1 * FV/TV \qquad (1)$$

|R| : The absolute value of the return on the ISE-TUM index

$$R = b_o + b_1 * NFV/TV \quad (2)$$

R : Return on the ISE-TUM index

In these regressions, the ratios are calculated using sum of the foreign transaction volume and sum of total volume for all stocks in the national market. The dependent variable is the return on the ISE-TUM index. ISE-TUM index is chosen, because it takes into account the change in the prices of all stocks in the national market. The absolute value of the return is used in the first regression, because FV/TV that is the independent variable of the same regression equation is always positive.

The following linear regressions are run in order to check if the level of foreign trading activity that takes place in each national sector can predict returns on national sector indices:

$$|R| = b_o + b_1 * FV/TV \quad (3)$$

|R| : The absolute value of return on one of the national sector indices

$$R = b_o + b_1 * NFV/TV \quad (4)$$

R : Return on one of the national sector indices

There are four national indices in the Istanbul Stock Exchange: ISE National-Industrials (XUSIN), ISE National-Financials (XUMAL), ISE National-Services

(XUHIZ) and ISE National-Technology (XUTEK). In the regressions above, the ratios are calculated using sum of the foreign transaction volume and sum of total volume for all stocks in each national index. The dependent variables are the returns on the national indices. The regressions are run for all national sectors except for XUTEK, because it starts in July 2000 and provides only 30 data points whereas other national indices exist since the beginning of our period of analysis and provide 72 data points each.

Research demonstrates that there exist a positive correlation between absolute value of price change and trading volume (Crouch, 1970; Epps and Epps, 1976; Westerfield, 1977; Wood, McInish and Ord, 1985; Harris, 1986) and a positive correlation between price change per se and trading volume in stock markets (Epps,1977; Hanna, 1978; Smirlock and Starks, 1985; Jain and Joh, 1988; Harris, 1986). Therefore, there might also be a positive correlation between absolute value of return and foreign trading activity and a positive correlation between return and net foreign trading activity. In addition, foreign investors' net transactions might be correlated with return for the following two reasons. Firstly, foreign investors might act like positive feedback traders and buy when prices increase and sell when prices decrease. Secondly, foreign investors might be powerful enough to influence prices and their net transactions might cause price changes. Therefore, in all of the regressions above (regressions numbered as 1,2,3 and 4), it is expected that the coefficient of the foreign trading activity ratio is positive.

The constants in these regressions predict return when no foreign transactions occurred in the market or the buy and sell transactions by foreigners are equal. Since there are other participants in the market, price changes will occur due to their transactions even if foreign investors have no transactions at that time. Therefore, the constant in these regressions are expected to be statistically significant. Their sign might be positive or negative according to the sign of average return during the time period analyzed in these regressions.

Market participants other than foreign investors might be following the changes in the level of foreign trading activity and make their investment decisions accordingly. Since market participants that invest in this manner might react to changes in the level of foreign transactions and affect prices in the market, a relationship between the change in the level of foreign trading volume and return is expected. An increase in foreign trading activity might be mostly in the form of buying (selling). In this case, market participants who follow foreign investor transactions buy (sell) stocks causing a higher increase (decrease) in prices. Therefore, a positive correlation between the change in the level of foreign trading activity and the absolute value of return is also expected. To check for this relationship, the following regression equation is estimated for the overall market:

$$/R/ = b_o + b_1 * D(FV/TV) \qquad (5)$$

|R| : The absolute value of the return on the ISE-TUM index

$D(FV/TV)_t = (FV/TV)_t - (FV/TV)_{t-1}$

The changes in net foreign trading activity might also be related to price changes. An increase in net foreign transactions in a given month means that the amount of shares bought by foreigners relative to the amount of shares sold by them has increased when compared to the purchases and sales by foreigners in the previous month and this is valid even if the net foreign transactions is negative in that month. When the difference between the total trading volumes of two consecutive months is small, an increase in net foreign transactions cause an increase in NFV/TV. Similarly, a decrease in net foreign transactions in a given month means that the amount of shares sold by foreigners relative to the amount of shares bought by them has increased when compared to the purchases and sales by foreigners in the previous month and this is valid even if the net foreign transactions is positive in that month. When the difference between the total trading volumes of consecutive months are small, a decrease in positive net foreign transactions cause a decrease in NFV/TV. Therefore, a positive correlation between the change in the level of NFV/TV and return is expected. The following regression is run for the overall market in order to check if the market return also responds to changes in the level of net foreign trading activity over time.

$$R = b_o + b_1 * D(NFV/TV) \qquad (6)$$

R : Return on the ISE-TUM index

$D(NFV/TV)_t = (NFV/TV)_t - (NFV/TV)_{t-1}$

In regressions numbered as 5 and 6, it is expected that the coefficients of the change in foreign trading activity ratios are positive since positive correlations between return variables and change in foreign trading activity variables are

expected for both regressions. The constants in these regressions predict return when no change in the level of total or net foreign trading activity occurs. They are expected to be statistically significant, since price changes will be observed even if no change in the level of total or net foreign trading activity takes place. Their signs might be positive or negative depending on the sign of average return in months with no change in foreign trading activity.

4.3.2 The effect of foreign trading activity on securities that are included and not included in the ISE-30 index:

Yılmaz and Yılmaz (1999) notice that the foreign investors' average share in the monthly transaction volume of the stocks in the ISE-30 index is higher than their average share in the total monthly transaction volume of all stocks in the national market. Based on this fact, the authors argue that the trading activity of foreign investors has a higher potential to affect the level of the ISE-30 index than the general level of the market. However, the authors reach this conclusion only by comparing the average level of foreign share in total trading volume and do not conduct a statistical significance test. In this thesis, the following hypothesis is tested to see if a statistically significant difference exists between the mean foreign share in the trading volume of stocks included in the ISE-30 index and the mean foreign share in the trading volume of stocks that are not included in the ISE-30 index:

Hypothesis 7: The average foreign share in the total trading volume of individual stocks included in the ISE-30 index does not differ from the average foreign share in the total trading volume of individual stocks that are not included in the ISE-30 index.

H_0: $\mu_{F,I} = \mu_{F,N}$

H_a: $\mu_{F,I} \neq \mu_{F,N}$

The hypothesis is tested separately for ratios FV/TV and NFV/TV. $\mu_{F,I}$ and $\mu_{F,N}$ represent the means of monthly ratios of foreign trading activity for individual stocks included in the ISE-30 index and those that are not included in the ISE-30 index, respectively. The time period that samples are collected covers 4 years from January 1999 to December 2000. The rejection of this hypothesis means that the share of foreign investor activity in the ISE-30 stocks differs from the share of foreign trading activity in the stocks that are not included in the ISE-30 index.

Stulz (1999) argues that foreign investors prefer investing in large-cap stocks since information related to them is more easily available. Since the ISE-30 index is formed of large-cap stocks with large trading volume, foreign investors might be more actively trading in them than stocks that are not included in the ISE-30 index on average. Therefore, it is expected that the hypothesis for FV/TV is rejected and the mean FV/TV for stocks included in the ISE-30 is higher than the mean FV/TV for stocks that are not included in the ISE-30 index.

The following regression is run in order to check if the foreign share in the total trading volume is more influential on the returns of stocks in the ISE-30 index than it is for all stocks in general.

$$/R_t/ = b_o + b_1 * FV/TV + b_2 * d_t + b_3 * d_t * FV/TV \qquad (7)$$

$|R_t|$: Absolute value of the monthly return on each stock

FV/TV: Foreign Transactions Volume / Total Volume (calculated monthly for each stock)

d_t : Dummy variable, having a value of 1 if the stock is included in the ISE-30 index in a given month and 0 otherwise

$$R_t = b_o + b_1 * NFV/TV + b_2 * d_t + b_3 * d_t * NFV/TV \qquad (8)$$

R_t : The monthly return on each stock

NFV/TV: Net Foreign Transactions / Total Volume (calculated monthly for each stock)

d_t : Dummy variable, having a value of 1 if the stock is included in the ISE-30 index in a given month and 0 otherwise

The dummy and interactive dummy variables are added to the regressions in order to check if the stocks included in the ISE-30 index are affected differently from the foreign activity. If the coefficients b_2 and b_3 turn out to be significant, it may be concluded that the foreign activity affects stocks included in the ISE-30 index differently from the way it affects the stocks that are not included in the ISE-30 index. In both of these regressions b_2 and b_3 coefficients are expected to have the

same signs with coefficients b_o and b_1 respectively. If the signs of b_2 and b_3 turn out to be as expected, it can be concluded that the effect of foreign trading on return is stronger for stocks that are included in the ISE-30 index. The sign of b_1 is expected to be positive for the same reason the coefficients of FV/TV and NFV/TV are expected to be positive in regressions numbered as 1,2,3 and 4.

4.3.3 The level of foreign trading and the returns:

Turkish media frequently publish news related to foreign investor transactions in the Istanbul Stock Exchange. Rumors about purchases by foreign investors are shown to have an impact on the stock prices (Kıymaz, 2001). This might imply that Turkish investors follow transactions by foreign investors and form their investment decisions accordingly. Domestic investors who follow transactions by foreigners might do so because they expect higher returns that may come as a result of buying by foreigners or they try to avoid losses that may come as a result of selling by foreigners. Therefore, it is worthwhile to check if a statistically meaningful difference between the returns of stocks that are most actively traded by foreign investors and the returns of stocks that are least actively traded by them exists.

In order to check for this, two equally weighted portfolios are formed of stocks that foreign investors have been the most and the least actively trading. The 6-month average of FV/TV for a stock is used as a criterion to measure the foreign activity since it reflects the level of foreign participation in the trading of the stock. These portfolios ($portfolio_H$ and $portfolio_{L,}$ where subscripts H and L

symbolize high and low foreign trading activity) are formed every 6 months by using the following method. The stocks are listed in descending order according to the average of FV/TV in the 6-month period and 30 stocks are selected from the top and bottom of the list for $portfolio_H$ and $portfolio_L$ respectively. The returns on these equally weighted portfolios are calculated over the same period that they are formed. The monthly returns of $portfolio_H$ and $portfolio_L$ are calculated for a time period of 6 years with the composition of the portfolios changing every 6 months. Monthly FV/TV values for each portfolio are calculated as averages of FV/TV values for individual stocks in a portfolio in a given month.

First it is checked if there is a significant difference between the returns on $portfolio_H$ and $portfolio_L$. The following hypothesis is tested:

> Hypothesis 8: The returns on $portfolio_H$ are different from the returns on $portfolio_L$.
>
> H_0: $\mu_{R,H} = \mu_{R,L}$
>
> H_a: $\mu_{R,H} \neq \mu_{R,L}$

$\mu_{R,H}$ is the mean return on $portfolio_H$ whereas $\mu_{R,L}$ is the mean return of $portfolio_L$. The rejection of the hypothesis means that the returns on stocks that are most actively traded by foreign investors are different from the returns on stocks that are least actively traded by them.

In order to see if foreign investor activity affects the returns on stocks that foreigners have been more active in trading differently than it affects the returns on stocks that they have been less active in trading, the following regression is analyzed. The monthly returns on each portfolio and the monthly values of FV/TV for each portfolio are dependent and independent variables respectively.

$$/R_t/ = b_o + b_1 * FV/TV + b_2 * d_t + b_3 * d_t * FV/TV \qquad (9)$$

$|R_t|$: Absolute value of the monthly return on a portfolio

FV/TV: Foreign Transactions / Total Volume (calculated monthly for each portfolio)

d_t : Dummy variable, having a value of 1 if the data point is associated with $portfolio_H$ and 0 otherwise

The dummy and interactive dummy variables are added to the model in order to check if $portfolio_H$ is affected differently from the foreign activity than $portfolio_L$. If the coefficients b_2 and b_3 turn out to be significant, it may be concluded that the foreign activity affects the returns on stocks that foreign investors have been most actively trading differently than the returns on those that they have been least actively trading. The coefficients b_2 and b_3 are expected to have the same signs with coefficients b_o and b_1, respectively. If the signs of b_2 and b_3 turn out to be as expected, it can be concluded that the effect of foreign trading on return is strengthened if a stock is more actively traded by foreign investors. The sign of b_1 is expected to be positive for the same reason the coefficients of FV/TV is expected to be positive in regressions numbered as 1 and 3.

Similar analyses are conducted by using NFV/TV as a foreign trading activity criterion to form portfolios. The 6-month average NFV/TV values for each stock are calculated and the stocks are listed in a descending order for each 6-month period. Two equally weighted portfolios are formed by selecting 30 stocks from the top and the bottom of the list. The portfolio that is formed of stocks from the top of the list contains only stocks that have on average positive NFV/TV values and is called portfolio_P. The portfolio that is formed of stocks from the bottom of the list contains only stocks that have on average negative NFV/TV values and is called portfolio_N. The monthly returns on portfolio_P and portfolio_N are calculated for a time period of 6 years with the composition of the portfolios changing every 6 months. The returns on these equally weighted portfolios are calculated over the same period that they are formed. Monthly NFV/TV values for each portfolio are calculated as averages of NFV/TV values for individual stocks in a portfolio in a given month.

First it is checked if there is a significant difference between the returns on portfolio_P and portfolio_N. The following hypothesis is tested:

Hypothesis 9: The returns on portfolio_P is different from the returns on portfolio_N.

H_0: $\mu_{R,P} = \mu_{R,N}$

H_a: $\mu_{R,P} \neq \mu_{R,N}$

$\mu_{R,P}$ is the mean return on portfolio$_P$ whereas $\mu_{R,N}$ is the mean return of portfolio$_N$ The rejection of the hypothesis means that the returns on stocks that have the largest positive NFV/TV values are different from the returns on stocks that have the largest negative NFV/TV in absolute value. The following regression is analyzed using the monthly return on each portfolio and the monthly values of NFV/TV for each portfolio as dependent and independent variables respectively.

$$R_t = b_o + b_1 * NFV/TV + b_2 * d_t + b_3 * d_t * NFV/TV \qquad (10)$$

R_t : monthly return on a portfolio

NFV/TV: Net Foreign Transactions / Total Volume (calculated monthly for each portfolio)

d_t : Dummy variable, having a value of 1 if the data point is associated with portfolio$_P$ and 0 otherwise

The dummy and interactive dummy variables are added to the model in order to check if portfolio$_N$ is affected differently from the foreign activity than portfolio$_P$. If the coefficients b_2 and b_3 turn out to be significant, it may be concluded that the positive net foreign trading volume affects the returns on stocks differently than negative net foreign trading volume does. The coefficients b_2 and b_3 are expected to have the same signs with coefficients b_o and b_1 respectively. If the signs of b_2 and b_3 turn out to be as expected, it can be concluded that the effect of net foreign trading on return is stronger if a stock has a large positive NFV/TV value. The sign of b_1 is expected to be positive for the same reason the coefficients of NFV/TV are expected to be positive in regressions number 2 and 4.

4.3.4 The sign of net foreign transactions and the returns:

It is also checked if mean return associated with positive net foreign transactions is different from the mean return associated with negative net foreign transactions using a t-test. Two sampling groups are formed of the stock returns associated with positive NFV and the stock returns associated with negative NFV. The difference in the means of these two sampling groups is tested:

Hypothesis 10: The returns associated with positive and negative net foreign transactions do not differ.

H_0: $\mu_{R,F}^{+} = \mu_{R,F}^{-}$

H_a: $\mu_{R,F}^{+} \neq \mu_{R,F}^{-}$

$\mu_{R,F}^{+}$ is the mean of stock returns that are associated with positive NFV and $\mu_{R,F}^{-}$ is the mean of stock returns that are associated with negative NFV. This hypothesis is expected to be rejected, since negative NFV and positive NFV might be more often associated with negative and positive returns, respectively. This might cause the mean of these groups to be different. The rejection of the null hypothesis means that positive NFV stocks have an average return that is different than the average return for negative NFV stocks.

Positive NFV indicates purchases by foreign investors and purchases by a group of investors in a market might lead to price increases. Therefore, the proportion of positive returns associated with positive NFV is expected to be higher than the

proportion of positive returns associated with negative NFV. In order to check if statistically meaningful differences exist between proportions of two groups, a hypothesis testing for proportions is conducted. Two sampling groups are formed of individual monthly stock returns associated with positive monthly NFV and negative monthly NFV. Each sampling group has proportions of positive, negative and zero returns. The following hypothesis is tested three times for proportions of positive, negative and zero returns. p_F^+ represent the proportions of positive, negative or zero returns in returns associated with positive NFV whereas p_F^- represent the proportions of positive, negative or zero returns in returns associated with negative NFV:

Hypothesis 11: The proportion of positive returns associated with positive NFV and the proportion of positive returns associated with negative NFV do not differ.

H_0: $p_F^+ = p_F^-$

H_a: $p_F^+ \neq p_F^-$

This hypothesis is also tested for the proportions of negative and zero returns.

Epps (1977) reports that the ratio of trading volume to the absolute value of return is greater for transactions in which the price increases than for transactions in which the price decreases. The asymmetry in the distribution of trading volume based on the direction of price change might have an implication for our study as well. An asymmetry might also exist in the stock returns based on the sign of net

foreign transactions. Thus, negative net foreign transactions might be causing a higher change in prices than the positive net foreign transactions do or vice versa. The following regression is used to check if negative NFV affects the return differently than positive NFV does:

$$R_t = b_o + b_1 * NFV/TV + b_2 * d_t + b_3 * d_t * NFV/TV \qquad (11)$$

R_t : The monthly return on each stock

NFV/TV: Net Foreign Transactions / Total Volume (calculated monthly for each stock)

d_t : Dummy variable, 1 if the NFV is negative and 0 otherwise.

The dummy and interactive dummy variables are added to the regression in order to check if the stock returns are affected differently from the negative foreign activity. If the coefficients b_2 and b_3 turn out to be significant, it may be concluded that the negative NFV affects stock returns differently from the way positive NFV affects stock returns. The sign of b_1 is expected to be positive for the same reason the coefficients of NFV/TV are expected to be positive in regressions number 2 and 4. The b_3 coefficient is expected to be also positive, because an asymmetry is expected in the relationship between return and NFV/TV. If b_3 turns out to be as expected, it can be concluded that negative NFV affects stock returns more than positive NFV does.

CHAPTER 5

RESULTS AND DISCUSSIONS

This chapter contains the results of research methods explained in the previous chapter and the discussion of these results. Firstly, the change in the ISE-TUM (UTUM) index level with foreign trading activity ratios and the foreign ownership of Turkish stocks over time is examined. FV/TV measures the share that foreign investors have in the total trading volume of the ISE. NFV/TV measures the direction and the level of foreign investors' net transactions relative to the total trading volume of the ISE. While FV/TV is a good measure of the overall foreign trading activity, NFV/TV also provides information about whether foreign investors have been net buyers or net sellers in a given period. Therefore, each of the foreign trading activity ratios provides different information and examining the change in both of them might provide valuable insight.

The foreign holdings of Turkish stocks over time are in general increasing until August 1999 and decreasing since then (Chart 1). The USD value of foreign holdings of Turkish stocks and the ISE-TUM index level seem to be moving together most of the time. Movements in the levels of these variables are observed to occur in the same direction, because the USD value of foreign holdings of

Turkish stocks is dependent on the prices of stocks held by foreigners and the prices of these stocks affect the ISE-TUM index level.

When FV/TV over time (Chart 2) is investigated, it is observed that the highest level of FV/TV is observed in August 1999 (FV/TV=28.69%) and the foreign trading activity increases before 17 August 1999 earthquake in Turkey. Immediately after the occurrence of the earthquake, the level of foreign trading activity follows a decreasing trend. This trend continues until December 2001 probably due to other political and economic developments affecting the Turkish stock market. The examination of the change in FV/TV over time demonstrates that the major events that affect Turkish economy might be influencing the trend of foreign share in the total trading volume of the Istanbul Stock Exchange. However, FV/TV values during the latest economic crisis (November 2000 – February 2001) are close to the mean value of FV/TV over our period of analysis ($\mu_{FV/TV}$=16.99%). This demonstrates that foreign trading activity has not unusually increased or decreased during the period of the recent economic crisis.

The examination of NFV/TV over time (Chart 3) provides information about the direction of foreign investors' transactions. Holding total trading volume (TV) constant, an increase in NFV/TV means that the amount of shares bought by foreign investors has increased more or decreased less than the amount of shares sold by foreign investors. Similarly, holding total trading volume constant, a decrease in NFV/TV means that the amount of shares sold by foreign investors has increased more or decreased less than the amount of shares bought by foreign

investors. Therefore, an increase in NFV/TV might indicate a change in foreign investor sentiment in favor of buying stocks and a decrease in NFV/TV might indicate a change in foreign investor sentiment in favor of selling stocks. The movements of NFV/TV and index level in the same or opposite directions might allow us to draw conclusions regarding foreign investor behavior.

One period of particular importance includes events such as the implementation of an economic stabilization program in 2000 and a currency crisis followed by a contraction period in 2001. After the public announcement of the economic stabilization program (December 1999), the Istanbul Stock Exchange had an outstanding performance causing the ISE-TUM index to reach its highest level in April 2000. Between December 1999 and April 2000, NFV/TV and ISE-TUM index moved in opposite directions in all months except March 2000. This demonstrates that foreign investors adopted a contrarian approach in this period and profited from the rise of the ISE by selling stocks that they already owned. After April 2000, foreign investors more closely followed the positive feedback trading strategy rather than the contrarian strategy. It is observed that NFV/TV and ISE-TUM index level moved in the same direction in 9 of the 12 months in the year following April 2000.

The first indicators of a currency crisis are observed in November 2000. Between January and November 2000 while economic prospects are still perceived to be good foreign investors have been net sellers except for March. The highest negative NFV/TV in our period of analysis is observed in January 2000

(NFV/TV=-4.85%). Since foreign investors are net sellers during this period, the extraordinary market performance observed in 2000 is attributable to the activities of domestic investors rather than foreign investors. During the crisis period (November 2000-February 2001), foreign investors are net sellers except January 2001. In some of the months following the crisis they are net sellers while in some of the months following the crisis they are net buyers.

5.1 The differences in foreign trading activity among sectors

The correlation coefficients for FV/TV and NFV/TV of sectors and subsectors are calculated in order to examine the extent of correlation of foreign trading activity among sectors and subsectors. In addition to correlation analysis, the differences in foreign trading activity among sectors and subsectors are examined using one-way ANOVA for FV/TV and NFV/TV values of each sector and subsector. As the technology sector is younger than other national sectors, analyses using 4 national sectors span a shorter time period of 30 months. The same analyses are also conducted for only industrials, services and financial sectors for a period of 72 months.

Firstly, the correlations between FV/TV values for national sectors are examined (Table 1). The correlations between FV/TV values of USIN (industrials) sector with FV/TV values of UHIZ (services) and UMAL (financials)[8] sectors are both

[8] Sector and subsector names related to sector and subsector codes mentioned in the text and in tables are presented in the appendix.

Chart 1. ISE-TUM index level and foreign holdings of Turkish stocks

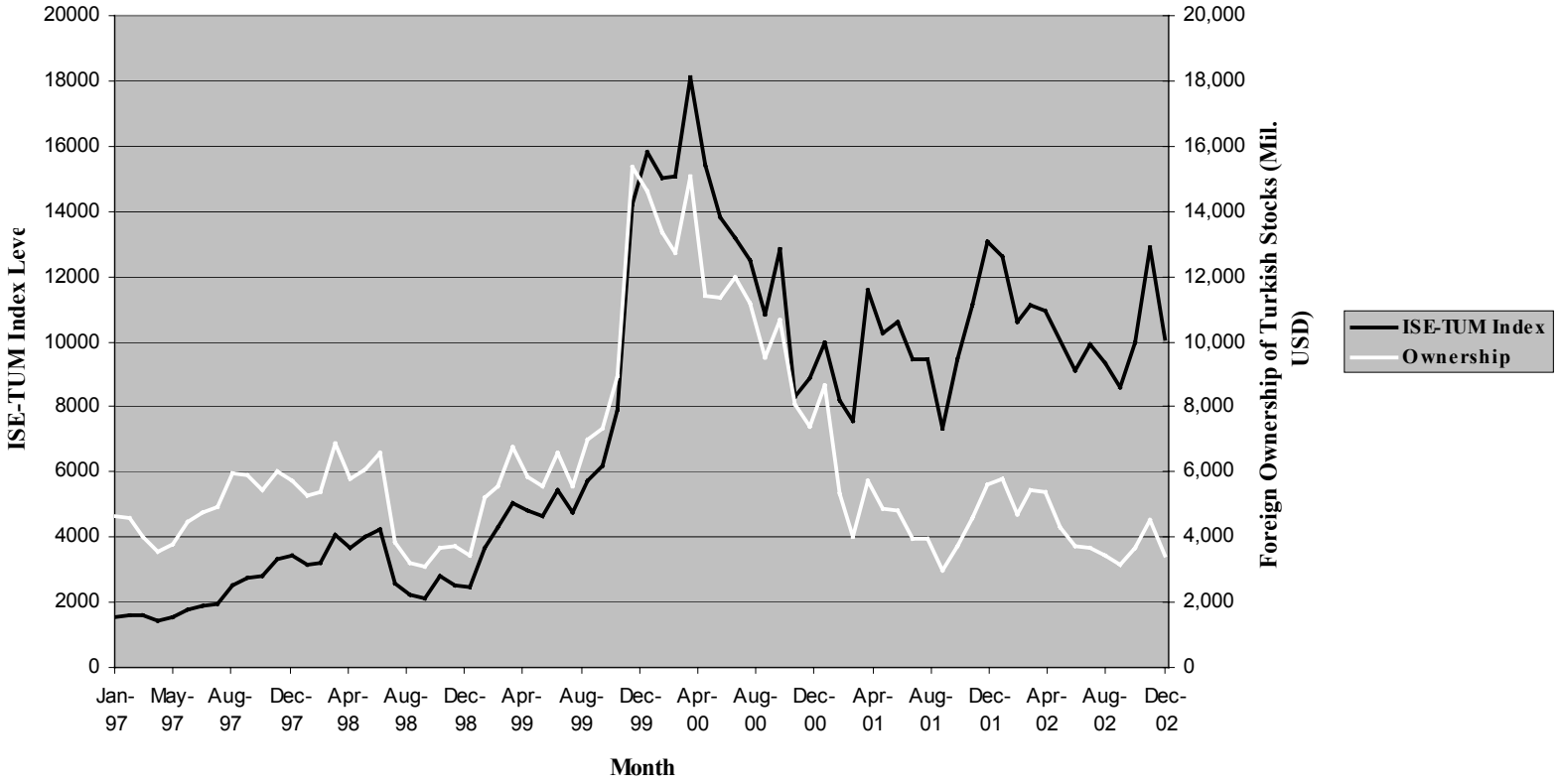


Chart 2. ISE-TUM index level and FV/TV

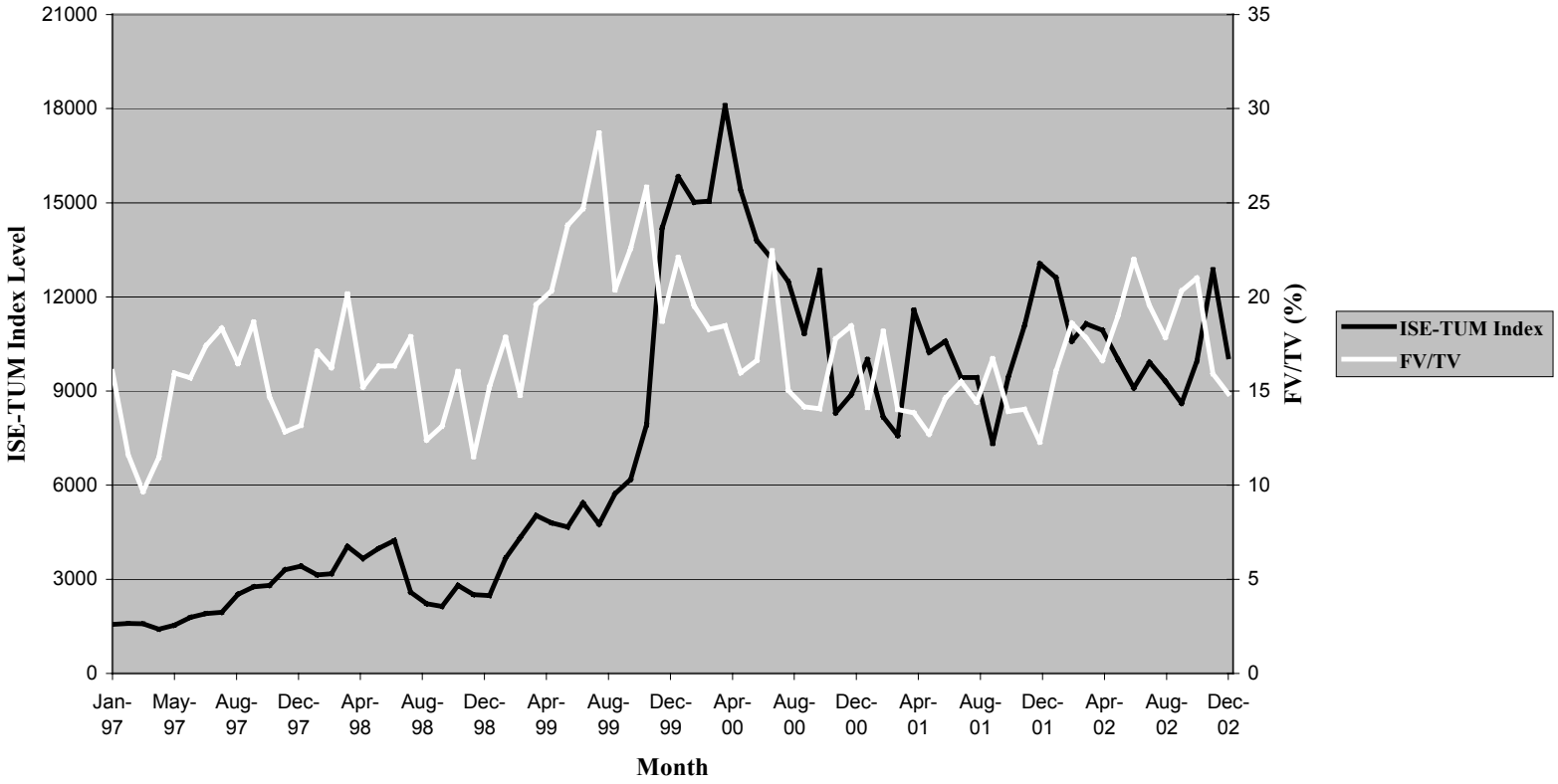
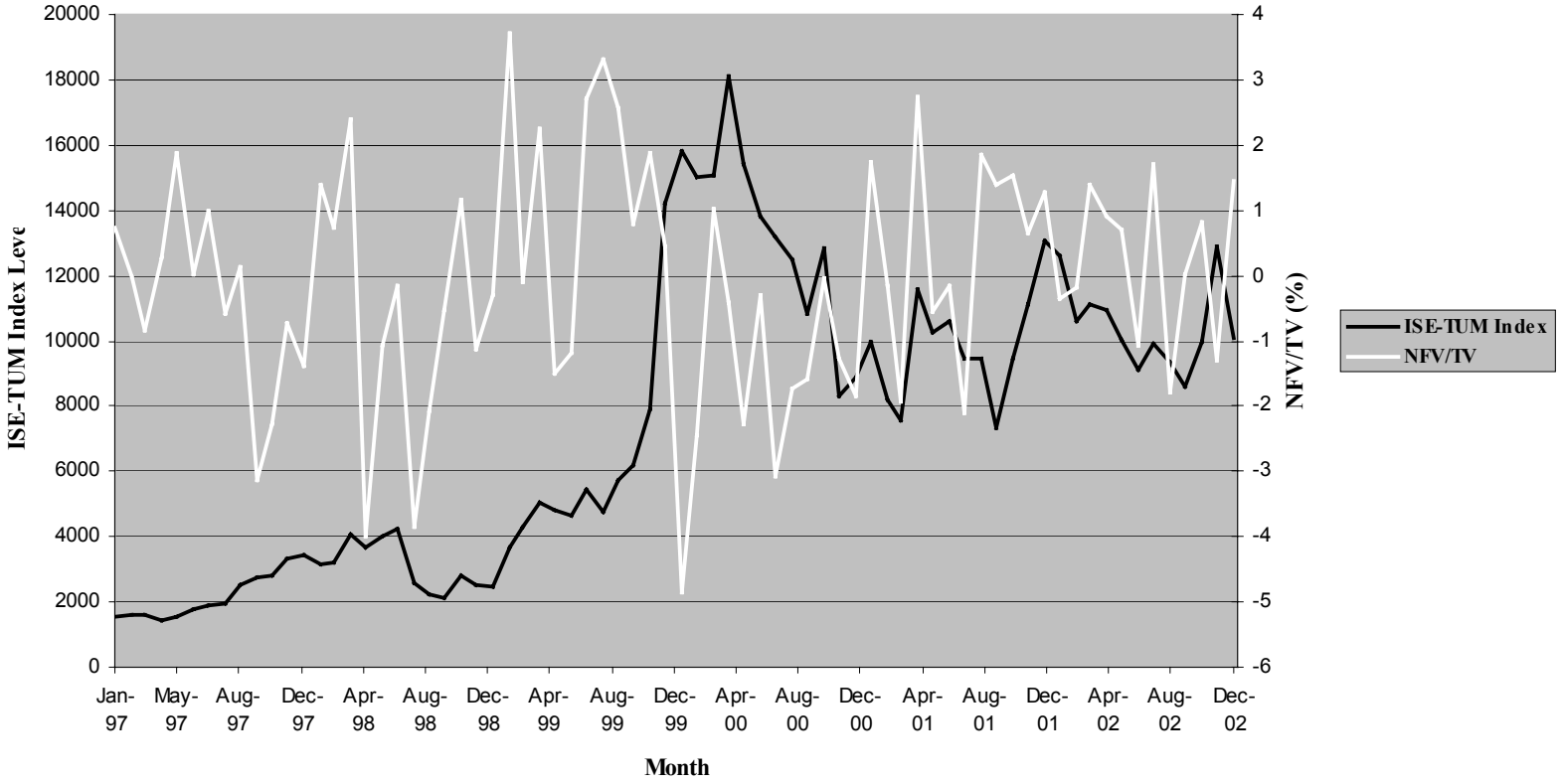


Chart 3. ISE-TUM index level and FV/TV



positive and statistically significant while there is no statistically significant correlation between the services and financials sector in terms of FV/TV. The correlation between FV/TV values of financials and FV/TV values of industrials sector is higher than the correlation between FV/TV values of services and FV/TV values of industrials. When the correlations for FV/TV values of national sectors including also the technology sector are examined, the only statistically significant correlation is observed between industrials and financials sectors. The correlation between the services and industrials sectors is not statistically significant in this shorter time period. Furthermore, there exist no significant correlation between the technology sector and any other sectors of the ISE.

The correlations between NFV/TV values of national sectors are also examined (Table 2). NFV/TV values of all national sectors have positive and statistically significant correlations with each other. This indicates that net foreign capital flows into and out of national sectors occur at the same time. The highest correlation coefficient is observed between the financials and industrials sectors. When the correlations of NFV/TV values for national sectors including also the technology sector are examined for a shorter period of 30 months, only the correlation between financials and services sector is statistically significant. Moreover, correlations between the technology sector and other national sectors are not statistically significant.

While calculating the correlation coefficients between subsectors of national sectors, some of the subsectors are excluded from the analysis due to following

Table 1. Correlation coefficients for FV/TV values of national sectors
The correlation coefficients for FV/TV values of national sectors are presented in two tables. Panel A contains correlation coefficients among only UHIZ (industrials), UMAL (financials) and USIN (industrials) sectors and the data used in calculating correlation coefficients presented in Panel A covers a period of 6 years between Jan-97 and Dec-02. Panel B contains correlation coefficients of national sectors including also UTEK (technology) sector, but the data used in calculating the correlation coefficients presented in Panel B covers a shorter period between Jul-00 and Dec-02. UTEK index is formed in July-00, therefore it is younger than other sectors that exist since the beginning of the period analyzed in this thesis. Pearson correlation coefficients are presented with p-values in parentheses.

Panel A. Correlations for the period from January 1997 to December 2002

	UHIZ	**UMAL**
UMAL	-0.156 (0.191)	
USIN	0.254** (0.032)	0.562*** (0.000)

Panel B. Correlations for the period from July 2000 to December 2002

	UTEK	**UHIZ**	**UMAL**
UHIZ	0.262 (0.171)		
UMAL	-0.183 (0.341)	0.161 (0.406)	
USIN	-0.027 (0.890)	0.226 (0.239)	0.584*** (0.001)

* Correlation is significant at the 0.10 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
*** Correlation is significant at the 0.01 level (2-tailed).

Table 2. Correlation coefficients for NFV/TV values of national sectors

The correlation coefficients for NFV/TV values of national sectors are presented in two tables. Panel A contains correlation coefficients among only UHIZ (industrials), UMAL (financials) and USIN (industrials) sectors and the data used in calculating correlation coefficients presented in Panel A covers a period of 6 years between Jan-97 and Dec-02. Panel B contains correlation coefficients of national sectors including also UTEK (technology) sector, but the data used in calculating the correlation coefficients presented in Panel B covers a shorter period between Jul-00 and Dec-02. UTEK index is formed in July-00, therefore it is younger than other sectors that exist since the beginning of the period analyzed in this thesis. Pearson correlation coefficients are presented with p-values in parentheses.

Panel A. Correlations for the period from January 1997 to December 2002

	UHIZ	**UMAL**
UMAL	0.440*** (0.000)	
USIN	0.368*** (0.001)	0.575*** (0.000)

Panel B. Correlations for the period from July 2000 to December 2002

	UTEK	**UHIZ**	**UMAL**
UHIZ	-0.259 (0.174)		
UMAL	0.082 (0.671)	0.465** (0.011)	
USIN	-0.197 (0.306)	-0.085 (0.662)	0.117 (0.544)

* Correlation is significant at the 0.10 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
*** Correlation is significant at the 0.01 level (2-tailed).

reasons. ILTM (communications) subsector that belongs to services sector is excluded because ILTM index begins its life later in our period of analysis and data for that sector spans a period shorter than other subsectors in the services sector does. ELKT (electrics) subsector that belongs to the services sector is also excluded, because there are missing data points for ELKT subsector during a period in which all the stocks in that subsector are transferred to the watch market. YORT (investment trusts) sector is excluded from the analysis, because it is not classified under any national sector by the ISE.

The correlation coefficients for subsectors in terms of their FV/TV and NFV/TV values are calculated. There exists no statistically significant correlation between subsectors of services sector while there exist significant correlations among subsectors of both financials and industrials sectors (Table 3 and Table 4). When correlations of FV/TV values of subsectors are examined, it is observed that 6 out of 10 bivariate correlations among subsectors of financials sector are positive and statistically significant at 1% level whereas only 5 out of 21 bivariate correlations among subsectors of industrials sector are positive and statistically significant at least 5% level. The average of significant correlations between the subsectors of the financials sector (ρ_{MAL}=0.454) is higher than the average of significant correlations between the subsectors of the industrials sector (ρ_{SIN}=0.355). Thus, in terms of FV/TV values the subsectors of financials sector seem to be more strongly correlated with each other than subsectors of industrials sector.

When correlations for NFV/TV values of subsectors are examined, it is observed that 4 out of 10 bivariate correlations among subsectors of financials sector are positive and statistically significant whereas 7 out of 21 bivariate correlations among subsectors of industrials sector are significant. However, the average of significant correlations for the financials subsectors (ρ_{MAL}=0.312) is lower than the average of significant correlations for the industrials subsectors (ρ_{SIN}=0.346) this time. Hence, in terms of NFV/TV values the subsectors of industrials sector seem to be more strongly correlated with each other than subsectors of financials sector.

The Pearson correlation coefficients between subsectors of the technology sector (BLSM (information technology) and SVNM (defense)) are –0.007 and 0.0520 for FV/TV and NFV/TV values respectively. The p-values associated with these correlations are 0.972 and 0.790, respectively. Therefore, correlations between subsectors of the technology sector are not statistically significant for both FV/TV and NFV/TV values.

These positive and statistically significant correlations between FV/TV values show that foreign trading activity increases and decreases simultaneously for all sectors and subsectors of the ISE. Results for NFV/TV values are even more interesting. They indicate that, at a point in time, foreign investors are either net buyers or net sellers in all sectors. These analyses provide supporting evidence for foreign investors moving in and out of sectors at the same time.

Table 3. Correlation coefficients of FV/TV values for subsectors

Each panel contains Pearson correlation coefficients among FV/TV values of subsectors in a different sector. Correlation coefficients are accompanied by p-values in parentheses.

Panel A. Subsectors of services sector

	TCRT	TRZM
TRZM	0.174 (0.144)	
ULAS	0.027 (0.823)	0.138 (0.248)

Panel B. Subsectors of financials sector

	BANK	FINK	GMYO	HOLD
FINK	0.330*** (0.005)			
GMYO	0.161 (0.178)	0.749*** (0.000)		
HOLD	0.505*** (0.000)	0.023 (0.848)	0.049 (0.680)	
SGRT	0.504*** (0.000)	0.318*** (0.007)	0.214 (0.071)	0.319*** (0.006)

Panel C. Subsectors of industrials sector

	GIDA	KAGT	KMYA	MANA	MESY	TAST
KAGT	0.458*** (0.000)					
KMYA	0.223 (0.060)	0.323*** (0.006)				
MANA	-0.036 (0.766)	0.168 (0.159)	0.050 (0.676)			
MESY	-0.054 (0.654)	0.241** (0.041)	0.038 (0.753)	0.421*** (0.000)		
TAST	0.096 (0.424)	0.160 (0.180)	-0.115 (0.337)	0.119 (0.320)	0.108 (0.366)	
TEKS	0.330*** (0.005)	-0.004 (0.971)	-0.003 (0.983)	-0.054 (0.653)	0.150 (0.208)	0.208 (0.079)

* Correlation is significant at the 0.10 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
*** Correlation is significant at the 0.01 level (2-tailed).

Table 4. Correlation coefficients of NFV/TV values for subsectors
Each panel contains Pearson correlation coefficients among NFV/TV values of subsectors in a different sector. Correlation coefficients are accompanied by p-values in parentheses.

Panel A. Subsectors of services sector

	TCRT	TRZM
TRZM	-0.185 (0.119)	
ULAS	0.063 (0.601)	0.091 (0.445)

Panel B. Subsectors of financials sector

	BANK	FINK	GMYO	HOLD
FINK	-0.009 (0.938)			
GMYO	-0.120 (0.316)	0.261** (0.027)		
HOLD	0.370*** (0.001)	0.208 (0.079)	0.231 (0.051)	
SGRT	0.307*** (0.009)	0.016 (0.893)	-0.051 (0.673)	0.311*** (0.008)

Panel C. Subsectors of industrials sector

	GIDA	KAGT	KMYA	MANA	MESY	TAST
KAGT	0.384*** (0.001)					
KMYA	0.227 (0.055)	0.006 (0.962)				
MANA	-0.092 (0.442)	0.165 (0.167)	0.198 (0.096)			
MESY	0.330*** (0.005)	0.410*** (0.000)	0.233** (0.049)	0.389*** (0.001)		
TAST	0.114 (0.338)	0.055 (0.647)	0.129 (0.280)	0.308*** (0.009)	-0.045 (0.708)	
TEKS	-0.021 (0.859)	-0.026 (0.832)	0.370*** (0.001)	-0.068 (0.569)	-0.081 (0.497)	0.145 (0.225)

* Correlation is significant at the 0.10 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).
*** Correlation is significant at the 0.01 level (2-tailed).

One-way ANOVA analysis is used to determine the differences in terms of foreign trading activity among sectors. Since all of the variables used in each test have the same sample size, deviations from normality in the distribution of these variables do not affect the results of ANOVA (Anderson, Sweeney and Wilson, 1999, pp.486). However, ANOVA is also dependent on the assumption of equality of variances. Levene's test statistics are calculated for each set of ANOVA variables in order to check the validity of this assumption. Levene's test is significant; thus, the equality of variances is rejected for all sets of ANOVA variables except for the NFV/TV values for 4 national sectors. Transformation of variables by taking the logarithm or the square root of them does not prove to be useful and the Levene's test remains significant for the transformed variables as well. Thus, the results of ANOVA analysis might not be accurate for sets of variables whose variances are not equal. In order to compensate for this, one-to-one differences among sectors in terms of foreign trading activity are determined by using a post-hoc test that does not rely on the assumption of equality of variances. Games-Howell test is used for this purpose.

One-way ANOVA results for 3 national sectors reject the equality of mean FV/TV values for these sectors. However, the mean NFV/TV values for these sectors are not significantly different from each other (Table 5). The Games-Howell test results confirm ANOVA results and indicates that all differences

Table 5. Differences in foreign trading activity among national sectors
Panel A contains the descriptive statistics on FV/TV and NFV/TV values for 3 national sectors: UHIZ (services), UMAL (financials) and USIN (industrials). Panel B contains the result of ANOVA analysis used to test the equality of means of ratios for these three national sectors. The data used in this analysis covers a period of 6 years between Jan-97 and Dec-02.

Panel A. Descriptive statistics for national sectors with data covering a time period between Jan-97 and Dec-02

Ratio	Sector	N	Mean	Std. Dev.	Minimum	Maximum
FV/TV	**UHIZ**	72	15.78	6.5863	2.61	35.00
	UMAL	72	21.94	5.7784	12.99	38.89
	USIN	72	13.91	3.0716	6.47	21.15
NFV/TV	**UHIZ**	72	-0.25	2.2005	-6.75	7.27
	UMAL	72	0.06	2.5252	-6.25	5.79
	USIN	72	-0.12	1.7888	-4.26	3.81

Panel B. ANOVA analysis for national sectors with data covering a time period between Jan-97 and Dec-02

		Sum of Squares	df	Mean Square	F	p value
FV/TV	**Treatments**	2541	2	1271	44.22	0.000
	Errors	6120	213	29		
	Total	8661	215			
NFV/TV	**Treatments**	4	2	2	0.37	0.694
	Errors	1024	213	5		
	Total	1027	215			

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Table 6. Differences in foreign trading activity among sectors
Panel A contains the descriptive statistics on FV/TV and NFV/TV values for 4 national sectors: UHIZ (services), UMAL (financials), USIN (industrials) and UTEK (technology). Panel B contains the results of ANOVA analysis used to test the equality of means of ratios for these four national sectors. The data used in this analysis covers a period of 30 months between Jul-00 and Dec-02.

Panel A. Descriptive statistics for national sectors with data covering a time period between Jul-00 and Dec-02

Ratio	Sector	N	Mean	Std. Dev.	Minimum	Maximum
FV/TV	**UHIZ**	30	20.74	5.8946	12.17	35
	UMAL	30	18.25	3.7385	12.99	26.53
	USIN	30	14.03	2.7349	10.02	19.55
	UTEK	30	8.08	3.593	2.87	16.61
NFV/TV	**UHIZ**	30	0.04	2.5858	-4.86	7.27
	UMAL	30	-0.12	1.9115	-3.49	2.91
	USIN	30	0.21	1.707	-4.26	3.81
	UTEK	30	-1.02	1.839	-5.50	2.31

Panel B. ANOVA analysis for national sectors with data covering a time period between Jul-00 and Dec-02

		Sum of Squares	Df	Mean Square	F	p value
FV/TV	**Treatments**	2759	3	920	53.24	0.000
	Errors	2004	116	17		
	Total	4764	119			
NFV/TV	**Treatments**	27	3	9	2.18	0.094
	Errors	482	116	4		
	Total	510	119			

Table 7. One-to-one differences among national sectors

Panel A and Panel B show the differences in the means of ratios for national sectors. P-values based on Games-Howell tests are presented in parentheses. The mean differences presented in the panels are calculated by subtracting the mean of the sector in the row from that of the sector in the column. Panel A contains values for 3 national sectors whose data cover 72 months whereas Panel B contains values for 4 national sectors whose data cover a shorter time period of 30 months. The Games-Howell test results for NFV/TV values of 4 national sectors are not reported in Panel B, because the Levene's test is not significant for NFV/TV values of these sectors, and ANOVA result is accurate for this period.

Panel A. Mean differences among national sectors (data covering a period from Jan-97 to Dec-02)

Ratio		UHIZ	UMAL	USIN
FV/TV	**UHIZ**			
	UMAL	6.1613* (0.000)		
	USIN	-1.8657* (0.080)	-8.0270* (0.000)	
NFV/TV	**UHIZ**			
	UMAL	0.3113 (0.710)		
	USIN	0.1301 (0.920)	-0.1812 (0.873)	

Panel B. Mean differences among national sectors (data covering a period from Jul-00 to Dec-02)

Ratio		UHIZ	UMAL	USIN	UTEK
FV/TV	**UHIZ**				
	UMAL	-2.4824 (0.222)			
	USIN	-6.7107* (0.000)	-4.2283* (0.873)		
	UTEK	-12.6530* (0.000)	-10.1706* (0.000)	-5.9423* (0.000)	

Significant differences among means are indicated by symbols *, ** and *** for 0.10, 0.05 and 0.01 levels of significance.

between mean FV/TV values of 3 national sectors are statistically significant where as none of the differences between mean NFV/TV values of these sectors are statistically significant (Table 7). The highest mean difference in FV/TV values is between UMAL and USIN ($\mu_{F(SIN)} - \mu_{F(MAL)} = -8.027\%$).

One-way ANOVA analysis results for 4 national sectors reject the equality of mean FV/TV values of these sectors. On the other hand, the mean NFV/TV values for these sectors are not statistically significantly different from each other (Table 6). Since the Levene's test is not statistically significant for NFV/TV values of these 4 sectors, ANOVA result for NFV/TV values of these sectors is accurate. Therefore, a post-hoc test in order to determine differences among sectors in terms of NFV/TV values is not conducted. The Games-Howell test conducted for FV/TV values of 4 national sectors indicate that all differences in the mean FV/TV values of 4 national sectors are significant except the difference between mean FV/TV values of UMAL and USIN sectors. The results reported in Panel A of Table 7 for 3 national sectors and the results reported in Panel B of Table 7 for 4 national sectors are different. This is probably due to data used in these tests covering different periods of time.

Significance tests for mean differences indicate that the average level of FV/TV differ among national sectors. Therefore, the average share of transactions by foreign investors in the total trading volume might be higher for some sectors than for other sectors. This means that foreign investors might trade in stocks of some sector more actively than they trade in stocks of other sectors. The mean FV/TV

value is highest for the UMAL (financials) sector over the full period of analysis (Table 5). However, over the last 30 months of the period of analysis, the mean FV/TV value of UHIZ (services) sector exceeds the mean FV/TV value of UMAL (financials) sector (Table 6). This demonstrates that the foreign trading activity might shift from one sector to another over time. Mean difference significance tests also indicate that the average level of NFV/TV does not differ among national sectors. This indicates that net foreign transactions relative to the total trading volume in the market do not differ among sectors.

The descriptive statistics of foreign trading activity ratios are presented in Table 8. The mean FV/TV for BANK (banks) subsector of financials sector ($\mu_{F(BANK)}$= 34.98%) is higher than the mean FV/TV value for any other subsector. The highest mean FV/TV values belong to the TCRT (wholesale and retail trade) subsector among subsectors of the services sector and KAGT (wood, paper, printing) subsector among subsectors of the industrials sector ($\mu_{F(TCRT)}$= 15.74%, $\mu_{F(KAGT)}$= 18.32%). In the technology sector, the mean FV/TV value for the BLSM (information technology) subsector exceeds that for the SVNM (defense) subsector ($\mu_{F(BLSM)}$= 8.47%, $\mu_{F(SVNM)}$= 3.39%). However, these values are much lower than the highest values for subsectors of other sectors.

When one-way ANOVA and Games-Howell tests are conducted for subsectors, ILTM, ELKT and YORT sectors are excluded from the analysis due to the same reasons they are excluded from the correlations analyses. The equality of mean FV/TV values is rejected for subsectors of each national sector (Table 9).

According to Games-Howell test results, all differences in the mean FV/TV values of subsectors in the services sector and financial sector are significant. In the industrials sector, the differences in the mean FV/TV values for the following groups of subsectors are statistically significant: TEKS–all other subsectors, KMYA–all other subsectors and KAGT–TAST.

The equality of mean NFV/TV values is rejected for subsectors of only the financials and technology sector (Table 9). The following pairs of subsectors in the financials sector have statistically significant differences in their mean NFV/TV values: BANK-GYMO, FINK-SGRT, GMYO-HOLD and GMYO-SGRT. Games-Howell test results confirm all ANOVA results except the ANOVA results for NFV/TV values of subsectors in the industrials sector. According to Games-Howell test, the following pair of subsectors in the industrial sector has a statistically significant difference in their mean NFV/TV values: GIDA-TEKS[9].

Since the technology sector has only two subsectors, t-test is used instead of ANOVA analysis to check for differences between the subsectors of technology sector in terms of their foreign trading activity ratios. The mean FV/TV and NFV/TV values for the BLSM (information technology) subsector and for the SVNM (defense) subsector are statistically significantly different from each other (Table 9).

[9] In order to conserve space, Games-Howell test results for foreign trading activity ratios of subsectors of national sectors are not reported. Games-Howell test results for subsectors will be provided upon request.

Table 8. Descriptive statistics of foreign trading activity ratios for subsectors

Panel A. Descriptive statistics for FV/TV values of subsectors

Sector	Subsector	N	Mean	Std. Dev.	Minimum	Maximum
UHIZ	**TCRT**	72	15.744	5.680	4.16	27.28
	TRZM	72	2.488	3.135	0.05	18.04
	ULAS	72	6.203	3.667	0.90	18.21
UMAL	**BANK**	72	34.981	13.108	15.97	72.75
	FINK	72	2.752	3.517	0.07	17.34
	GMYO	72	6.540	6.386	0.16	33.55
	HOLD	72	16.183	5.131	8.30	28.37
	SGRT	72	28.385	14.607	8.17	67.15
USIN	**GIDA**	72	14.898	7.958	4.55	38.63
	KAGT	72	18.356	8.360	6.30	45.30
	KMYA	72	11.559	3.432	4.67	23.17
	MANA	72	16.464	6.700	6.89	38.09
	MESY	72	17.295	5.737	8.67	33.58
	TAST	72	14.334	6.721	4.67	41.66
	TEKS	72	3.391	2.199	0.87	8.95
UTEK	**BLSM**	30	8.468	3.459	3.44	17.34
	SVNM	30	3.395	5.412	0.00	25.97

Panel B. Descriptive statistics for NFV/TV values of subsectors

Sector	Subsector	N	Mean	Std. Dev.	Minimum	Maximum
UHIZ	**TCRT**	72	-0.364	2.882	-9.14	8.46
	TRZM	72	0.266	2.208	-5.30	8.58
	ULAS	72	-0.167	1.967	-6.58	5.10
UMAL	**BANK**	72	0.446	4.532	-10.96	12.41
	FINK	72	-0.674	1.869	-9.26	2.44
	GMYO	72	-1.427	3.590	-15.55	5.42
	HOLD	72	0.051	2.622	-5.80	5.58
	SGRT	72	1.623	5.841	-21.77	20.05
USIN	**GIDA**	72	0.551	2.535	-5.95	8.72
	KAGT	72	0.453	3.480	-9.14	10.73
	KMYA	72	0.133	2.327	-4.42	6.63
	MANA	72	0.244	4.721	-12.00	14.59
	MESY	72	-0.751	2.984	-7.56	7.39
	TAST	72	-0.256	4.672	-19.15	20.66
	TEKS	72	-0.546	1.110	-4.24	1.79
UTEK	**BLSM**	30	-1.183	1.866	-5.89	2.05
	SVNM	30	0.087	2.430	-6.58	8.37

Table 9. Differences among subsectors

The results of ANOVA analysis to test for the equality of mean FV/TV and NFV/TV values for subsectors in each sector are presented below. Each table contains the results of ANOVA for subsectors of a different sector. ANOVA results for the technology sector are not reported, because the technology sector has only two subsectors and a t-test is conducted instead of ANOVA for that sector.

Panel A. ANOVA for subsectors of UHIZ (services) sector

		Sum of Squares	Df	Mean Square	F	p value
FV/TV	**Treatments**	6734	2	3367	181.88	0.000
	Errors	3943	213	19		
	Total	10677	215			
NFV/TV	**Treatments**	15	2	7	1.32	0.270
	Errors	1210	213	6		
	Total	1225	215			

Panel B. ANOVA for subsectors of UMAL (financials) sector

		Sum of Squares	Df	Mean Square	F	p value
FV/TV	**Treatments**	54940	4	13735	147.79	0.000
	Errors	32993	355	93		
	Total	87933	359			
NFV/TV	**Treatments**	384	4	96	6.15	0.000
	Errors	5531	355	16		
	Total	5915	359			

Panel C. ANOVA for subsectors of USIN (industrials) sector

		Sum of Squares	Df	Mean Square	F	p value
FV/TV	**Treatments**	11154	6	1859	47.70	0.000
	Errors	19368	497	39		
	Total	30523	503			
NFV/TV	**Treatments**	109	6	18	1.62	0.139
	Errors	5552	497	11		
	Total	5661	503			

Panel D. t-test for subsectors of UTEK (technology) sector

	Levene's Test for Equality of Variances		t-test for Equality of Means		
Ratio	**F**	**p-value**	**T**	**p-value**	**Mean Difference**
FV/TV	0.724	0.398	4.326	0.000	5.073
NFV/TV	0.044	0.835	-2.271	0.027	-1.27

To summarize, there exist differences in terms of foreign trading activity among sectors. Foreign trading activity for some sectors is higher than the foreign trading activity in other sectors. Foreign investors might be following economic indicators of each sector or subsector and make investments in sectors or subsectors with a positive economic outlook. Differences in foreign trading activity might result from the differences in the economic outlooks of sectors based on their economic indicators.

5.2 The influence of November 2000 – February 2001 crisis on the foreign trading activity

Changes in the distributional characteristics of foreign trading activity ratios and returns of the market, sectors and subsectors are examined by using significance tests for differences before and after the crisis. Data used in these analyses covers two different periods: 22 months before November 2000 and 22 months after February 2001. November 2000 to February 2001 is considered as the crisis period. UTEK (technology) sector and its subsectors are excluded from these analyses, because variables associated with this sector do not have enough data points for the before-crisis period. ELKT(electrics) subsector is excluded from the analysis, since it has missing data points. Significance tests for the differences between variances are conducted first. An appropriate t-test for the equality of means is used to test for the differences between means according to the results of the F-test used for differences in variances.

Differences in mean and variances of return on the market index and national sector indices are not statistically significant. However, changes are observed in the distributional characteristics of foreign trading activity variables for the overall market as well as for the national sectors with the exception of the industrials sector (Table 10). The variances of both foreign trading activity ratios have decreased for the overall market after the crisis. Foreign trading activity has also decreased since the mean FV/TV for the overall market is smaller in the period after the crisis. However, return on the overall market index and the sector indices are not statistically significantly different in before-crisis and after-crisis periods.

It is observed that mean FV/TV has decreased for financials sector while it has increased for the services sector. Therefore, foreign trading activity has shifted from the financials sector to the services sector after the crisis. Moreover, the mean NFV/TV values for the overall market and services sector that are negative before the crisis become positive after the crisis. This increase in foreign trading activity in the services sector might have occurred in the form of buying shares of stocks in the services sector, since NFV/TV has become positive after the crisis for the services sector.

Differences in the mean values of returns on sector indices are insignificant. Therefore, the shift of foreign interest from the financials sector to the services sector might not be due to return chasing. Foreign investors might have started to trade the stocks of firms in the financials sector less actively, because banks and

Table 10. Differences in foreign trading activity and returns before and after the crisis for the overall market and national sectors

The equality of variances and means of FV/TV, NFV/TV and return for the overall market and each sector before and after the crisis are tested. FV/TV and NFV/TV represent, respectively, the percentage of total foreign trading volume and the percentage of net foreign trading volume in the total trading volume in a sector. Return values are calculated for each sector. UTUM row shows the results for the overall market, and the return on the ISE-TUM index.

Sector	Variable	Mean before crisis	Mean after crisis	Variance before crisis	Variance after crisis	Equality of Variances F-test (p-value)	Equality of Means t-test (p-value)
UTUM	**FV/TV**	19.5041	16.4376	16.2667	7.5565	2.1527* 0.0862	2.947*** 0.005
	NFV/TV	-0.0534	0.3175	4.8960	1.8406	2.6600** 0.0297	-0.670 0.507
	Return	9.5518	2.4142	492.2674	338.8324	1.4528 0.3991	1.161 0.252
UHIZ	**FV/TV**	16.6577	20.1709	34.4992	26.6235	1.2958 0.5565	-2.108** 0.041
	NFV/TV	-1.4988	0.4667	5.4901	6.7819	0.8095 0.6327	-2.632** 0.012
	Return	6.0644	2.2159	408.0804	389.3281	1.0482 0.9152	0.639 0.526
UMAL	**FV/TV**	24.6187	18.3431	35.3561	17.6156	2.0071 0.1183	4.044*** 0.000
	NFV/TV	0.2054	0.2412	8.2766	3.4066	2.4296** 0.0478	-0.049 0.961
	Return	10.4264	2.1626	597.1474	423.4376	1.4102 0.4375	1.213 0.232
USIN	**FV/TV**	14.6783	13.7949	12.2654	6.4862	1.8910 0.1525	0.957 0.344
	NFV/TV	-0.1364	0.5796	3.8931	2.2572	1.7248 0.2199	-1.354 0.183
	Return	9.4509	3.0630	492.2674	338.8324	1.4528 0.4321	1.156 0.254

* Difference is significant at the 0.1 level (2-tailed).
** Difference is significant at the 0.05 level (2-tailed).
*** Difference is significant at the 0.01 level (2-tailed).

some other financial institutions have been severely influenced by the economic crisis. Since the mean NFV/TV for the financials sector has not changed significantly from before crisis to after crisis, it may be concluded that foreign investors did not aggressively sell financials sector stocks in their portfolios in a panic after the crisis. Nevertheless, some part of the shift of foreign trading activity from the financials sector to the services sector might be attributed to ILTM (communications) subsector that belongs to the services sector and that started its life in July 2000. ILTM sector's life spans all 22 months in the after-crisis period whereas it spans only 4 months of the before-crisis period. Since ILTM subsector contains the stock TCELL (Turkcell) that is one of the stocks most actively traded by foreigners, the inclusion of the ILTM sector in the services sector later in the before-crisis period, might have led to an increase in the mean FV/TV value of the services sector in the after-crisis period.

In the services sector, TCRT (wholesale and retail trade) and TRZM (tourism) subsectors' FV/TV values significantly decreased after the crisis (Panel A of Table 11). This is contrary to the significant increase in the mean FV/TV values of the services sector in general. This conflicting result might be observed due to the exclusion of the results for ILTM and ELKT subsectors from subsectors analysis because of reasons explained in correlations analysis section. The mean FV/TV value has significantly decreased for all of the subsectors of the financials sector except the GMYO (real estate investment trusts). The highest decrease is in the BANK (banks) subsector followed by the SGRT (insurance) subsector. This decrease in foreign trading activity of these subsectors is also accompanied by a

significant decrease in the variances of their foreign trading activity ratios (Panel B of Table 11). In the industrials sector, most significant changes are observed in the GIDA (food, beverage) subsector. The large increase in the FV/TV value of this subsector is accompanied by large increases in the variances of FV/TV and NFV/TV ratios. There is a large significant decrease in the FV/TV value for the MESY (metal products, machinery) subsector as well (Panel C of Table 11).

One important point to mention is that all of the significant changes in variances of foreign trading activity ratios are decreases except the one for GIDA subsector. Moreover, a significant decrease in the variance of FV/TV is accompanied by a significant decrease in mean FV/TV value in 5 of the 6 cases where significant variance decreases are observed. After the crisis, both the mean value and the variance of FV/TV decreased for UTUM (the overall market) and TRZM (tourism), BANK (banks), FINK (leasing, factoring) and SGRT (insurance) subsectors. In GIDA (food, beverages) subsector, both the variance and mean value of FV/TV has increased largely after the crisis. On the other hand, six out of seven significant changes in the variance of NFV/TV are accompanied by no significant difference in mean NFV/TV values. Significant differences in the mean values of NFV/TV are observed only for UHIZ (services) sector and TCRT (wholesale trade) and FINK (leasing, factoring) subsectors. All of these significant changes are increases and represent a change from a negative NFV/TV mean value to a positive one for UHIZ sector and TCRT subsector.

Table 11. Differences in foreign trading activity and returns before and after the crisis for the subsectors in national sectors

The equality of variances and means of FV/TV, NFV/TV and return for each subsector before and after the crisis are tested. FV/TV and NFV/TV represent respectively the percentage of total foreign trading volume and the percentage of net foreign trading volume in the total trading volume in a subsector. Return values are calculated over each subsector index.

Panel A. Services Sector

Sector	Variable	Mean before crisis	Mean after crisis	Variance before crisis	Variance after crisis	Equality of Variances F-test (p-value)	Equality of Means t-test (p-value)
TCRT	**FV/TV**	19.2136	12.7345	26.2800	13.0148	2.019 (0.115)	4.848*** (0.000)
	NFV/TV	-1.5898	0.4172	8.1899	6.3635	1.287 (0.568)	-2.468** (0.018)
	Return	6.8838	1.8964	387.4480	232.3521	1.668 (0.249)	0.94 (0.353)
TRZM	**FV/TV**	2.4670	0.7790	5.5319	1.6461	3.361*** (0.000)	2.955*** (0.006)
	NFV/TV	-0.1022	0.2040	4.9204	1.0562	4.659*** (0.000)	-0.587 (0.561)
	Return	9.8499	2.7313	1149.3388	798.1755	1.440 (0.410)	0.757 (0.454)
ULAS	**FV/TV**	7.3915	6.3982	12.8537	17.8836	0.719 (0.456)	0.84 (0.405)
	NFV/TV	-0.4793	0.1822	5.9634	3.3845	1.762 (0.203)	-1.015 (0.316)
	Return	9.3902	2.8029	794.4224	476.5314	1.667 (0.250)	0.867 (0.391)

Panel B. Financials Sector

Sector	Variable	Mean before crisis	Mean after crisis	Variance before crisis	Variance after crisis	Equality of Variances F-test (p-value)	Equality of Means t-test (p-value)
BANK	**FV/TV**	38.1324	23.9606	125.2139	29.9658	4.179*** (0.002)	5.336*** (0.000)
	NFV/TV	0.4484	0.0920	14.4263	6.2605	2.304* (0.062)	0.367 (0.715)
	Return	10.0657	1.8919	631.6426	482.6897	1.309 (0.543)	1.148 (0.257)
FINK	**FV/TV**	2.8990	0.4953	8.6277	0.2921	29.533*** (0.000)	3.775*** (0.001)
	NFV/TV	-0.8979	-0.0022	4.3593	0.0388	112.442*** (0.000)	-2.003* (0.058)
	Return	10.2358	2.6312	591.3992	291.4873	2.029 (0.113)	1.200 (0.237)
GMYO	**FV/TV**	6.0683	4.6010	12.5819	10.0590	1.251 (0.613)	1.446 (0.155)
	NFV/TV	-0.4383	0.2273	3.3441	2.8656	1.167 (0.727)	-1.253 (0.217)
	Return	-1.1925	1.0957	61.6680	343.5054	0.180*** (0.000)	-0.533 (0.598)
HOLD	**FV/TV**	18.6299	14.1948	20.7608	25.5743	0.812 (0.637)	3.056*** (0.004)
	NFV/TV	0.0550	0.4758	8.8768	5.3070	1.673 (0.727)	-0.524 (0.603)
	Return	11.4577	3.0785	628.4197	404.7862	1.552 (0.321)	1.223 (0.228)
SGRT	**FV/TV**	30.3369	18.5458	195.4544	52.1530	3.748*** (0.000)	3.515*** (0.001)
	NFV/TV	0.9140	0.5125	23.4130	11.3212	2.068 (0.104)	0.319 (0.751)
	Return	11.9168	2.0510	594.8916	305.0646	1.950 (0.134)	1.543 (0.130)

Panel C. Industrials Sector

Sector	Variable	Mean before crisis	Mean after crisis	Variance before crisis	Variance after crisis	Equality of Variances F-test (p-value)	Equality of Means t-test (p-value)
GIDA	**FV/TV**	8.7762	19.3020	9.7906	55.1544	0.178*** (0.000)	-6.126*** (0.000)
	NFV/TV	0.2815	0.5332	2.2907	11.7979	0.194*** (0.000)	-0.315 (0.755)
	Return	8.7829	2.5212	350.2213	354.4032	0.988 (0.979)	1.106 (0.275)
KAGT	**FV/TV**	17.7293	21.6364	57.2217	81.0126	0.706 (0.432)	-1.559 (0.127)
	NFV/TV	0.7722	0.6656	10.8742	14.3013	0.760 (0.999)	0.100 (0.921)
	Return	9.0298	5.5834	353.2783	413.2967	0.855 (0.723)	0.584 (0.562)
KMYA	**FV/TV**	11.1400	13.7728	8.6007	11.4711	0.750 (0.515)	-2.756*** (0.009)
	NFV/TV	-0.0643	0.8641	5.6715	4.7393	1.197 (0.685)	-1.350 (0.184)
	Return	8.0133	1.8814	484.7483	300.2873	1.614 (0.281)	1.027 (0.311)
MANA	**FV/TV**	18.4496	16.5345	78.0219	26.0733	2.992** (0.030)	0.880 (0.385)
	NFV/TV	0.2125	1.3582	26.9579	25.5540	1.055 (0.904)	-0.742 (0.462)
	Return	10.8716	3.4332	448.5882	306.7192	1.463 (0.391)	1.269 (0.211)
MESY	**FV/TV**	19.8166	13.5643	38.5629	16.5128	2.335 (0.058)	3.952*** (0.000)
	NFV/TV	-0.9191	0.0408	5.8957	6.6905	0.881 (0.775)	-1.269 (0.211)
	Return	11.6524	4.3355	612.4289	403.0819	1.519 (0.345)	1.077 (0.288)

Panel C. Industrials sector (continuation)

TAST	**FV/TV**	11.1479	13.5632	29.7298	26.5091	1.121 (0.795)	-1.511 (0.138)
	NFV/TV	-0.1886	1.1141	30.0688	9.2422	3.253*** (0.009)	-0.975 (0.335)
	Return	8.6198	4.4728	348.1471	222.0875	1.568 (0.311)	0.815 (0.420)
TEKS	**FV/TV**	2.2740	2.4981	1.0437	2.2695	0.460 (0.083)	-0.578 (0.567)
	NFV/TV	-0.2529	-0.0674	0.2214	0.1735	1.276 (0.581)	-1.385 (0.173)
	Return	8.8645	3.8778	410.3258	283.9798	1.445 (0.406)	0.888 (0.380)

* Difference is significant at the 0.1 level (2-tailed).
** Difference is significant at the 0.05 level (2-tailed).
*** Difference is significant at the 0.01 level (2-tailed).

Another important point is that none of the differences in mean returns is statistically significant whereas significant differences in variances of returns occurred only in some subsectors of the financials sector. Therefore, differences in mean foreign trading activity ratios are not due to return chasing. However, they might be due to each sector's expected performance during an economic contraction period, because Turkish economy contracted by 9.4% in 2001 according to State Institute of Statistics. Subsectors in the financials sector can be classified as interest-sensitive industries and the changes in expected interest rates after an economic crisis might affect these sectors more than others. Foreign investors might have lost interest in the financials sector due to the economic crisis that resulted in an increase in interest rates which might have caused the firms in the financials sector to perform poorly. The mean value of FV/TV for the MESY (metal products, machinery) had a large significant decrease after the crisis. MESY subsector contains automotive and durable goods production firms

and can be classified as a cyclical industry. Cyclical industries are expected to perform poorly during a contraction period and foreign investors might have lost interest in MESY subsector due to this reason.

Significant large increases in foreign trading activity in defensive industries are observed. Defensive industries are expected to perform well during economic contraction periods. GIDA (food, beverages) subsector is a defensive industry and a large significant increase in the mean FV/TV value is observed for this subsector. Although ELKT (electrics) has a few missing data points in the period before the crisis, tests are also conducted for this subsector. Statistically significant increases in foreign trading activity similar to those in GIDA subsector could also be observed for the ELKT subsector, since public utilities sector is also considered as a defensive industry. The results of tests indicate that the increase in the FV/TV value for the ELKT subsector is statistically significant at the 0.01 level and the mean value of FV/TV has more than doubled after the crisis ($\mu_{F,1}$ = 6.14% ,$\mu_{F,2}$= 12.76%). Another defensive sector is the ILTM (communications) sector that includes only the Turkcell Company (TCELL) that is a mobile communications company and provides public utilities services. It is observed that the mean FV/TV value after the crisis for the ILTM sector is higher than any other subsector ($\mu_{F,2}$= 38.14%). Therefore, based on this evidence it can be concluded that foreign trading activity has decreased in interest-sensitive and cyclical industries whereas it increased in defensive industries. This pattern of foreign trading behavior might lead us to conclude that foreign investors rely on fundamental analysis to make investment decisions.

5.3 The relationship between the level of foreign participation in total trading activity and the returns

5.3.1 The relationship between returns on the ISE-TUM and ISE national sector indices and foreign trading activity:

The relationship between return and foreign trading activity is examined through a series of regressions. The dependent variable in these regressions is return or the absolute value of return. Since linear regression is based on the assumption that error terms are normally distributed, the normality of dependent variables is checked by calculating skewness and kurtosis statistics and by conducting Kolmogorof-Smirnof test. The normality tests demonstrate that returns on market and national sector indices follow a normal distribution and that the absolute values of returns show departures from normal distribution (Table 12). The absolute value of return is transformed in order to make the dependent variable closer to normal distribution. Logarithmic transformation proved to be useful and the transformed absolute values of returns more closely resemble normal distribution. Therefore, transformed values of absolute return and untransformed values of return are used in regression analyses.

The relationship between market return and FV/TV turned out to be insignificant whereas there exists a statistically significant relationship between market return and NFV/TV (Table 13). NFV/TV explains 15.4% of return on its own. The coefficient of NFV/TV is positive and statistically significant. One percentage point increase in NFV/TV of the overall market is associated with a 4.6 percentage point increase in return on the market index. However, this positive

correlation between return and the percentage of net foreign transactions in the total transactions volume does not mean that changes in net foreign transactions cause changes in returns. Running regressions using lagged variables is necessary in order to draw conclusions about the causality that possibly exists in the relationship between return and NFV/TV. Since the relationship between return and foreign trading activity that occurs in the same time period is examined in this thesis, it is not possible to say anything about the casual relationship between these variables. Furthermore, analysis of the casual relationship between return and NFV/TV is beyond the scope of this master thesis.

The relationships between returns on national sector indices and foreign trading activity ratios for these sectors is similar to the relationship between market return and foreign trading activity ratios for the overall market. The relationship between FV/TV and absolute value of return is not statistically significant for all of the national sectors. In the regressions with return as dependent variable, the coefficient of NFV/TV is positive and statistically significant for all national sectors. However, there are differences in the explanatory power of NFV/TV for return on different sector indices (Table 14). NFV/TV in the financials sector can explain 22.2% of return on the UMAL (financials sector) index on its own. However, the adjusted R^2 values for UHIZ (services) and USIN (industrials) sectors are lower than that for UMAL sector with values of 3.5% and 9.4% respectively. This demonstrates that the high explanatory power of NFV/TV for return on the overall market index might largely be attributable to the high

Table 12. Normality tests for dependent variables of regressions

Skewness and kurtosis values are calculated and Kolmogorof-Smirnof test is conducted to check for the normality of dependent variables of regressions. Regressions with these dependent variables represent the relationship between return on the market or sector indices, and the foreign trading activity.

Panel A. Return on indices

Index	Mean	Std. Deviation	Skewness	Kurtosis	Kolmogorof-Smirnof p-value (2 tailed)
XUTUM	5.030	19.851	1.072	2.697	0.482
XUHIZ	4.324	19.205	0.755	1.064	0.764
XUMAL	5.891	22.287	1.093	2.404	0.538
XUSIN	4.653	18.183	0.951	2.524	0.319

Panel B. Absolute value of return on indices

Index	Mean	Std. Deviation	Skewness	Kurtosis	Kolmogorof-Smirnof p-value (2 tailed)
XUTUM	14.466	14.404	2.237	6.350	0.013
XUHIZ	14.805	12.866	1.759	3.781	0.154
XUMAL	16.331	16.170	2.161	5.883	0.040
XUSIN	13.080	13.382	2.074	5.301	0.034

Panel C. Transformed absolute value of return on indices

Index	Mean	Std. Deviation	Skewness	Kurtosis	Kolmogorof-Smirnof p-value (2 tailed)
XUTUM	0.137	0.123	1.669	2.930	0.037
XUHIZ	0.142	0.113	1.345	1.787	0.251
XUMAL	0.154	0.135	1.479	2.259	0.057
XUSIN	0.125	0.118	1.701	3.080	0.078

explanatory power of NFV/TV in the financials sector for the return on UMAL index.

The differences in terms of R^2 among regressions for national sectors might be caused by the differences in the FV/TV values among these sectors. FV/TV represents the foreign investors' contribution to the total trading volume in the market. As the share of foreign trading volume in the total trading volume increases, foreign investors' potential to influence prices might also increase. In previous sections, it is shown that the mean value of FV/TV for the financials sector is higher than the mean values of FV/TV for services and industrials sectors. Therefore, foreign investors' potential to influence the level of UMAL index might be higher than their potential to influence the levels of UHIZ and USIN index. The higher R^2 value for the relationship of NFV/TV and return in the financials sector might be due to higher foreign trading activity in that sector.

There might be a relationship between return and the change in the level of foreign trading activity. Regressions with return on the market index as the dependent variable and the change in the level of foreign trading activity in the overall market as the independent variable are also run in order to check for this. According to the results of these analyses, the relationship between absolute value of return and the change in the level of FV/TV is not statistically significant whereas the relationship between return and the change in the level of NFV/TV is statistically significant at 10% level (Table 15). The coefficient of NFV/TV is

Table 13. Regressions with return on market index as dependent variables

Dependent Variable:	$\|R_{UTUM}\|$ (1)	R_{UTUM} (2)
Constant	0.092 (1.281)	0.055** (2.563)
Total foreign transaction	0.267 (0.645)	
Net foreign transaction		4.569*** (3.729)
Adjusted R^2	0.0%	15.4%
Durbin-Watson	1.901	1.629

This table shows parameter estimates for the regression equations. Independent variables of these regressions are shown in the first column. In columns two and three, results of regressions for absolute return and return on the overall market index are reported. The numbers reported in parentheses under the dependent variable names represent the numbers assigned to these regression equations in the methodology chapter. The numbers in parentheses reported under parameter estimates are t-statistics. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively. $|R_{UTUM}|$ is the absolute value of $\ln(R_{UTUM}+1)$. R_{UTUM} is the return on the ISE-TUM index in decimal form. Total foreign transaction (FV/TV) is the ratio of total foreign trading volume to the total trading volume in the market. Net foreign transaction (NFV/TV) is the ratio of net foreign trading volume to the total trading volume in the market. The Durbin-Watson statistic checks for the autocorrelation in error terms from these regression equations.

Table 14. Regressions with return on sector indices as dependent variables

Dependent Variable:	$\|R_{UHIZ}\|$	R_{UHIZ}	$\|R_{UMAL}\|$	R_{UMAL}	$\|R_{USIN}\|$	R_{USIN}
	(3)	(4)	(3)	(4)	(3)	(4)
Constant	0.139***	0.048**	0.132**	0.056**	0.089	0.050**
	(3.981)	(2.146)	(2.090)	(2.428)	(1.359)	(2.467)
Total foreign transaction	0.016		0.098		0.256	
	(0.079)		(0.352)		(0.556)	
Net foreign transaction		1.926*		4.283***		3.319***
		(1.893)		(4.643)		(2.890)
Adjusted R^2	0.0%	3.5%	0.0%	22.5%	0.0%	9.4%
Durbin-Watson	1.847	1.829	1.883	1.689	1.872	1.652

This table shows parameter estimates for the regression equations. Independent variables of these regressions are shown in the first column. In columns two to six, results of regressions for absolute return and return on sector indices are reported. The numbers reported in parentheses under the dependent variable names represent the numbers assigned to these regression equations in the methodology chapter. The numbers in parentheses reported under parameter estimates are t-statistics. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively. $|R_{SECTOR}|$ is the absolute value of $\ln(R_{SECTOR}+1)$. R_{SECTOR} is the return on the sector index in decimal form. Total foreign transaction (FV/TV) is the ratio of total foreign trading volume to the total trading volume in the national sector. Net foreign transaction (NFV/TV) is the ratio of net foreign trading volume to the total trading volume in the national sector. The Durbin-Watson statistic checks for the autocorrelation in error terms from these regression equations.

Table 15. Regressions with changes in the level of foreign trading activity as independent variables

Dependent Variable:	$\|R_{UTUM}\|$	R_{UTUM}
	(5)	(6)
Constant	0.132***	0.042*
	(9.431)	(1.930)
Change in total foreign transaction	-0.151	
	(-0.338)	
Change in net foreign transaction		1.867*
		(1.957)
Adjusted R^2	0.0%	3.9%
Durbin-Watson	1.934	1.678

This table shows parameter estimates for the regression equations. Independent variables of these regressions are shown in the first column. In columns two and three, results of regressions for absolute return and return on the overall market index are reported. The numbers reported in parentheses under the dependent variable names represent the numbers assigned to these regression equations in the methodology chapter. The numbers in parentheses reported under parameter estimates are t-statistics. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively. $|R_{UTUM}|$ is the absolute value of $\ln(R_{UTUM}+1)$. R_{UTUM} is the return on the ISE-TUM index in decimal form. Change in the level of total foreign transactions is the change in the ratio of total foreign trading volume to the total trading volume in the market ($D(FV/TV)_t = (FV/TV)_t - (FV/TV)_{t-1}$). Change in the level of net foreign transactions is the change in the ratio of net foreign trading volume to the total trading volume in the market ($D(NFV/TV)_t = (NFV/TV)_t - (NFV/TV)_{t-1}$). The Durbin-Watson statistic checks for the autocorrelation in error terms from these regression equations.

positive in this regression equation. Therefore, return on the market index responds to the change in the level of NFV/TV for the overall market.

5.3.2 The effect of foreign trading activity on securities that are included and not included in the ISE-30 index:

The ISE-30 index is formed of 30 stocks whose market capitalization and trading volume are highest among all stocks in the market. Hence, the ISE-30 index is composed of mainly large firms whose stocks have large trading volumes. Every quarter, adjustments to the composition of the ISE-30 index can be made depending on changes in either market capitalization or trading volume of stocks. Non-seasonal changes are made when a stock is delisted from the ISE. In that case, a new stock that has the highest market capitalization and trading volume is added to the index[10].

A hypothesis test is conducted in order to check if the level of foreign trading activity differs between stocks included and not included in the ISE-30 index. The hypothesis is tested for the equality of mean values of FV/TV and NFV/TV for the stocks included in the ISE-30 index and for the stocks not included in the ISE-30 index. There exist a significant difference in FV/TV values and an insignificant difference in NFV/TV values for these two groups of stocks. The mean value of FV/TV is higher for stocks included in the ISE-30 index than for the stocks not included in the ISE-30 index (Table 16). However, since there is no difference in

[10] ISE web site, Hisse Senetleri Piyasası Endeksleri, http://www.imkb.gov.tr/endeksler/hissex.htm, viewed on 30 July 2002.

NFV/TV values for these two groups of stocks, the level of net foreign trading volume in a stock relative to the total trading volume in that stock does not differ depending on whether it is included in the ISE-30 index or not, although foreign investors are more actively trading in stocks that are included in the ISE-30 index.

Stulz (1999) argues that foreign investors are not well-informed about foreign securities and they think that the foreign securities that they buy are actually securities that domestic investors believe to be overvalued. As a protection against this, foreign investors invest in large firms for which information is more easily available. Kang and Stulz (1997) find that foreign investors are considerably more biased towards large firm stocks in Japan. The observation of higher foreign trading activity in the ISE-30 stocks might be explained by the size of firms included in the ISE-30 index rather than these stocks being included in the ISE-30 index. Since the ISE-30 index is composed of large firms and foreign investors are able to reach information about these firms more easily, they might prefer investing in these firms.

Two regressions are run in order to check if foreign investors has a higher potential to influence the prices of stocks included in the ISE-30 index than their potential to influence prices of stocks not included in the ISE-30 index. The absolute value of return on individual stocks and the return on individual stocks are the dependent variables and total foreign trading activity and net foreign trading activity, respectively, are the independent variables of these two

Table 16. Differences in foreign trading activity between stocks included in the ISE-30 index and stocks not included in the ISE-30 index

Equality of means is tested twice, once for NFV/TV and once for FV/TV values. An appropriate t-test method is used according to the result of the equality of variances test. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively.

Ratio	Mean value for stocks included in the ISE-30	Mean for stocks not included in the ISE-30	Equality of variances F-test (p-value)	Equality of Means t-test (p-value)
FV/TV	21.8933	4.0062	944.513*** (0.000)	37.288*** (0.000)
NFV/TV	0.1919	0.0029	232.426*** (0.000)	1.147 (0.252)

regressions. The normality of dependent variables is checked by conducting the Kolmogorof-Smirnof test and by observing normal probability plots of these variables. Since Kolmogorof-Smirnof tests indicate that both variables are not normally distributed, logarithmic transformation is applied to these variables. Kolmogrof-Smirnof test rejects the normality of transformed variables as well, but the normal probability plots do improve especially for the transformed return variable. Therefore, transformed dependent variables are used in both of the regressions.

The first regression with the absolute value of return as dependent variable turned out to be insignificant whereas the second regression with the return as dependent

Table 17. Regression used to test foreign investors' potential to influence prices of stocks included in the ISE-30 index

Dependent Variable:	Absolute value of stock returns (7)	Stock Returns (8)
Constant	0.183***	0.022***
	(3.981)	(9.529)
Total foreign transaction	-0.010	
	(-0.658)	
Net foreign transactions		0.292***
		(6.867)
ISE-30 indicator	-0.005	0.004
	(-0.166)	(0.558)
Total foreign transaction * ISE-30 indicator	0.000	
	(0.020)	
Net foreign transaction* ISE-30 indicator		0.998***
		(8.324)
Overall Significance		
F-test	0.383	60.152
p-value	(0.765)	(0.000)
Adjusted R^2	0.0%	1.4%
Durbin-Watson	1.785	1.977

This table shows parameter estimates for the regression equations 7 and 8. Independent variables of these regressions are shown in the first column. In columns two and three, results of regressions for absolute return and return on individual stocks are reported. The numbers reported in parentheses under the dependent variable names represent the numbers assigned to these regression equations in the methodology chapter. The numbers in parentheses reported under parameter estimates are t-statistics. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively. *Absolute value of stock return* is the absolute value of ln(R+1). *Stock return* is ln(R+1). R is the return on individual stocks in decimal form. *Total foreign transaction (FV/TV)* is the ratio of total foreign trading volume to the total trading volume of a stocks. *Net foreign transaction (NFV/TV)* is the ratio of net foreign trading volume to the total trading volume of a stock. *ISE-30 indicator* is a dummy variable having a value of 1 if the stock is included in the ISE-30 index in a given month and 0 otherwise. *Total foreign transaction*ISE-30 indicator* and *net foreign transaction*ISE-30 indicator* are the interactive dummy variables. Durbin-Watson statistic checks for the autocorrelation in error terms from these regression equations.

variable turned out to be significant at the 1 percent level (Table 17). The interactive dummy variable (NFV/TV*d) used in this regression also has a statistically significant coefficient at the 1 percent level. Furthermore, its coefficient has the same sign with that of the foreign trading activity ratio (NFV/TV). This demonstrates that net foreign transactions have a larger affect on a stock's return if it is included in the ISE-30 index.

This result might be a combined affect of high FV/TV values for stocks included in the ISE-30 index and the net foreign transactions in those stocks. A high FV/TV value for a stock means that foreign investors have a large share in the total trading volume of that stock. As foreign investors' share in the total trading volume increases, their potential to influence stock prices may also increase. Therefore, a large FV/TV value can increase the effect of NFV/TV on stock returns. The regression results support this conclusion, because stocks included in the ISE-30 index also have large FV/TV values. Hence, the effect of NFV/TV is larger for these stocks.

5.3.3 The level of foreign trading and the returns:

The statistical difference between the mean return on stocks most actively traded by foreigners and the mean return on stocks least actively traded by them is also examined. In addition to this, the statistical difference between the mean return on stocks that has the lowest negative NFV/TV values and the mean return on stocks that has the highest positive NFV/TV values is also tested. In order to check for this, two sets of portfolios are formed. The first set of portfolios are formed of

Table 18. Tests for equality of mean returns on portfolios formed according to the level of foreign trading activity in individual stocks

This table shows mean returns as well as test statistics for differences in means and variances of returns on portfolios. An appropriate t-test method is used according to the result of the equality of variances test.

Panel A. Differences between mean returns on $portfolio_H$ and $portfolio_L$

Mean value of return on $portfolio_H$	Mean value of return on $portfolio_L$	Equality of variances F-test (p-value)	Equality of Means t-test (p-value)
6.2092	5.6017	0.315 (0.575)	-0.200 (0.842)

Panel B. Differences between mean returns on $portfolio_P$ and $portfolio_N$

Mean value of return on $portfolio_P$	Mean value of return on $portfolio_N$	Equality of variances F-test (p-value)	Equality of Means t-test (p-value)
7.3566	4.2790	0.038 (0.845)	0.968 (0.335)

* Difference is significant at the 10 percent level (2-tailed).
** Difference is significant at the 5 percent level (2-tailed).
*** Difference is significant at the 1 percent level (2-tailed).

stocks that have highest and lowest FV/TV values ($portfolio_H$ and $portfolio_L$, respectively). The second set of portfolios are formed of stocks that have highest positive NFV/TV values and lowest negative NFV/TV values ($portfolio_P$ and $portfolio_N$, respectively). The returns on these equally weighted portfolios are used in testing two hypotheses mentioned above.

The results of these hypotheses tests indicate that there exist a significant difference neither between the mean returns on $portfolio_H$ and $portfolio_L$ nor between the mean returns on $portfolio_P$ and $portfolio_N$ (Table 18). Regressions with the return on a portfolio as dependent variable and the average monthly foreign trading activity ratios of stocks in that portfolio as independent variables are run (regression 9 and 10). Both of these regressions turned out to be statistically insignificant. Therefore, conclusions cannot be drawn using the information related to the coefficients of these regressions.

5.3.4 The sign of net foreign transactions and the returns:

Positive net foreign transactions are expected to result in positive returns whereas negative net foreign transactions are expected to result in negative returns. Two hypotheses are tested in order to check for this. Firstly, the equality of mean values for returns associated with positive net foreign transactions and returns associated with negative net foreign transactions is tested. Secondly, the equality of proportions of positive, negative and zero returns in returns associated with negative and positive net foreign transactions is tested.

First hypothesis test indicates that there exists a significant difference between the mean returns associated with positive NFV and mean returns associated with negative NFV (Table 19). The mean return associated with positive NFV is higher than the mean return associated with negative NFV. This might be due to the fact that positive returns occur more frequently when NFV values are positive than when NFV values are negative. The results of the second hypothesis testing confirm this. There exists a significant difference between the proportion of positive returns in the sample of returns associated with positive NFV and the proportion of positive returns in the sample of returns associated with negative NFV. The proportion of positive returns in the sample of returns associated with positive NFV is higher. Similarly, the proportion of negative returns in the sample of returns associated with negative NFV is higher than that associated with positive NFV. Furthermore, there exists no statistically significant difference between the proportions of zero returns (Table 20).

A regression is run in order to check for the existence of an asymmetric relationship between return and net foreign trading activity. Kolmogorof-Smirnof test rejects the normality of stock returns in our sample. Transformed individual stock returns are used in the analysis as the dependent variable, because transforming returns makes the distribution closer to normality. The regression is significant at the 1 percent level. However, the interactive dummy variable is insignificant suggesting that there does not exist an asymmetric relationship between return and net foreign trading activity based on the sign of net foreign transactions (Table 20). However, the Pearson correlation coefficient between the

net foreign trading activity ratio (NFV/TV) and the interactive dummy (NFV/TV*d) is 0.718. A sample correlation coefficient greater than +0.70 for two independent variables indicates potential problems with multicollinearity (Anderson, Sweeney, Williams, 1999). Thus, multicollinearity might be the reason for the interactive dummy to have a statistically insignificant coefficient whereas the coefficient on net foreign trading activity ratio is statistically significant.

Table 19. Hypothesis testing for differences in returns according to the sign of net foreign transactions

Panel A shows the test results for the equality of mean values of returns associated with positive net foreign transactions and returns associated with negative net foreign transactions. Panel B shows the test results for the equality of proportions of positive, negative and zero returns in the sample of returns associated with positive and negative net foreign transactions.

Panel A. Mean differences

Mean value of stock returns associated with positive net foreign transactions	Mean value of stock returns associated with negative net foreign transactions	Equality of variances	Equality of Means
		F-test (p-value)	t-test (p-value)
8.1274	4.5372	13.650*** (0.000)	-7.727*** (0.000)

Panel B. Proportion differences

	Proportion in returns associated with positive net foreign transactions	Proportion in returns associated with negative net foreign transactions	Equality of proportions
			Z-score (p-value)
Positive Returns	0.5580	0.4962	7.455*** (0.000)
Negative Returns	0.4072	0.4697	-7.580*** (0.000)
Zero Returns	0.0348	0.0341	0.223 (0.824)

- Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively.

Table 20. Regression to check for an asymmetry in the return and net foreign trading activity relationship

Dependent Variable:	Stock Returns
	(11)
Constant	0.0020***
	(8.003)
Net foreign transaction	0.3870***
	(10.344)
Negative net foreign transaction	0.0069*
	(1.762)
Net foreign transaction * negative net foreign transaction	-0.0013
	(-0.0025)
Overall Significance	
F-test	70.438
p-value	(0.000)
Adjusted R^2	1.1%
Durbin-Watson 4/	1.985

This table shows estimated parameters for the regression equation 11. Independent variables of these regressions are shown in the first column. In column two the result of the regression for returns on individual stocks is reported. The number reported in parentheses under the dependent variable name represents the number assigned to this regression equation in the methodology chapter. The numbers in parentheses reported under parameter estimates are t-statistics. Significance at the 10, 5 and 1 percent levels are indicated by the symbols *, ** and ***, respectively. *Stock return* is ln(R +1). R is the return on individual stocks in decimal form. *Net foreign transaction* (NFV/TV) is the ratio of net foreign trading volume to the total trading volume in a stock. *Negative net foreign transaction* is a dummy variable having a value of 1 if NFV in a given month is negative and 0 otherwise. *Net foreign transaction*negative net foreign transaction* is an interactive dummy variable. Durbin-Watson statistic checks for the autocorrelation in error terms from this regression equation.

CHAPTER 6

CONCLUSION

In this master thesis, the role of foreign investors in the Istanbul Stock Exchange is examined in three dimensions: differences among sectors and subsectors in terms of foreign trading activity, the effect of November 2000 – February 2001 crisis on foreign trading activity and the relationship between return and foreign trading activity. Foreign trading activity over time is also examined. Monthly data covering a time period of 72 months between January 1997 and December 2002 is used in empirical analyses.

Important findings from the examination of total and net foreign trading activity over time are mentioned first. Foreign trading activity has been generally increasing until August 1999 and has a decreasing trend since then until December 2001. Foreign investors are not unusually less or more active during the crisis period between November 2000 and February 2001. Foreign investors are net sellers in almost all of the months between December 1999 when the economic stabilization plan was publicly announced and November 2000 when the first indications of a currency crisis are observed. Therefore, the outstanding performance of the ISE during this time period when economic prospects were perceived to be good is not attributable to inflow of foreign capital.

The correlations for foreign trading activity ratios across sectors and subsectors are also examined. Positive and statistically significant correlations among national sectors in terms of their FV/TV and NFV/TV values are generally observed. Therefore, total and net foreign trading activity in national sectors generally move together. Positive and statistically significant correlations among subsectors of the financials sector and among subsectors of the industrials sector in terms of their FV/TV and NFV/TV values are also observed in general. The FV/TV values of the subsectors of the financials sector seem to be more strongly correlated than those of the subsectors of the industrials sector. However, in terms of NFV/TV values the subsectors of the industrials sector seem to be more strongly correlated with each other than the subsectors of the financials sector.

Significance tests for the differences in foreign trading activity ratios between national sectors indicate that the average level of FV/TV differ among national sectors whereas the average level of NFV/TV does not differ among them. In addition, there exist statistically significant differences in mean FV/TV values of subsectors of all national sectors whereas there exist statistically significant differences in mean NFV/TV values of subsectors of only the financials and technology sectors. The differences in foreign trading activity among sectors and subsectors might have two possible explanations. Firstly, foreign investors might be making investment decisions based on fundamental analysis and their interest in sectors might differ as long as the economic prospects based on economic indicators of sectors and subsectors also differ. Secondly, foreign investors might

be investing in large firms on which they can obtain information more easily (Stulz, 1999). Thus; higher foreign trading activity is observed in sectors and subsectors with higher average firm size on the ISE.

The effects of November 2000 – February 2001 crisis on returns and foreign trading activity are also examined. No statistically significant change in mean returns on the overall market, national sector or subsector indices is observed after the crisis. The only statistically significant change in the variance of return after the crisis is observed for the GMYO (investment trusts) subsector. The variance of returns on this subsector has increased after the crisis. Therefore, the crisis does not seem to affect the distributional characteristics of returns on the overall market, national sector and most subsector indices.

FV/TV represent the total foreign trading volume relative to the total trading volume in the market. The mean FV/TV values of the overall market before and after the crisis are statistically significantly different from each other. Foreign investors have been less actively trading in stocks listed on the ISE after the economic crisis. Statistically significant differences in the mean FV/TV values before and after the crisis are observed for the services and financials sectors. Foreign investors have been less actively trading financials sector stocks whereas they have been more actively trading services sector stocks after the crisis. The decrease in foreign trading activity in the financials sector might be due to foreign investors losing interest in stocks of financials sector firms that are adversely affected by the crisis. The mean FV/TV values of subsectors that are interest-

sensitive and cyclical have decreased while the mean FV/TV values of subsectors that are defensive have increased after the crisis. Therefore, after the crisis foreign trading activity has shifted from interest-sensitive and cyclical industries to defensive industries. This indicates that foreign investors might be making investment decisions based on fundamental analysis.

The relationship between return and foreign trading activity is examined firstly for the overall market and national sectors. There exist a positive and statistically significant correlation between return and NFV/TV for both the overall market and the national sectors. NFV/TV of the overall market explains 15.4% of return on the market index on its own. The explanatory power of NFV/TV for return on sector indices is higher for the financials sector than for the services and industrials sectors. Return on the overall market also responds to the change in the level of NFV/TV for the overall market.

The relationship between return and foreign trading activity is also examined for the stocks included in the ISE-30 index. Foreign investors are more actively trading in stocks included in the ISE-30 than they do in stocks not included in the ISE-30 index. Foreign investors tend to prefer larger firms (Kang and Stulz, 1997). Therefore, the fact that the mean FV/TV is higher for stocks included in the ISE-30 index than for stocks not included in the ISE-30 index might be due to the fact that the ISE-30 index is mainly composed of large-capitalization stocks with large trading volumes. Moreover, regression results indicate that the effect of NFV/TV on return is higher for stocks that are included in the ISE-30 index.

Therefore, foreign investors have more potential to influence prices of stocks included in the ISE-30 index than their potential to influence prices of stocks not included in the ISE-30 index. However, this might be due to the FV/TV values for stocks included in the ISE-30 index being also large, because foreign investors might have a higher potential to influence the prices of stocks in whose total trading volume they have a larger share.

Foreign investors are more actively trading in some stocks than others. It is checked if there exists a statistically significant difference between the returns on stocks that are most actively and least actively traded by foreign investors. Two portfolios of stocks with largest and smallest 6-month average FV/TV values are formed ($portfolio_H$ and $portfolio_L$). There exists no statistically significant difference between the returns on these two portfolios. It is also checked if there exists a statistically significant difference between the returns on stocks with the highest positive NFV/TV values and the lowest negative NFV/TV values. Two portfolios of stocks with largest and smallest 6-month average NFV/TV values are formed ($portfolio_P$ and $portfolio_N$). No statistically significant difference between the returns on these two portfolios is found either. These results might be due to the portfolio formation method used in this thesis. These portfolios are formed based on average FV/TV or NFV/TV values of stocks calculated over 6-month periods. These 6-month averages might be influenced by very large or very small foreign trading activity measures that are observed only a few times in this 6-month period. Although these stocks satisfy the portfolio formation criteria according to their average foreign trading activity ratios over a 6-month period,

there may not be a consistently high or low foreign trading activity in these stocks throughout that time period to grant a difference in their returns on a monthly basis.

Positive net foreign transactions are expected to result in positive returns whereas negative net foreign transactions are expected to result in negative returns. Therefore, a statistically significant difference might exist between returns on stocks associated with positive NFV and returns on stocks associated with negative NFV. Hypothesis test indicates that such a difference exists. It is also found that the proportion of positive (negative) returns in the sample of returns associated with positive NFV is statistically significantly different than the proportion of positive (negative) returns in the sample of returns associated with negative NFV values. As expected, it is more likely to observe positive returns when NFV is positive and it is more likely to observe negative returns when NFV is negative.

To conclude, foreign trading activity has shifted from interest-sensitive and cyclical industries to defensive industries after the November 2000 – February 2001 crisis. Net foreign trading volume relative to the total trading volume (NFV/TV) is positively correlated with return. The effect of NFV/TV on return is larger for stocks included in the ISE-30 index than for stocks not included in the ISE-30 index. Therefore, domestic investors who invest in stocks included in the ISE-30 might benefit more from following net foreign trading activity in stocks included in the ISE-30 index than they might benefit from following net foreign

trading activity in stocks not included in the ISE-30 index. It is more likely that positive (negative) return is associated with positive (negative) NFV. Therefore, domestic investors might be able to predict the direction of price change by following whether foreign investors are net sellers or net buyers.

Foreign portfolio investment is a phenomenon that has yet many aspects to discover. Further research in this subject can be conducted. Firstly, the level of foreign trading activity in the overall market, sectors and subsectors might be predicted by economic indicators of the overall economy, sectors and subsectors, respectively. Some findings of this master thesis might indicate that foreign investors make investment decisions based on fundamental analysis. Therefore, there might be a significant relationship between economic indicators and foreign trading activity. Secondly, foreign investor trading patterns might be examined in order to draw conclusions regarding the causal relationship between returns and NFV/TV values.

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APPENDIX

CODES OF SECTOR AND SUBSECTOR INDICES ON THE ISE

CODE	*INDEX*
XU100	**ISE NATIONAL-100**
XU050	**ISE NATIONAL-50**
XU030	**ISE NATIONAL-30**
XUTUM	**ISE NATIONAL - ALL SHARES**
XUSIN	**ISE NATIONAL - INDUSTRIALS**
XGIDA	FOOD, BEVERAGE
XTEKS	TEXTILE, LEATHER
XKAGT	WOOD, PAPER, PRINTING
XKMYA	CHEMICAL, PETROLEUM, PLASTIC
XTAST	NON-METAL MINERAL PRODUCTS
XMANA	BASIC METAL
XMESY	METAL PRODUCTS, MACHINERY
XUHIZ	**ISE NATIONAL - SERVICES**
XELKT	ELECTRICITY
XULAS	TRANSPORTATION
XTRZM	TOURISM
XTCRT	WHOLESALE AND RETAIL TRADE
XILTM	TELECOMMUNICATIONS
XUMAL	**ISE NATIONAL - FINANCIALS**
XBANK	BANKS
XSGRT	INSURANCE
XFINK	LEASING, FACTORING
XHOLD	HOLDING AND INVESTMENT
XGMYO	REAL ESTATE INVEST.TRUSTS
XUTEK	**ISE NATIONAL TECHNOLOGY**
XBLSM	INFORMATION TECHNOLOGY
XSVNM	DEFENSE
XYORT	**ISE INVESTMENT TRUSTS**

Source: ISE web site, *Constituent Companies of ISE Stock Market Indices*, http://www.ise.org/data/index.zip , viewed in December 2002.