

An Examination of U.S. Institutional Investor Sentiment Effect on the Turkish Stock Market

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Abstract

The purpose of this study is to examine the effect of rational and irrational components of U.S. institutional investor sentiment on Istanbul Stock Market (ISE) return and volatility. A VAR analysis reveals a significant lagged relationship between ISE stock returns and rational U.S. institutional investor sentiment. An Impulse Response analysis further shows that unanticipated increase in the rational component of U.S. institutional investor sentiment has a significant positive effect on ISE returns, but a significant negative effect on ISE volatility. An increase in the irrational component too effects ISE returns but with a lag. Overall, the empirical results support the contention that the behavior of U.S. sophisticated investors, who trade on market fundamentals, reduces uncertainty and noise risk in the ISE market. The findings also provide some support to the recent claim that stock returns are negatively related to stock market volatility.

Keywords: Investor sentiment, ISE, VAR model

JEL Classification: G12, G14

Introduction

Although a number of models have been proposed to explain and predict stock returns, forecasting stock returns is still a formidable challenge. In particular, the traditional financial models ignore the psychological and sociological factors that conceivably influence asset prices and the investment decision process. Because of the limited efficacy of traditional finance models, researchers have been trying to build alternative models that rely on psychological and behavioral factors (Barberies and Thaler, 2003).

Behavioral finance challenges the rational investor assumption that underlies traditional finance models and argues that some financial anomalies can best be explained using models that assume some degree of investor irrationality (De Long et al., 1990). This is a contrarian approach as it assumes that investors might be irrational in their reaction to new information about asset pricing and investment decisions. The presence of irrational investors or noise traders (Kyle, 1985) constrains the ability of rational, efficiently informed investors to conduct arbitrage because although the rational investors are capable of hedging fundamental risks perfectly, they are still subject to the irrational investor risk, or noise trader risk, and this causes the stocks to be mispriced to an even greater extent (De Long et al., 1990). Irrational investors do not trade on stock fundamentals but on the basis of sentiment and other psychological impulses.

The investor sentiment can persevere in the financial markets. The unpredictability of investor's perceptions creates risk in the asset prices, preventing rational arbitrageurs from aggressively betting against them. As a result, asset prices can deviate significantly from their intrinsic values because such investors do not use stock fundamentals when they make investment decisions. Therefore, investor sentiment has a long term impact on asset prices. A partial list of behavioral asset models include De Long, Shleifer, Summers and Waldmann

(DSSW) (1990), Campbell and Kyle (1993), Hirshleifer, Subrahmanyam and Titman (2006), Dumas, Kurshev and Uppal (2005) and Kogan, Ross, Wang and Westerfield (2006). However, empirical validation of these models has produced mixed results. Lee, Shleifer and Thaler (LST) (1991), Swaminathan (1996), Brown and Cliff (2004) and Neal and Wheatley (1998) find investor sentiment significantly affects stock returns. Sias, Starks and Tinic (2001) and Qui and Welch (2006) do not find a significant relation between proxies for individual investor sentiment and closed-end fund discounts. Behavior, unlike rational choice, is society and culture specific. Thus, the empirical findings of behavioral models cannot necessarily be generalized to other societies and cultures; each needs to be studied independently to determine the relevance and applicability of the behavioral models.

This study is the first research that examines the impact of U.S. institutional investor sentiment on ISE stock return and volatility. The ISE, an emerging stock market, was established in 1985 and started operating in 1986. The purpose of establishing the ISE was to create a secure and stable trading environment for both investors and the firms. As of December 2011, the market capitalization of the 361 companies listed in the ISE was approximately \$423.6 billion dollars ranking the ISE 15th among emerging markets in terms of capitalization with average daily trading of \$798.4 million (<http://www.ise.org/Publications/AnnualReports>). This paper adds to the growing literature on behavioral finance by filling a gap and addressing the spillover effect of foreign investor sentiment in the Istanbul Stock Market.

The empirical results of the generalized impulse functions generated from vector autoregression (VAR) shows that unanticipated changes in the rational component of U.S. institutional investor sentiment has a positive significant impact on ISE returns. Thus a positive investor sentiment tends to increase ISE returns. A positive increase in the irrational component

of U.S. institutional investor sentiment has a significant negative effect on ISE volatility in the second lag. Thus, this effect is slow to trickle down to the ISE. An Impulse Response analysis is then performed to study the impact of an unanticipated increase in the rational and irrational components of U.S. institutional investor sentiment on the ISE returns and volatility. The first-period impulse response indicates that a one standard deviation shock to ISE return results in approximately a 2.0% increase in ISE return, and a 0.8% decrease in ISE volatility. The irrational component of the U.S. institutional investor sentiment also has a significant impact on ISE returns but with a lag. These results show that the U.S. institutional investor sentiment is driven by both rational and irrational impulses and that the Investor Intelligence (II) survey is a good proxy for institutional investor sentiment.

The results of this study have practical implications for both domestic and international investors. Investors who are interested in making investment in the Turkish stock market have to consider the impact of U.S. institutional investor sentiment on Turkish stock market return and volatility. These spillover effects from U.S. need, therefore, to be incorporated in the investor's international asset pricing model.

The rest of the paper is organized as follows. Section 2 presents literature review, Section 3 discusses the model and methodology, Section 4 presents data, Section 5 first discusses the impact of U.S. market fundamentals on sentiment, and then reports the VAR results, and Section 6 concludes the research.

2. Literature Review

The effect of investor sentiment on stock market return has been extensively investigated in developed financial markets during the last two decades, for example, Black (1986); De Long, Shleifer, Summers, and Waldman (1990); Shleifer and Vishny (1997); Lewellen, Lease, and

Schlarbaum (1977); Poterba and Summers (1988); Lee, Shleifer, and Thaler (1991); Elton, Gruber, and Busse (1998); Campbell and Shiller (1988); D'Avolio (2002); Trueman (1988); Barberis, Shleifer, and Vishny (1998); Shefrin and Statman (1994); Shleifer and Summers (1990); and Brown and Cliff (2004, 2005). These studies reveal that investor sentiment has a significant effect on asset prices, with important implications for portfolio allocation and asset management. The studies also evidence the existence of a class of traders, referred to in the literature as irrational or noise traders, who make their investment decisions on sentiment rather than fundamentals. Consequently, unanticipated movements in the sentiment of irrational traders can have a significant effect on stock returns (Baker and Wurgler, 2006, 2007; Barberis *et al.*, 1998; Black, 1986; De Long *et al.*, 1990; Fisher and Statman (2000); Kumar and Lee, 2006; Trueman, 1988).

Previous studies have focused generally on investor sentiment and aggregate stock return in developed markets, and have tested in different ways whether the stock market as a whole could have deviated from fundamental prices (Baker & Wurgler, 2007).

Shiller, Kon-Ya, and Tsutsui (1996) article delves into the reasons for the Japanese stock market crash and its loss of value between 1989 and 1992. Investor sentiment was gauged through a survey of institutional investors in Japan and the United States. The semiannual questionnaires asked the respondents in both Japan and the United States about their expectations and attitudes over the period 1989 to 1994. They found dramatic differences in expectations between the two countries, with the Japanese expectations for future earnings growth in Japan becoming less optimistic between 1989 and 1994. They concluded that the Japanese stock market crashed due to changes in Japanese price expectations and speculative strategies.

Brown and Cliff (2004) examine the effect of investor sentiment on near-term stock in the U.S. stock market. They document that historical stock returns are an important factor for investor sentiment.

Baker and Wurgler (2006) provide evidence that investor sentiment has significant cross-sectional effects in the U.S. stock market. For example, they find that when beginning-of-period proxies for investor sentiment are low, subsequent stock returns are relatively high on small stocks, young stocks, high-volatility stocks, unprofitable stocks, non-dividend-paying stocks, extreme-growth stocks, and distressed stocks. This suggests that these stocks are relatively undervalued during periods when investor sentiment is low. During high-sentiment periods, they find the opposite pattern, indicating that these categories of stocks are relatively overvalued when sentiment is high.

Another study conducted by Kumar and Lee (2006) investigates the impact of 1.8 million retail transactions on stock returns in the United States from 1991 to 1996. They test the noise trader model, to determine whether individual investor sentiment can have an impact on stock returns. Their findings are consistent with noise trader theory and suggest that systematic retail transaction activities have incremental explanatory power for small stocks, value stocks, stocks with low institutional ownership, and stocks with low prices. Thus their results support the notion that investor sentiment has an important impact on stock prices. Lemmon and Portniaguina (2006) examine the effect of investor sentiment on U.S. stock market return. They use consumer confidence data as a proxy for sentiment and find that changes in consumer confidence forecasts predict variation in stock returns. Their findings are consistent with the behavioral finance theory that investor sentiment affects stock returns. In addition, they find that

when consumer confidence is high, investors appear to overvalue small stock relative to the large stocks.

As indicated, most of these earlier studies on the investor sentiment focus on developed stock markets. In addition, they only investigate the effect of investor sentiment on stock returns. The effect of foreign investor sentiments in emerging stock market returns and volatility are not fully examined (Verma et al., 2008; Verma & Soydemir, 2006). Therefore, this study examines the impact of the U.S. institutional investor sentiment on the ISE returns and volatility. It adds to the limited number of studies on the effect of international investor sentiment on stock returns and volatility in emerging markets by showing that the U.S. institutional investor sentiment has a statistically significant impact on the ISE return and volatility.

Several recent studies have grappled with the challenge of measuring investor sentiment. Investor sentiment is difficult to measure directly so several proxies have been suggested in the finance literature. A frequently used proxy for institutional investor sentiment is the Investors Intelligence Surveys (II). This proxy has been used by, among others, Brown and Cliff (2004), Clarke and Statman (1998); Lee et al. (2002), Solt and Statman (1988), Verma and Soydemir (2006) and Calafiore (2010). This study also measures investor sentiment for the U.S. institutional investor by using the same proxy.

3. Model and Methodology

This study examines the impact of U.S. institutional investor sentiment on ISE market returns and volatility. Extant literature demonstrates that U.S. market fundamentals have a significant effect on international stock market returns, including those of emerging stock markets (Andersen, Bollerslev, Diebold, & Vega, 2007; Becker et al., 1995; Tandon & Ulrich, 1987; Wongswan, 2006, Meric, Leal, Ratner, & Meric, 2001; Ratanapakorn & Sharma, 2002; Soydemir, 2002).

Qui and Welch (2006) show that information about important market fundamentals is likely to be correlated with current market conditions. In line with previous studies on the subject, for example, Qui and Welch (2006), Baker and Wurgler (2006), Lemmon and Portniaguina (2006), Verma and Soydemir (2006) and Schmeling (2009), we regress U.S. market fundamentals on U.S. institutional investor sentiment in order to capture the effect of economic risk factors on investor sentiment. We use the Verma and Soydemir (2006) model below to capture the two components of investor sentiment - rational and irrational:

$$Sent_{1t} = \gamma_0 + \sum_{j=1}^n \gamma_j FUND_{jt} + \xi_t \quad (1)$$

where γ_0 is a constant; γ_j is the parameter to be estimated; and ξ_t is the random error term.

$Sent_{1t}$ is the movement in U.S. institutional investor sentiment at time t . $Fund_{jt}$ is the set of fundamental factors indicating rational investor expectations based on several risk variables which are commonly accepted and used to value asset prices in the literature.

The fitted values of Equation 1 enable the computation of the rational component of sentiment i.e. $Sent_{1t}$, while the residual of Equation 1 captures the irrational component of investor sentiment i.e. ξ_t . The return generation for ISE is then modeled following Calafaire (2010):

$$R_t = \alpha_0 + \alpha_1 Sent_{1t-k} + \alpha_2 \xi_t + \alpha_3 \vartheta_t + \alpha_4 \sigma_t + \rho_t \quad (2)$$

where α_0 is a constant; α_1 , α_2 , α_3 , and α_4 are the parameters to be estimated; k is the appropriate lag length; and ρ_t is the random error term. In this model, the parameter α_1 captures the impact of U.S. rational institutional investor sentiment, while the parameter α_2 captures the impact of U.S. irrational institutional investor sentiment, and α_4 captures the ISE volatility.

The monthly standard deviation of ISE stock returns, σ , is estimated using the Hull (2007) model. The model provides unbiased estimates of the monthly standard deviation by using the most recent m observations on the u_t , which is the continuously compounding return between the end of the month t and month $t-1$:

$$\sigma_t = \sqrt{\frac{1}{m} \sum_{i=1}^m u_{t-i}^2} \quad (3)$$

The effect of investor sentiment on ISE volatility is then modeled after Calafoire (2010):

$$\sigma_t = \alpha_0 + \alpha_1 Sent_{1t-k} + \alpha_2 \xi_t + \rho_t \quad (4)$$

where σ_t is the one-month volatility of the ISE as estimated using Equation 3; α_0 is a constant; α_1 , and α_2 are parameters to be estimated; and ρ_t is the random error term. The parameter α_1 captures the transmitted effect of the rational sentiment of U.S. institutional investors, while α_2 captures the effect of the irrational sentiment of U.S. institutional investors on ISE volatility.

The Vector Autoregression (VAR) modeling approach proposed by Sims (1980) is chosen as an appropriate methodology to explore the impact of U.S. institutional investor sentiment on ISE return and volatility. Several studies show that the predictive performance of the VAR models is better than the most complex structural models (Litterman and Supel, 1983; Hakkio and Morris, 1984; and Webb, 1999). Therefore, the VAR model captures dynamic relationships in a relatively unconstrained way and provides a good approximation of the true data-generating process.

However, time delays in the information transmission from the macroeconomic variables may create lags in the observation of data regarding market fundamentals and the incorporation of this information into asset prices. To determine the proper lag lengths, this study uses the Akaike information criterion (AIC) and Schwarz information criterion (SIC). The VAR model is expressed as follows:

$$Z(t) = C + \sum_{s=1}^m A_s Z(t-s) + \varepsilon(t)$$

where $Z(t)$ is a column vector of variables under consideration; C is a constant that captures deterministic sentiment; $A(s)$ is a matrix of coefficients; m is the lag length; and $\varepsilon(t)$ is a vector of random error term.

VAR is a multifactor index models that examines the impact of expected movements in investors sentiments. The model ignores the effect of unexpected changes in investor sentiment on stock market returns (Verma and Soydemir, 2008). Besides, it is a very difficult to interpret the coefficients from the regression models in VAR system and the individual VAR coefficient results are not able to capture the full impact of an independent variable (Statmen *et al.*, 2006). Therefore, this study uses the generalized impulse response functions (IRFs) generated from the Vector Autoregression (VAR) model to examine the effect on ISE stock returns and volatility of unanticipated movements in U.S. institutional investor sentiment. The IRF captures in a better and unambiguous manner the effect on current and future values of economic fundamentals of a one-time shock to the system.

4. Data

The sample period for this study extends from January 2004 to December 2010. The U.S institutional investor sentiment index is obtained from the survey data, Investors Intelligence (II), in line with some previous studies, such as Brown & Cliff (2004), Clarke & Statman, (1998), Lee *et al.* (2002) and Solt & Statman (1988). Investors Intelligence (II) is an investment service located in Larchmont, New York, that publishes data based on a survey of investment advisory newsletters. Each advisory newsletter is assessed as being bullish, bearish, or hold. The institutional investor sentiment is calculated as the spread between the percentage of bullish and

the percentage of bearish investors. The II investor sentiment index thus provides a view of the overall economy.

The ISE returns and volatility are calculated using the Istanbul Stock Exchange National-100 Index. This index is the main indicator of the overall condition of the Turkish economy. The ISE market returns indices are obtained from Datastream, and converted into monthly continuously compounded returns for use in the study.

Several macroeconomic factors as follows are used in this study as being representative of U.S. market fundamentals:

- Economic growth measured as the monthly change in the U.S. industrial production index (IIP) (Fama, 1970).
- Short-term interest rates measured as the yield on the one-month U.S. Treasury bill (Campbell, 1991).
- Inflation measured as the monthly change in the U.S. consumer price index (Fama & Schwert, 1977; Sharpe, 2002).
- Currency fluctuation (Elton & Gruber, 1991) measured as the change in the Turkish lira and U.S. dollar exchange rate.
- Business conditions measured as a default spread, which is the difference in yields on Baa and Aaa corporate bonds (Fama & French, 1988).
- Future economic expectation factor measured as the term spread, which is the difference in yields on ten-year U.S. Treasury bond and three-month T-bills (Fama, 1990).

- Excess return on the market portfolio measured as the value-weighted returns on all NYSE, Amex, and NASDAQ stocks minus the one month T-bill (Lintner, 1965; Sharpe, 1964).
- The premium on a portfolio of small stocks relative to large stocks (SMB) (Fama & French, 1993).
- The premium on a portfolio of high-book-to-market stocks relative to small stocks (HML) (Fama & French, 1993).
- The momentum factor, which is the average return on two high prior return portfolios minus the average return on two low prior return portfolios (Jegadeesh & Titman, 1993).

The data on U.S. industrial production index, business conditions, and inflation rates are obtained from Datastream; short-term interest rates, future economic variables, and currency fluctuations are obtained from the Federal Reserve Bank of St. Louis; the excess return on the market portfolio, SMB, HML, and the momentum factor are obtained from the Kenneth French Data Library at the Tuck School of Business, Dartmouth College.

5. Empirical Results

Descriptive Statistics

Table 1 shows the summary of descriptive statistics for all the variables pertaining to U.S. market factors in this study. The mean of $SENT_1$ is 18.74%, suggesting that U.S. institutional investors have been bullish on average during most of the sample period. In addition, the sentiment measure, $SENT_1$ has a higher standard deviation than that for ISE returns, indicating that investor sentiment has been highly volatile. The means of the ISE index returns and

volatility are 1.90% and 7.16% respectively during the sample period. More importantly, the volatility of the variables for market fundamentals, as measured by the standard deviation, is lower than that of the sentiment proxy and the ISE index returns.

Table 1

Descriptive Statistics of U.S. and ISE Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
SENT ₁	0.1874	0.2193	0.6426	-0.3000	0.1594	-0.5879	3.6707
ISTRET	0.0190	0.0367	0.2284	-0.2279	0.0882	-0.3179	3.1785
ISTVOL	0.0716	0.0713	0.1361	0.0091	0.0262	0.2370	2.6751
BUSCON	0.0091	0.0085	0.0141	0.0055	0.0021	0.7101	2.4307
EXCRATE	-0.0011	0.0017	0.0314	-0.0467	-0.0163	-0.5009	2.6357
FUTEC	-0.0002	-0.0006	0.0080	-0.0040	0.0027	0.7960	3.0625
HML	0.0021	0.0007	0.1972	-0.0875	0.0376	1.4491	10.6938
IIP	0.0051	0.0046	0.1492	-0.2079	0.0509	-0.9046	7.5700
INF	0.0002	0.0004	0.0104	-0.0089	0.0036	-0.0061	3.0843
INT	0.0028	0.0167	0.0513	0.0002	0.0183	0.3340	1.5938
MOM	-0.0002	0.0008	0.3764	-0.3188	0.0979	0.3291	6.5760
RM	0.0001	0.0066	0.0816	-0.1063	0.0455	-0.3463	2.6141
SMB	0.0086	0.0068	0.1462	-0.1160	0.0399	0.2004	4.3878

Note. Variables are U.S. institutional investor sentiments (SENT₁), returns on the ISE index (ISTRET), volatility of the ISE index (ISTVOL), U.S. economic growth (IIP), U.S. business conditions (BUSCON), U.S. future economic conditions (FUTEC), the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML), the premium on a portfolio of small stocks relative to large stocks (SMB), inflation (INF), short-term interest rates (INT), momentum factors (MOM), currency fluctuations (EXCRATE), and excess return on the market portfolio (RM).

The cross-correlations between variables relating to U.S. market fundamentals are provided in Table 2. There appears to be low correlations among the variables. Therefore, this indicates that each variable measures a different construct, and they are independent from each other.

Table 2

Cross-Correlations of U.S. and ISE Variables

	SENT ₁	IST-RET	IST-VOL	BUS-CON	EXC-RATE	FUT-EC	HML	INF	INT	MOM	RM	SMB	IIP
SENT ₁	1.00												
ISTRET	0.25	1.00											
ISTVOL	-0.08	0.01	1.00										
BUSCON	-0.09	-0.14	0.22	1.00									
EXCRATE	0.17	0.02	-0.16	-0.17	1.00								
FUTEC	-0.05	0.13	-0.1	0.09	0.14	1.00							
HML	0.07	0.31	-0.04	-0.28	0.38	0.25	1.00						
INF	-0.04	0.13	-0.07	-0.08	0.05	0.06	0.13	1.00					
INT	0.05	0.09	0.06	-0.01	0.03	-0.02	0.01	-0.06	1.00				
MOM	0.05	-0.05	-0.07	0.01	-0.02	-0.15	-0.05	-0.04	-0.32	1.00			
RM	-0.03	-0.17	-0.01	-0.04	0.12	0.13	-0.04	0.10	0.17	-0.25	1.00		
SMB	0.04	-0.03	-0.02	-0.01	0.01	0.14	-0.06	0.02	0.16	0.16	0.26	1.00	
IIP	-0.16	-0.09	0.15	0.05	0.02	0.13	0.04	-0.16	-0.01	-0.40	-0.18	-0.39	1.00

Note. Variables are U.S. institutional investor sentiments (SENT₁), returns on the ISE index (ISTRET), volatility of the ISE index (ISTVOL), U.S. economic growth (IIP), U.S. business conditions (BUSCON), U.S. future economic conditions (FUTEC), the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML), the premium on a portfolio of small stocks relative to large stocks (SMB), inflation (INF), short-term interest rates (INT), momentum factors (MOM), currency fluctuations (EXCRATE), and excess return on the market portfolio (RM).

Estimation Results

The time series properties of each variable was checked by applying ADF Test (Dickey & Fuller, 1979, 1981).¹ According to the ADF Test, the null hypothesis of non-stationary is rejected for first differences. Therefore, the results suggest that the series used in this section are stationary. The variance inflation factor (VIF) test showed the absence of multicollinearity between the variables in Equation 1. This indicates that each variable represents a distinctive characteristic of the U.S. market fundamentals and that the variables are independent of each other.²

In order to analyze the effect of U.S. institutional sentiment on the ISE returns and volatility, the institutional investor sentiment variables are decomposed into rational and irrational components based on Equation 1, and an OLS (ordinary least squares) regression model based on Equations 1 is estimated. The result of the estimation which shows the effect of market fundamentals on institutional investor sentiments is summarized in Table 3. The low value of the Durbin-Watson statistic indicates a high degree of positive first-order correlation.

Table 3

The Effects of Market Fundamentals on U.S. Institutional Investor Sentiments

$$Sent_{1t} = \theta_0 + \sum_{j=1}^n \theta_j FUND_{jt} + \vartheta_t$$

Dependent Variable: SENT₁

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BUSCON	-19.771***	2.2835	-8.6583	0.0000
EXCRATE	-0.8384	0.6828	-1.2279	0.2235
FUTEC	141.16**	62.134	2.2718	0.0261
HML	0.4450	0.5118	0.8696	0.3874
IIP	0.1247	0.0852	1.4639	0.1476
INF	-2.6423***	0.9077	-2.9109	0.0048
INT	-0.2032	0.7835	-0.2593	0.7961
MOM	0.1831	0.3446	0.5313	0.5968
RM	-0.4906**	0.2336	-2.0997	0.0393
SMB	0.5143	0.3500	1.4693	0.1461
C	0.4934	0.0449	10.967	0.0000
R-squared	0.6225			
S.E. of regression	0.1049			
Sum squared resid	0.7932			
Log likelihood	75.221			
F-statistic	11.876			
Durbin-Watson stat	1.1079			

Note. Variables are U.S. institutional investor sentiments (SENT₂), U.S. economic growth (IIP), U.S. business conditions (BUSCON), U.S. future economic conditions (FUTEC), the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML), the premium on a portfolio of small stocks relative to large stocks (SMB), inflation (INF), short-term interest rates (INT), momentum factors (MOM), currency fluctuations (EXCRATE), and excess return on the market portfolio (RM). *, **, and *** denote significance level at the 10%, 5%, and 1%.

An AR(1) process is therefore included in the regression equation (Table 3) to remove the serial correlation in error term and achieve normality in residuals. As a result, the Durbin-Watson statistic is improved from 1.1079 to 1.9776, suggesting that there is no first-order serial correlation in error term (Table 5). In addition, the Breusch-Godfrey Serial Correlation LM Test (Table 4) was performed, and the result also suggest that there is no serial correlation problem with this equation as the F -statistic p -value of 0.4578 is greater than 0.05. The lagged residual is insignificant. The Jarque-Bera histogram-normality test failed to reject normality.²

Table 4

Breusch-Godfrey Serial Correlation LM Test

F -statistic	0.790505	Prob. F(2,67)	0.4578
Obs*R-squared	1.867307	Prob. Chi-Square(2)	0.3931

Table 5

The Effects of Market Fundamentals on U.S. Institutional Investor Sentiments

$$Sent_{1t} = \theta_0 + \sum_{j=1}^n \theta_j FUND_{jt} + AR(1) + \vartheta_t$$

Dependent Variable: SENT₁

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BUSCON	17.365	13.995	1.2407	0.2189
EXCRATE	1.7639**	0.7816	2.2567	0.0272
FUTEC	4.2889	4.9234	0.8711	0.3867
IIP	-0.9495**	0.4570	-2.0773	0.0415
INF	-6.4741**	3.1671	-2.0441	0.0448
INT	10.747**	4.5045	2.3858	0.0198
MOM	0.1174	0.2303	0.5098	0.6118
RM	0.2497	0.1595	1.5651	0.1221
SMB	-0.3703	0.2954	-1.2532	0.2142
HML	-0.7929**	0.3740	-2.1199	0.0376
AR(1)	0.7593***	0.0794	9.5591	0.0000
C	0.0395	0.1383	0.2860	0.7757
R-squared	0.6308			
S.E. of regression	0.1056			
Sum squared resid	0.7696			
Log likelihood	73.642			
F-statistic	10.718			
Durbin-Watson stat	1.9776			

Note. Variables are U.S. institutional investor sentiments (SENT₁), U.S. economic growth (IIP), U.S. business conditions (BUSCON), U.S. future economic conditions (FUTEC), the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML), the premium on a portfolio of small stocks relative to large stocks (SMB), inflation (INF), short-term interest rates (INT), momentum factors (MOM), currency fluctuations (EXCRATE), and excess return on the market portfolio (RM). *, **, and *** denote significance level at the 10%, 5%, and 1%.

The result of running Equation 1 which shows the effect of market fundamentals on institutional investor sentiment is summarized in Table 5, The result suggests that institutional investor sentiment is significantly positively related to currency fluctuation (EXCRATE), short-term interest rate (INT), and significantly negatively related to U.S. economic growth (IIP), inflation (INF), and the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML). The regression equation (1) has an R-square value of 0.6308,

suggesting that about two-third of the variation in U.S. institutional investor sentiment can be explained by market fundamentals.

To investigate the effect of U.S. investor sentiment on ISE index returns, the model in equation 2 is estimated. A six-variable VAR model with two lags is estimated. The variables in this VAR model are ISE index returns (ISTRET), ISE volatility (ISTVOL), the rational components of U.S. institutional investor sentiments, $SENT_{1t}$ and the irrational components of U.S. institutional investor sentiments, ξ_t . The estimation result is given in Table 6. The results show that the rational component of U.S. institutional investor sentiment (SENTRAT1) has a significant impact on ISE returns (ISTRET) at both the first and second lags. The effect on the first lag is significant at the one percent level and that on the second lag is significant at the five percent level. The results in Table 6 also reveal that there is a significant negative relationship between ISE stock returns and ISE volatility with a second lagged coefficient of -0.5019 and standard error of 0.2285. This finding provides some support to the recent claim that stock returns are negatively related to the stock market volatility (Bekaert & Wu, 2000; Whitelaw, 2000; Li et al., 2005).

Table 6

U.S. institutional investor sentiment impact on the ISE

		SENTRAT _{1t}	SENTIRRAT _{1t}	ISTRET _t	ISTVOL _t
SENTRAT _{1(t-1)}	Coeffi.	0.4841***	0.1056	-0.0724	-0.1087
	SE	0.1178	0.1694	0.1754	0.0897
	<i>p</i> -value	(0.00)	(0.28)	(0.29)	(0.28)
SENTRAT _{1(t-2)}	Coeffi.	0.2092*	0.1090	0.0367	0.0117
	SE	0.1214	0.1746	0.1807	0.0924
	<i>p</i> -value	(0.07)	(0.55)	(0.84)	(0.90)
SENTIRRAT _{1(t-1)}	Coeffi.	0.0660	0.5468***	-0.0403	-0.0776
	SE	0.0810	0.1166	0.1207	0.0617
	<i>p</i> -value	(0.45)	(0.00)	(0.75)	(0.26)
SENTIRRAT _{1(t-2)}	Coeffi.	-0.1717*	-0.2394*	0.0425	0.0896
	SE	0.0831	0.1195	0.1237	0.0632
	<i>p</i> -value	(0.09)	(0.10)	(0.74)	(0.11)
ISTRET _(t-1)	Coeffi.	0.3525***	-0.1678	0.0786	-0.1021
	SE	0.0827	0.1189	0.1231	0.0629
	<i>p</i> -value	(0.00)	(0.21)	(0.27)	(0.91)
ISTRET _(t-2)	Coeffi.	0.2393**	-0.0740	-0.0196	-0.1057
	SE	0.0904	0.1300	0.1346	0.0688
	<i>p</i> -value	(0.02)	(0.59)	(0.55)	(0.18)
ISTVOL _(t-1)	Coeffi.	0.0150	0.3059	-0.0977	0.1538
	SE	0.1552	0.2233	0.2312	0.1182
	<i>p</i> -value	(0.46)	(0.11)	(0.65)	(0.12)
ISTVOL _(t-2)	Coeffi.	-0.1940	-0.5867**	-0.5019*	0.1388
	SE	0.1535	0.2207	0.2285	0.1168
	<i>p</i> -value	(0.26)	(0.04)	(0.07)	(0.14)
C	Coeffi.	0.0524**	0.0076	0.0639*	0.0616***
	SE	0.0225	0.0323	0.0335	0.0171
	<i>p</i> -value	(0.03)	(0.41)	(0.06)	(0.00)

Note. This table reports coefficient (Coeffi.), coefficient standard errors (SE), and *p*-value for a VAR model, the impact of U.S. institutional investor sentiment on the ISE stock market, with two lags. The variables are the rational sentiments of U.S. institutional investors (SENTRAT2), the irrational sentiments of U.S. institutional investors (SENTIRRAT2), returns on the ISE index (ISTRET), and volatility on the ISE index (ISTVOL).

*, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

However, it is difficult to interpret the coefficients from the regression equations in VAR systems. In other words, individual VAR coefficient estimates do not capture the full effect of an independent variable. The generalized Impulse response functions use all the VAR coefficient estimates to examine the full effect of unanticipated shocks in investor sentiments (Sims, 1980; Statman et al., 2006). IRFs represent the behavior of a series in response to shocks while keeping

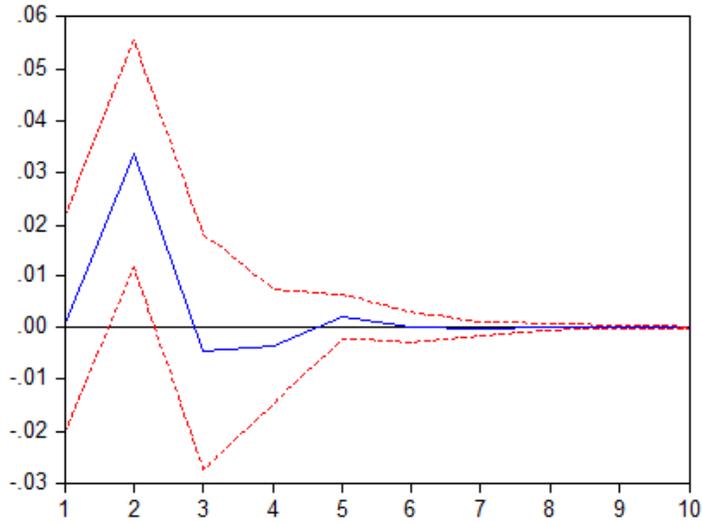
the effects of other variables constant. This approach traces the response of one explanatory variable to a one standard deviation shock to another variable in the VAR system while keeping the effects of other variables constant. Confidence bands constructed around the mean are considered statistically significant at the 95% confidence level when the upper and lower bands carry the same sign. Following Paseran & Shin (1998), we use the generalized impulse method to study unanticipated shocks to the system from a change in investor sentiment.

Figure 1 shows the impulse responses of the ISE stock returns to a one-standard deviation increase in the rational and irrational sentiments of U.S. institutional investors. Figure 1 contains two impulse response function graphs. Panel (a) shows that a shock from the irrational sentiment of U.S. institutional investors has an insignificant effect on the ISE stock returns for the first period, but has a positive significant effect in the second period. It appears that an irrational change in the consumer confidence is not well anticipated and its effects therefore take time to percolate through the economy.

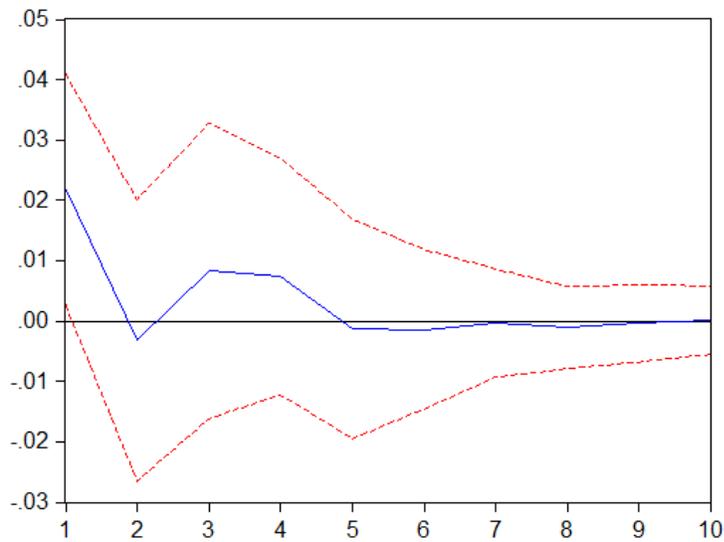
On the other hand, as Panel (b) in Figure 1 indicates, the effect of rational sentiment of U.S. institutional investors on ISE stock returns is significant in the first period but then peters out and becomes insignificant. For example, in Panel (b) the first period generalized impulse response indicates that a one standard deviation shock to the ISE results in approximately a more than 2.0% increase in ISE returns. This suggests that a positive rational sentiment tends to increase ISE stock returns during the first month.

These results provide empirical evidence that the impact of the rational component of U.S. institutional investor sentiment is positively significant and greater in magnitude than the irrational component during the first period. This is another indication that U.S. institutional investors generally apply market fundamentals before making investment decisions in Turkey. It

also supports the assumption that institutional investors are more rational, sophisticated, and well-informed.



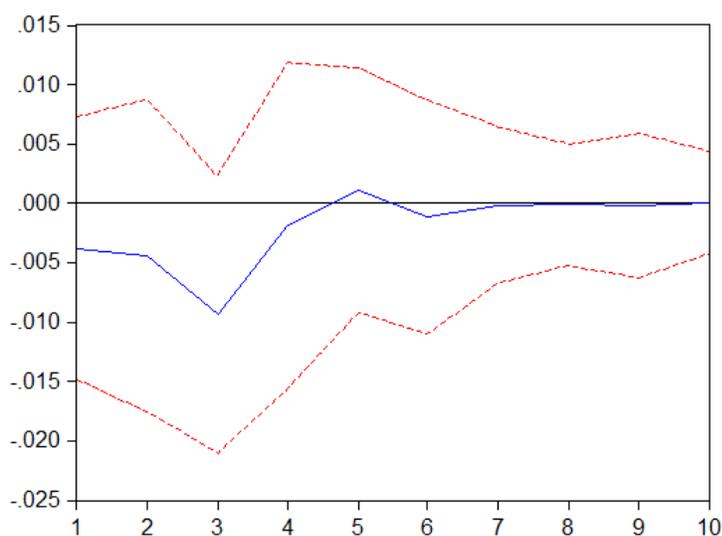
(a) ISE returns response to U.S. irrational institutional investor sentiment shock.



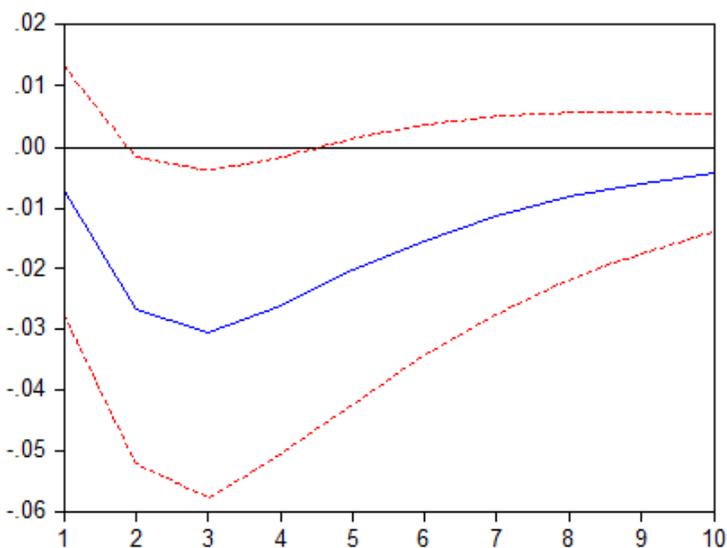
(b) ISE returns response to U.S. rational institutional investor sentiment shock.

Figure 1. ISE returns impulse response functions to U.S. institutional investor sentiment with two standard error bands. The dashed lines on each graph represent the upper and lower 95% confidence band. When the upper and lower bands carry the same sign, the response becomes statistically significant. On each graph, the percentage returns are plotted on the vertical axis, and time on the horizontal axis.

Figure 2 shows the effect of U.S. institutional investor sentiment on ISE volatility. Panel (a) in Figure 2 reveals that the impact of the irrational component of U.S. institutional investor sentiment on ISE volatility is insignificant. However, as seen in Panel (b), there is a significant negative impact of the rational component of U.S. institutional investor sentiment on ISE volatility around the second period. This suggests that a one standard deviation increase in the rational component of sentiments affects ISE stock volatility negatively. This provides empirical evidence to support the assumption that the behavior of sophisticated investors, who apply and analyze market fundamentals carefully, reduces uncertainty and noise risk in the ISE market.



(a) ISE volatility response to U.S. irrational institutional investor sentiment shock



(b) ISE volatility response to U.S. rational institutional investor sentiment shock

Figure 2. ISE volatility impulse response functions to U.S. institutional investor sentiment with two standard error bands. The dashed lines on each graph represent the upper and lower 95% confidence band. When the upper and lower bands carry the same sign, the response becomes statistically significant. On each graph, percentage returns are plotted on the vertical axis, and time on the horizontal axis.

It is also worth pointing out that there is a noticeable difference in the reaction time of ISE returns and volatility to the rational and irrational components of investor sentiment.

6. Conclusion

This study examines the effect of U.S. institutional investor sentiment on the ISE stock market returns and volatility. It is not clear whether investor sentiment might be driven by rational factors, noise or combination of both (Brown & Cliff, 2004; Lee et al., 2002). Therefore following Brown and Cliff (2004), Verma and Soydemir (2006), and Calafiore (2010), this study decomposes U.S. institutional investor sentiment into rational and irrational components in investigating the impact of U.S. institutional investor sentiments on the Turkish stock market returns and volatility.

This study first investigated the impact of U.S. market fundamentals on U.S. institutional investor sentiment. The results suggest that U.S. institutional investor sentiments are significantly positively related to currency fluctuations (EXCRATE), and inflation (INF); significantly negatively related to U.S. economic growth (IIP), short-term interest rates (INT), and the premium on a portfolio of high book/market stocks relative to low book/market stocks (HML) have a significant impact on U.S. institutional investor sentiments. The R-squared value (0.6308) showed that almost two-thirds of the variation in institutional investor sentiment is captured by market fundamentals. This provides evidence that institutional investors, who are rational, generally apply market fundamentals when making investment decisions. This result is consistent with the results of De Long, Shleifer, Summers, and Waldman (1990), Shleifer and Vishny (1997), Brown and Cliff (2004, 2005), Verma and Soydemir (2006), and Calafiore (2010).

The response of the ISE stock returns to the irrational sentiments of U.S. institutional investors was shown to be insignificant. On the other hand, the effect of rational sentiments of U.S. institutional investors on ISE stock returns is statistically significant. This is another indication that U.S. institutional investors apply market fundamentals before making investment decisions. It also supports the assumption that institutional investors are more rational, sophisticated, and well-informed (Brown & Cliff, 2004, 2005; Calafoire, 2010; Qiu and Welch, 2006; Verma & Soydemir, 2006).

The effect of irrational U.S. institutional investor sentiments on ISE volatility was shown to be statistically insignificant. However, the study showed a significant decrease in ISE volatility in the first two periods with a one standard deviation increase in rational sentiment. This supports the assumption that the behaviors of sophisticated investors, who apply and analyze market fundamentals carefully, reduce uncertainty and noise risk in the stock markets (Verma and Soydemir, 2006; Calaforie, 2010)..

Overall, these findings provide empirical evidence consistent with behavioral finance theory that holds that expert investor surveys are a good proxy to measure the impact of institutional investor sentiment on the stock market. Also, this study supports previous findings that investor sentiment has a significant impact on the stock markets (Baker & Wurgler, 2006; Brown & Cliff, 2004, 2005; Calafoire, 2010; Qiu and Welch, 2006; Verma & Soydemir, 2006).

Lastly, the finding also provides some support to the recent claim that stock returns are negatively related to the stock market volatility (Bekaert & Wu, 2000; Whitelaw, 2000; Li et al., 2005).

The results of this study have practical implications for both domestic and international investors. Investors who are interested in making investment in the Turkish stock market have to

consider the impact of U.S. institutional investor sentiment on Turkish stock market return and volatility. These spillover effects from U.S. need, therefore, to be incorporated in the investor's international asset pricing model.

Notes

1. The results of unit root tests are available from the authors upon request.
2. The results of the Breusch-Godfrey Serial Correlation LM Test and the Jarque-Bera histogram-normality test before AR(1) process included are available from the authors upon request.
3. The results of the Breusch-Godfrey Serial Correlation LM Test and the Jarque-Bera histogram-normality test after AR(1) process included are available from the authors upon request.

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