Article

Rational–Irrational Investor Sentiments and Emerging Stock Market Returns: A Comparison from Turkey

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Abstract

This study investigates the dynamic relationship between rational and irrational consumer-business sentiments and stock returns in an emerging stock market, Turkey. Consumer and business sentiments are divided into two components: rational and irrational sentiments. Then, the dynamic interactions and the impact of the sentiments on stock returns are examined. The fundamental economic variables used in the study consist of business conditions, economic risk premium, country risk, exchange rate risk, country growth rate, inflation rate, and terms of trade. The results show that Istanbul Stock Exchange (ISE)-100 index returns are positively and significantly affected by the rational sentiments of both consumers and businesses.

JEL Classification: G02, G12, G150

Keywords

Investor sentiment, investor rationality, stock returns, emerging markets, Turkey

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Introduction

Financial asset prices are believed to be driven by both fundamental risk factors and investor sentiment (Baur, Quintero, & Stevens, 1996). Rational expectations theory puts emphasis on the fundamentals, while behavioural theories of asset pricing focus on the investor sentiment. Investor sentiment represents a degree of the mood for investors and it ranges from bullish (optimistic) to bearish (pessimistic). Likewise, Baker and Wurgler (2006) define investor sentiment as 'A belief about future cash flows and investment risks that is not justified by the facts at hand'. However, there is also emerging evidence that these sentiments may also reflect fully rational expectations based on fundamentals, besides an irrational enthusiasm, or a combination of the two (Verma et al., 2008). The latter argument is also in line with Hirshleifer (2001) who implies that the expected returns relate to both risks and investor misevaluation.

Numerous studies have worked on theoretical structures to investigate the dynamics of the relationship between stock returns and investor sentiment (Barberis, Shleifer, & Vishny, 1998; Black, 1986; Campbell & Kyle, 1993; Daniel, Hirshleifer, & Subramanyam, 1998; De Long, Shleifer, Summers, & Waldmann, 1990, 1991; Hong & Stein, 1999; Lakonishok, Shleifer, & Vishny, 1991; Palomino, 1996; Shefrin & Statman, 1994; Shleifer & Summers, 1990; Trueman, 1988). One common theme among these studies is the conclusion that a group of investors, named as noise traders, often make investment decisions without the consideration of fundamentals, and they are able to affect stock prices with their unpredictable changes in their sentiments. Individual investors are more likely to be these noise traders as they have access to the least privileged information in the market.

The seminal work by Delong, Shleifer, Summers and Waldman in 1990 carries a great importance in the field as it develops theoretical framework for a noise trader model. In this model, noise traders are claimed to act on their sentiments rather than the fundamental risk factors and their trading activities are considered to distort the stock prices from the intrinsic values. Calafiore, Soydemir and Verma (2009), Verma, Baklaci and Soydemir (2008), Brown and Cliff (2004, 2005), Lee, Jiang and Indro (2002), Fisher and Statman (2000), Clarke and Statman (1998), Solt and Statman (1988) and De Bondt (1993) examine the influence of investor sentiments on stock returns and provide evidence in favour of strong co-movements between individual-institutional investor sentiments on stock returns.

Literature on investor sentiments and stock prices contains inconclusive and conflicting results on whether casual effects are attributable to

fundamental risk factors, irrational risk factors or a mix of both. Prior to Verma et al. (2008), literature assumed that sentiments were completely irrational without conducting any test or modelling to rule out existence of fundamentals-driven component (Brown & Cliff, 2004, 2005; Lee et al., 2002). Verma et al. (2008) bring a new framework to the literature that decomposes sentiment into fundamentals-driven and irrational components. Additionally, Verma et al. (2008) consider the possibility of any cross-variable dynamics that may exist between individual and institutional investor sentiments, which was ignored in previous studies. Their study examines the role of sentiments at both individual and institutional levels, analysing their simultaneous impact on US stock market returns. The study concludes that investor sentiment is combination of both fundamentals-driven (rational) and irrational risk factors and rational sentiments driven by the fundamentals have a larger impact on stock market returns than that of irrational sentiments. However, the effects of both rational component and irrational component of sentiments on stock returns are significant.

In the essence of Verma et al. (2008), there have been a limited number of studies in the literature that have investigated the role of fundamentals-driven and irrationality-driven investor sentiments on stock returns in emerging stock markets (Calafiore et al., 2009). Analysis of such relationship in emerging markets is critical as these markets, because of the higher possibility of market inefficiencies, may be exposed to more unpredictable changes in sentiments, which may cause increased noise trading. This research extends the literature by following the methodologies of Verma et al. (2008) and Calafiore et al. (2009) for an emerging market: Turkey. Similar studies to this study have been conducted only for USA and Brazil. Therefore, undertaking this study will enable readers to compare and contrast the results with the results of the studies on both, developed markets and first generation emerging markets. Such comparisons may reveal important implications for investors, policymakers, governments and academic scholars. This research splits sentiments into both fundamentals-driven and irrational components of consumer and business sentiments. Then, the distinct impacts of fundamentals-driven (rational) and irrational sentiments of consumers and businesses on stock returns in an emerging market are also examined. Moreover, it considers the concurrent impact of consumer and business sentiments on stock returns. Studies in literature mostly model individual and institutional investor sentiments separately, ignoring their possible interaction with each other. However, Verma et al. (2008) shows how simultaneous modelling of both sentiments can provide more complete picture of such interaction and its effects on stock returns. Following their approach, this study also examines the synchronised effects of the consumer and business sentiments on the

stock market returns in one model by differentiating between the two types of sentiments in the Istanbul Stock Exchange. Previous literature mostly assumes that the changes in investor sentiment cause changes in stock returns. However, latest discussions about the direction of causality offer possible bi-directional causality between the sentiments and past stock returns. Instead of focusing on the unidirectional relationship between sentiments and stock returns, this study investigates possible bi-directional causality at both consumer level and business level in Turkey.

The effects of anticipated and unanticipated events in finance are treated differently. According to rational expectations theory and efficient markets hypothesis, the response of stock market to unanticipated events matters due to two different aspects: speed of information dissemination and accurate valuation of the information (magnitude change in stock prices). Hence, this study focuses on the unanticipated component of sentiments and their effects on stock returns as they may have different implications than the anticipated shocks.

Vector auto regression (VAR) technique is used to investigate the effects of such shocks on the system as a whole by interpreting the results obtained by generalised impulse response functions. The returns used in the ordinary least squares (OLS) and VAR estimations are continuously compounded monthly stock index returns. Verma et al. (2008) and Calafiore et al. (2009) did not utilise any widely used asset pricing models in their return estimations. Thus, some may argue that the same model with returns calculated by asset pricing models may exhibit different results. In order to overcome this possible argument and check the robustness of the results for this study, the capital asset pricing model (CAPM) calculated returns are used as well as continuously compounded returns. The results obtained by both VAR models are compared to see whether they are robust to differently calculated return series.

The rest of the article is organised as follows: Second section surveys related literature. Third section presents the data and methodology for the study. Fourth section discusses the results of the models. Implications and comparisons are revealed in fifth section and sixth section concludes.

Literature Review

The role of investor sentiment on noise trading in financial markets is first discussed by Black (1986). This study discusses the effects of noise trading in financial markets and distinguishes between information and noise. The term ‘noise traders’ is first used by Black (1986) and Kyle

(1985) and it represents a group of investors that have no access to fundamental or accurate information but use speculations instead to make buy/hold/sell decisions in the stock markets based on these speculations. The study by Black (1986) supports that some market participants may use noise as it was information. Trueman (1988) brings legitimate reasons for both noise trading and why it must be an important issue in securities markets.

De Long et al. (1990) demonstrate how a set of investors, noise traders, can impact stock prices in equilibrium. The study also illustrates that the risk caused by unpredictable changes in investor sentiments lessens the attractiveness of the markets and diminishes information traders' advantage to carry out arbitrage. This study develops a cornerstone model, 'Noise Traders' Model'.

Palomino (1996) follows the footsteps of De Long et al. (1990) and develops an imperfectly competitive market model with risk averse investors. In this model, noise traders earn higher returns and achieve higher expected utilities than rational investors. This conclusion is consistent with the earlier literature that finds long-run survival of noise traders. On the other hand, Wang (2001) criticises De Long et al. (1990) in that their model is static and insufficient to capture long-run survival matters of noise traders. Thus, Wang (2001) introduces a model that takes into account the wealth accumulation process of irrational investors as this accumulation arises from the market competition between rational and irrational investors. The conclusion of the study is that bullish sentiments can endure while bearish sentiments cannot persist in the long run.

In another model, De Long et al. (1991) show how noise traders make their portfolio allocations. This study also shows that noise traders can earn higher returns than rational investors and they may survive in terms of wealth gain in the long run. This long-run success of noise traders occurs despite their excessive risk taking and consumption. Moreover, Campbell and Kyle's (1993) model demonstrates that the competitive interaction between noise traders and rational investors influence stock prices substantially.

In a different context, Shleifer and Summers (1990) offer an alternative to efficient markets hypothesis (Fama, 1970). This argument emphasises the role of investor sentiments and limited arbitrage in determining stock prices. Their study implies that changes in investor sentiments are not fully counteracted by arbitrageurs thus may affect stock returns. Moreover, Lakonishok et al. (1991) find that institutional investors manipulate stock prices in small markets that consist of stocks with small market capitalisation using their powers to influence prices.

As conventional asset pricing models failed to produce plausible explanations regarding the drivers of stock returns, Shefrin and Statman (1994) develop the behavioural capital asset pricing theory. In this model, they assume an interaction between noise traders and information traders. Focusing on specific cognitive errors, they illustrate that the effect of noise traders in the market depends on the type of these errors. Sentiments of noise traders may distort stock prices and may make markets inefficient.

Another stream of research focuses on the relationship between the risk factors and stock prices. The most commonly used sources of risks in financial markets include growth rate of the economy, short-term interest rates, economic risk premiums, interest rates, inflation, business conditions, performance of market portfolio and currency fluctuations. These are some of the fundamental variables of economics and finance literature that are widely used in capital asset pricing and risk models and are known to feature essential information of general economy and expectations. The common theme among these sources of rational risk factors is the component of 'uncertainty' about their future values.

In the light of all discussions in literature, another argument is developed that the investor sentiment can be a function of both, fundamental risk factors and unexplainable investor exuberance. Verma et al. (2008) follow the framework provided by Shleifer and Summers (1990) and Brown and Cliff (2004) where they assume that stock prices are affected by both fundamental and noise components of sentiments. They find that the impact of rational sentiments (fundamental risk factors) on stock market returns is greater than that of irrational sentiments (unexplainable investor exuberance) for the US stock markets. Their results support the economic fundamentals-based arguments of stock returns while providing evidence that the irrational sentiments or the investor error have a significant role in determining stock returns. Calafiore et al. (2009) use the same econometric technique and framework of Verma et al. (2008) and test the impact of rational-irrational sentiments on stock returns for Brazil. Their results confirm significant bidirectional relationship between stock returns and rational component of sentiments. They find no significant effect of irrational components on Brazilian stock returns.

Methodology and Data

Brown and Cliff (2005), Shleifer and Summers (1990), Verma et al. (2008) and Calafiore et al. (2009) state that sentiments to some extent contain both, rational expectations based on risk factors and investor

irrationality. Moreover, Hirshleifer (2001) suggests that expected returns are related to both, rational risk factors and investor misevaluation. Thus, it is expected for stock returns to be affected by both fundamentals and noise components of sentiments. Accordingly, investor sentiments could be decomposed into two parts: (i) rational (fundamentals) component based on the fundamentals; and (ii) irrational component based on the noise (Verma et al., 2008).

Consequently, equations (1) and (2) could be formulated to model rational and irrational effects of fundamentals and noise respectively on sentiments of consumers and businesses:

$$ConSent_t = \nu_0 + \sum_{j=1}^{J} \nu_j Fund_{jt} + \xi_t \quad (1)$$

$$BusSent_t = \omega_0 + \sum_{j=1}^{J} \varpi_j Fund_{jt} + \delta_t \quad (2)$$

where ν_0 and ω_0 are constants, ν_j and ϖ_j are the parameters to be estimated, ξ_t and δ_t are the random error terms. $ConSent_t$ and $BusSent_t$ represent the shifts in sentiments of consumers and businesses respectively at time *t*. $Fund_{jt}$ is the set of fundamentals representing rational expectations based on risk factors that have been shown to carry necessary information in conditional asset pricing literature. The fitted values of equations (1) and (2) capture the rational component of sentiments (i.e., $\widehat{ConSent}_t$ and $\widehat{BuSent}_t$). Additionally, the residuals of equations (1) and (2) capture the estimated irrational component of sentiments (i.e. $\hat{\xi}_t$ and δ_t). Equation (3) shows how the fundamentals (rational) and irrational components of sentiments, estimated based on equations (1) and (2), impact the stock returns:

$$R_t = \alpha_0 + \alpha_1 \widehat{ConSent}_t + \alpha_2 \widehat{BusSent}_t + \alpha_3 \hat{\xi}_t + \alpha_4 \hat{\delta}_t + \rho_t \quad (3)$$

where α_0 is a constant while α_1, α_2, α_3 and α_4 are the parameters to be estimated, ρ_t is the random error term. Specifically, the parameters α_1 and α_2 capture the effects of fundamentals-based (rational) sentiments on the part of consumers and businesses, respectively, while α_3 and α_4 capture the effects of noise-based (irrational) sentiments of consumers and businesses, respectively.

Equations (1) and (2) are run in order to decompose consumer and business sentiments into fundamentals-based (rational) and irrational components using OLS regression models. Fairly low correlations among variables as shown in Table 2 indicate that multicollinearity is not an issue. Table 4 reports the results of the OLS regressions. Table 4 details that the

consumer sentiments are significantly affected by business conditions, country risk, currency and inflation. Similarly, Table 4 also reports that the business sentiments are significantly related to business conditions, number of liquidated companies, currency, economic risk premium, economic growth and inflation. Seven out of eight fundamental variables included in the second OLS regression model have significant effects on the business sentiment in Turkey. The fitted values of equations (1) and (2) are named as '*RATIONALCONSUMER*' and '*RATIONALBUSINESS*' as these values represent the fundamentals-driven components of the sentiments. Likewise, the residuals from the same equations are designated the names of '*IRRATIONALCONSUMER*' and '*IRRATIONALBUSINESS*' as they correspond to the irrationality-driven components of the sentiments.

Brown and Cliff (2004, 2005), Lee et al. (2002), Verma et al. (2008) and Calafiore et al. (2009) suggest that there may be an interaction between stock market returns and investor sentiments. VAR is found to be the most suitable econometric approach for this research as it enables to investigate the postulated relationships.

According to efficient markets hypothesis of finance, stock markets should only react to the unanticipated component of explanatory variables (Fama, 1970). All variables in a multi index model must be surprises or innovations and they should not be predicted from their past values (Elton & Gruber, 1991). Moreover, VAR models are better than the structural models as they have stronger prediction power (Hakkio & Morris, 1984; Litterman & Supel, 1983; Litterman, 1986; Lupoletti & Webb, 1986; Webb, 1999).

Another important aspect to consider is related to the transmission of information contained in the stock prices. This transmission may not be simultaneous for both components of sentiments. Fundamentals-based (rational) and irrational components of investor sentiments may be exposed to different delays in the markets. These delays may cause lags between the observation of data concerning such variables and the incorporation of this information to stock prices. Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) are used to determine appropriate lag lengths for information delays. These criteria help us to identify the optimal lag length for the model and the optimal lag length is found to be two. The general expression of the VAR model is

$$P(t) = C + \sum_{s=1}^{m} K(s) + Z(t-m) + \vartheta(t) \tag{4}$$

where $P(t)$ represents a column vector of variables under consideration, C is the deterministic component comprised of a constant, $K(s)$ is a matrix of coefficients, m is the lag length and $\vartheta(t)$ is a vector of random

error terms. Impulse response functions that are obtained from VAR models are extremely useful tools to see the likely response of one variable to a one time unitary shock in another variable, when all else in the model remain constant. When the upper and lower bands carry the same sign, impulse responses are considered to be statistically significant at the 95 per cent confidence level. The generalised impulses technique that is described by Pesaran and Shin (1998) are used as the orthogonal set of innovations and do not depend on the variable ordering in this technique.

In order to examine the relative effects of fundamentals-driven (rational) and irrational consumer and business sentiments on stock market returns, a five-variable VAR model with two lags is performed and the general expression for this model is depicted in equation (3). The variables for the VAR model are: ISE-100 Index returns (*ISE100*), fundamentals-driven (rational) sentiments of consumers and businesses (*RATIONALCONSUMER* and *RATIONALBUSINESS*) and irrational sentiments of consumers and businesses (*IRRATIONALCONSUMER* and *IRRATIONALBUSINESS*). Latter four variables are the ones that are generated by the fitted values and residuals of equations (1) and (2).[1] Sims (1980) and Enders (2003) indicate that autoregressive systems such as the VAR model utilised in this work are difficult to describe in a few words and it is even more difficult to make sense of them by analysing the coefficients provided by the estimates. Furthermore, the *t*-tests on individual coefficients are not very reliable guides as they do not fully capture the important interrelationships among the variables. Therefore, Sims (1980) suggests focusing on the system's response to typical random shocks (impulse response functions-IRFs). In the light of previous findings on autoregressive systems and VAR models, refrain from interpreting the individual coefficients of the VAR model, but rather focus on the relevant effects of IRFs.

Variables and Descriptive Statistics

This research uses a monthly data from December 2003 to January 2010. The source for the data is DataStream Advance and Central Bank of the Republic of Turkey. The choice of consumer and business sentiments is very similar to Brown and Cliff (2004), Fisher and Statman (2000), De Bondt (1993) and Verma et al. (2008) and Calafiore et al. (2009), which use the survey data of American Association of Individual Investor (AAII), consumer and business confidence index scores. Therefore, 'Consumer Confidence Index' (CCI) and 'Business Confidence Index' (BCI) scores

are utilised as proxies to measure consumer and business sentiments for Turkey. These surveys are conducted by the Turkish government and they aim to reflect the sensitivity of consumers and businesses to the changes in economic and political environments globally as well as domestically. Thus, *ConSent* and *BusSent* represent CCI scores and BCI scores, respectively.

ISE-100 Index prices are used to calculate the stock returns. This index represents 90 per cent of the market capitalisation in the Istanbul Stock Exchange. The continuously compounded returns for ISE-100 Index are estimated by DataStream Advance. This index includes first 100 companies ranked based on size (market capitalisation) in the ISE. The name of this variable in the study is '*ISE100*'. Returns on the ISE-All Shares Index are used as a proxy for the return on a market portfolio as this index includes all listed shares in the ISE at equal weights. ISE-All Shares Index returns are denoted with '*Rm*', henceforth. All returns are US dollar denominated.

Following variables are used to represent the fundamentals as they provide needed information in the asset pricing literature[2]:

1. overnight interest rates measured as the effective yield on Turkish deposits (Calafiore et al., 2009; Campbell, 1991) ('BUSCON');
2. the number of companies liquidated per month to measure business conditions (Lennox, 1999) ('COMPANY');
3. JP Morgan Emerging Markets Bond Index + Turkey rate is used to measure the specific country risk of Turkey (Calafiore et al., 2009) ('COUNTRISK');
4. the terms structure of interest rates calculated as the difference between 90-day interbank interest rate and 30-day interbank interest rate as a proxy for economic risk premium (Campbell & Shiller, 1987; Ferson & Harvey, 1991) ('ECONRISKPRE');
5. currency fluctuation measured as the changes in Turkish Lira to US dollar exchange rate index (Calafiore et al., 2009; Verma et al., 2008) ('EXCHANGE');
6. economic growth as measured by the changes in the Industrial Production Index monthly series (Calafiore et al., 2009; Fama, 1970; Schwert, 1990; Verma et al., 2008) ('GROWTH');
7. inflation measured as the monthly changes in the consumer price index (Fama & Schwert, 1977; Sharpe, 2002) ('INFTR'); and
8. terms of trade for Turkey as measured by the monthly ratio between the export price index and the import price index (Calafiore, 2009) ('TOT').

Table 1 reports the descriptive statistics of the variables used in the study. The mean of *ConSent* is greater than the mean of *BusSent* for the sample period. This suggests that consumers have been more bullish than businesses during the sample period. The monthly mean return for the ISE-100 Index is 1 per cent. The standard deviations of both, consumer and business sentiments, are much higher than the standard deviation of the ISE-100 Index returns, suggesting that the sentiments have been more volatile than the ISE-100 Index returns during the sample period.

The cross-correlations between stock market returns, sentiment variables and the fundamentals are shown in Table 2. The correlation between consumer and business sentiments is 0.85. This correlation is higher than what previous studies found in similar studies in both, developed and emerging markets. This high correlation shows that consumer and business sentiments in Turkey are highly interrelated and there are possible feedback effects between the two. This result strengthens the previous argument of modelling them jointly in a multivariate setting rather than using isolated modelling for each sentiment. The correlation between the business sentiment and ISE-100 Index returns is 0.44 which is higher than the correlation between the consumer sentiment and the ISE-100 Index returns of 0.27. This may indicate that business investors are more active as noise traders than consumer investors, which is contrary to what previous studies, focusing on developed stock markets, have found. One important reason for this conflicting indication could be that emerging stock markets have fewer consumer investors than developed stock markets. Majority of the correlations among fundamental variables are at acceptable levels, which suggests that each variable represents a unique risk.

Augmented Dickey Fuller (ADF) test (Dickey & Fuller, 1979, 1981) to check for unit-roots is performed on each variable. The results of the ADF test are shown in Table 3. The null hypothesis of the ADF test is rejected for all variables and the variables are stationary and ready for further econometric techniques to be applied. Table 3 shows the results of the unit root tests for all variables in the study.

Results of the VAR Model

Figure 1(a) and (b) shows the impulse responses of the ISE-100 Index returns to a one-time SD increase in the fundamentals-driven (rational) and irrational sentiments of consumers, respectively. As seen in the Figure 1(a), the effect of the rational component of consumer sentiment on the ISE-100 Index returns is positive and significant for the first three

Table 1. Descriptive Statistics of Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CONSENT	92.61	93.89	111.90	68.88	11.26	–0.37	2.17
BUSSENT	–2.70	4.40	26.60	–69.00	24.40	–1.22	3.60
ISE100	0.01	0.04	0.30	–0.30	0.12	–0.45	3.18
RM	0.02	0.04	0.31	–0.41	0.13	–0.78	4.21
BUSCON	15.86	16.25	26.00	6.50	4.03	–0.22	3.36
COMPANY	766.32	672.00	1,670.00	381.00	285.76	1.74	5.32
COUNTRISK	253.10	251.07	337.81	177.87	35.23	0.19	2.71
ECONRISKPRE	0.26	0.17	1.32	–1.39	0.37	–0.38	7.76
EXCHANGE	1.39	1.36	1.69	1.16	0.13	0.10	2.28
GROWTH	0.61	–0.28	22.66	–24.93	8.02	0.03	3.92
INFTR	0.70	0.64	2.60	–0.73	0.72	0.40	2.93
TOT	97.43	97.60	103.82	89.30	3.11	–0.29	2.86

Source: Author's own.

Notes: The variables are consumer sentiments (CONSENT), business sentiments (BUSSENT), US dollar denominated returns on the ISE-100 index (ISE100), US dollar denominated returns on the ISE-All Share Index used as a proxy for the return on a market portfolio (Rm), business conditions measured by overnight interbank rate (BUSCON) and the number of companies liquidated per month (COMPANY), country risk measured by JP EMBI+Turkey (COUNTRISK), economic risk premium measured by the spread between 90-day interbank rate and 30-day interbank rate (ECONRISKPRE), currency fluctuation measured by the changes in Turkish Lira to US Dollar exchange rate index (EXCHANGE), economic growth measured by the percentage change in industrial production index (GROWTH), inflation measured by the percentage change in consumer price index (INFTR), terms of trade for Turkey measured by the monthly ratio between the export price index and the import price index (TOT).

Table 2. Cross Correlations of Variables

	CONSENT	BUSSENT	ISE100	RM	BUSCON1	COMPANY	COUNTRISK	ECONRISKPRE	EXCHANGE	GROWTH	INFTR	TOT
CONSENT	1.00											
BUSSENT	0.85	1.00										
ISE100	0.27	0.44	1.00									
RM	0.27	0.43	0.96	1.00								
BUSCON	0.57	0.27	–0.08	–0.07	1.00							
COMPANY	–0.12	–0.20	0.08	0.11	–0.14	1.00						
COUNTRISK	–0.74	–0.47	0.09	0.09	–0.75	0.16	1.00					
ECONRISKPRE	–0.41	–0.31	–0.15	–0.15	–0.07	–0.03	0.03	1.00				
EXCHANGE	–0.27	–0.09	–0.14	–0.15	–0.28	–0.05	0.01	0.39	1.00			
GROWTH	0.09	0.14	0.02	0.03	–0.07	–0.27	–0.02	–0.04	0.01	1.00		
INFTR	0.00	0.01	–0.11	–0.13	–0.01	–0.16	0.05	–0.16	0.00	0.12	1.00	
TOT	0.65	0.69	0.37	0.37	0.15	–0.08	–0.36	–0.32	–0.08	0.08	–0.25	1.00

Source: Author's own.

Notes: The variables are consumer sentiments (CONSENT), business sentiments (BUSSENT), returns on ISE100 index (ISE100), returns on ISE market portfolio (Rm), business conditions (BUSCON), the number of companies liquidated (COMPANY), country risk (COUNTRISK), economic risk premium (ECONRISKPRE), currency fluctuation (EXCHANGE), economic growth (GROWTH), inflation (INFTR) and terms of trade (TOT).

Table 3. Unit Root Tests

	Level	First Difference	ADF test results
CONSENT		X	–5.70***
BUSSENT		X	–6.25***
ISE100	X		–7.50***
RM	X		–7.27***
BUSCON		X	–5.44***
COMPANY	X		–4.76***
COUNTRISK		X	–8.90***
ECONRISKPRE	X		–5.27***
EXCHANGE		X	–7.38***
GROWTH		X	–11.30***
INFTR		X	–6.57***
TOT		X	–7.84***

Source: Author's own.

Notes: ***, **, * denotes significance at the 1, 5 and 10 per cent levels, respectively. The variables are consumer sentiments (CONSENT), business sentiments (BUSSENT), returns on ISE100 index (ISE100), returns on ISE market portfolio (Rm), business condition (BUSCON), the number of companies liquidated (COMPANY), country risk (COUNTRISK), economic risk premium (ECONRISKPRE), currency fluctuation (EXCHANGE), economic growth (GROWTH), inflation (INFTR) and terms of trade (TOT). The symbol 'X' indicates the rejection of the null hypothesis for the ADF test either at the level or first difference for each variable.

months and it becomes insignificant thereafter. However, the effect of the irrational component of consumer sentiment on the ISE-100 Index returns remains insignificant at all times during the sample period as shown in Figure 1(b). Thus, the response to the rational component is much greater than the response to the irrational component. This may indicate that a positive rational sentiment creates a tendency to increase returns. This result also provides evidence that investor sentiment is not fully irrationality based. There is a good portion of the sentiment that is fundamentals driven.

Figure 2(a) and (b) exhibits the impulse responses of the ISE-100 Index returns to a one-time SD increase in the fundamentals-driven (rational) and exuberance irrational components of business sentiment, respectively. Similar to the results at the consumer level, the impulse response of the ISE-100 Index returns to a one-time SD increase in the rational component of business sentiment is positive and significant for the first three months and it becomes insignificant thereafter. Once again, the impulse response of the ISE-100 Index returns to a one-time SD increase in the irrational component of business sentiment is insignificant at all times during the sample period.

Table 4. Effects of Fundamentals on Consumer Sentiment and Business Sentiment

	Dependent Variable: CONSENT				Dependent Variable: BUSSENT			
	Coefficient	SE	*t*–Statistic	Prob.	Coefficient	SE	*t*–Statistic	Prob.
BUSCON	–1.03	0.35	–2.93	0.005***	–2.04	1.10	–1.85	0.069*
COMPANY	–2.37E–04	8.91E–04	–0.27	0.790	–4.92E–03	2.80E–03	–1.76	0.084*
COUNTRISK	0.08	0.03	2.70	0.009***	0.35	0.09	3.93	0.000***
EXCHANGE	–9.93	3.94	–2.52	0.014**	–25.00	12.37	–2.02	0.048**
ECONRISKPRE	–0.22	0.68	–0.33	0.744	3.77.0	2.14	1.76	0.083*
GROWTH	–0.02	0.03	–0.80	0.425	0.22	0.10	2.27	0.027**
INFTR	–0.63	0.36	–1.76	0.084*	–2.21	1.12	–1.96	0.054*
TOT	0.11	0.16	0.71	0.478	0.63	0.49	1.30	0.200
ν_0	–0.17	0.82	–0.20	0.841	2.61	2.59	1.01	0.317
R^2	0.45				0.49			
AIC	4.32				6.60			
Schwarz criterion	4.60				6.89			
Sum squared residuals	241.40				2,376.94			
Log likelihood	–144.19				–225.38			
F–statistic	6.32				7.56			
Prob (F–statistic)	0.00				0.00			

Source: Author's own.

Notes: ***, **, * denotes significance at the 1, 5 and 10 per cent levels, respectively. The variables are consumer sentiment (CONSENT), business conditions (BUSCON), the number of companies liquidated (COMPANY), country risk (COUNTRISK), currency fluctuation (EXCHG), economic risk premium (ECONRISKPRE), economic growth (GROWTH), inflation (INF) and terms of trade (TOT).

$$ConSent_t = \nu_0 + \sum_{j=1}^{J} \nu_j Fund_{jt} + \xi_t$$

$$BusSent_t = \omega_0 + \sum_{j=1}^{J} \varpi_j Fund_{jt} + \delta_t$$

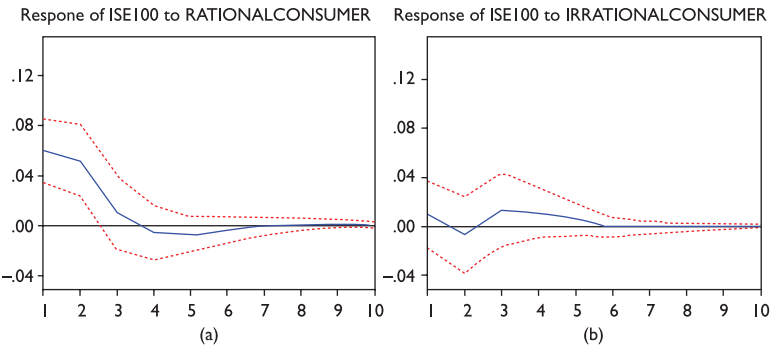

Figure 1. Response of the ISE-100 Index Returns to the (a) Rational and (b) Irrational Sentiments of Consumers

Source: Author's own.

Notes: The dashed lines on each graph represent the upper and lower 95 per cent confidence bands. When both the bounds carry the same sign the response becomes statistically significant. On each graph, 'percentage returns' are on the vertical and 'horizon' is on the horizontal axis.

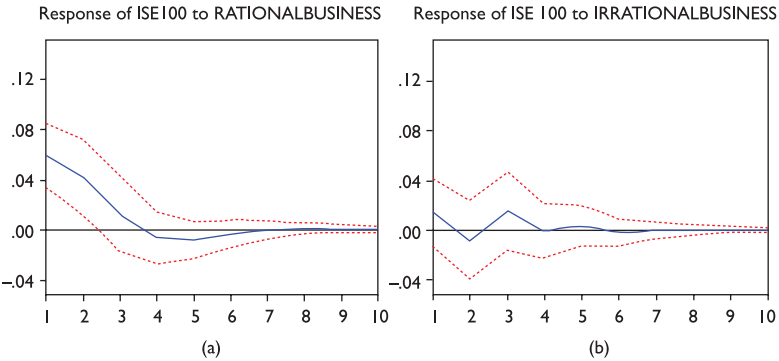

Figure 2. Response of the ISE-100 Index Returns to the (a) Rational and (b) Irrational Sentiments of Businesses

Source: Author's own.

The impulse responses of rational and irrational components of consumer sentiments to a one-time SD increase in the ISE-100 Index returns are shown in Figure 3(a) and (b), respectively. Likewise, Figure 4(a) and (b) shows the impulse responses of rational and irrational components of business sentiments to a one-time SD increase in the ISE-100 Index returns. As seen in Figures 3(a) and 4(a), the impulse responses of rational sentiments of consumers and businesses to a one-time SD increase in the

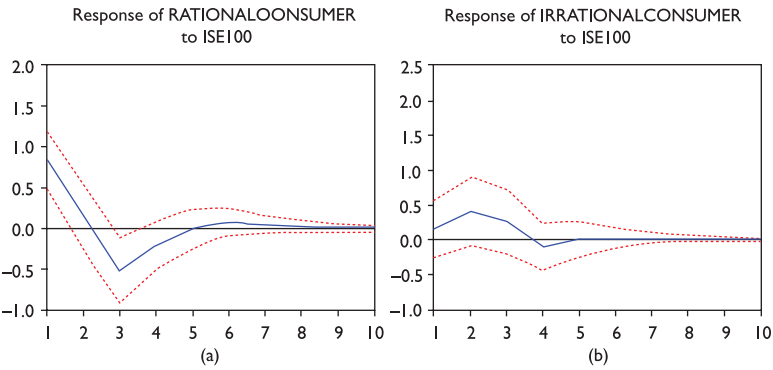

Figure 3. Response of the (a) Rational and (b) Irrational Sentiments of Consumers to the ISE-100 Index Returns

Source: Author's own.

Notes: The dashed lines on each graph represent the upper and lower 95 per cent confidence bands. When both the bounds carry the same sign the response becomes statistically significant. On each graph, 'percentage returns' are on the vertical and 'horizon' is on the horizontal axis.

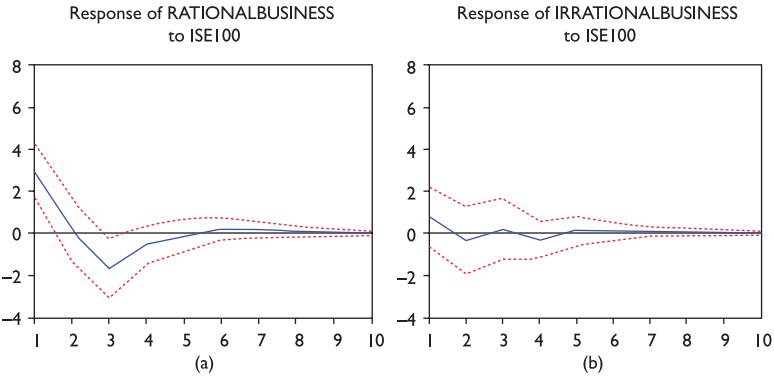

Figure 4. Response of the (a) Rational and (b) Irrational Sentiments of Businesses to ISE-100 Index Returns

Source: Author's own.

ISE-100 Index returns are positive and significant for the first three months and it becomes insignificant thereafter. On the other hand, the impulse responses of irrational sentiments of consumers and businesses to a one-time SD increase in the ISE-100 Index returns remain insignificant at all times during the sample period as seen in Figures 3(b) and 4(b).

These findings may mean that the rational components of sentiments, both at the consumer and business levels, are affected positively and significantly by the increases in the ISE-100 Index returns. The ISE-100 Index price increases may indicate a good economic habitat and it may be reflected in the fundamental variables used in the study. Thus, it becomes as a natural outcome that fundamentals-based analysis shows this impact on the sentiments more severely.

In summary, a significant bidirectional relationship between returns and rational component of consumer and business sentiments is confirmed and the results do not show any significant differences between consumer and business levels. The findings are consistent with Calafiore et al. (2009), which focus on another emerging market: Brazil. Their study also confirms significant bidirectional relationship between stock returns and rational components of consumer and business sentiments. They find no significant effect of irrational components on Brazilian stock returns.

However, both, the results of this study and that of Calafiore et al. (2009), only partially agree with Verma et al. (2008). Contrary to Verma et al. (2008), Calafiore et al. (2009) and this study do not find any significant effect in favour of irrational sentiments. Such disparity could be attributed to the differences between developed and emerging stock markets as Verma et al. (2008) focus on US stock markets. In contrast to developed stock markets, institutional investors play more major role in shaping emerging stock market movements than individual investors. Institutional investors are known to utilise more technical and analytical analysis in their decision-making processes. It may be implied that as the number of individual investors increase and they become more active participants, irrational components of sentiments in emerging stock markets may become significant following the trails of their developed counterparts.

Relationship Between CAPM Estimated Excess Returns and Sentiments

Some might argue that the ISE-100 Index returns included in the VAR estimations are continuously compounded returns, which are not calculated or fitted with any of the widely used asset pricing models of the finance literature. Asset pricing models such as CAPM (Sharpe, 1964) and Arbitrage Pricing Model (APT) (Ross, 1976) enable stock market participants to predict future expected returns to some extent. Thus, in order to handle such limitation of the stock price index returns included in the previous VAR model, the CAPM-generated excess returns are estimated for

the ISE-100 Index. Then, another five-variable VAR model is run to check the robustness of the previous results in the above section. The regression estimation for the CAPM is generally expressed as (Ruppert, 2004).

$$R_{i,t} - R_{f,t} = \alpha_{i,t} + \beta_{i,t}(R_{m,t} - R_{f,t}) + \rho_t \tag{5}$$

where $R_{i,t} - R_{f,t}$ is the excess return on the capital asset, it is the excess return of the ISE-100 Index at time t in this study, R_f is the risk-free rate of interest such as interest arising from government bonds at time t, β_i (the beta) is the sensitivity of the expected excess asset returns to the expected excess market returns and $R_{m,t} - R_{f,t}$ is the excess return of the market portfolio that contains every security in the market with the actual weights at time t.

The CAPM requires a risk-free rate of return: a rate of return for a riskless asset in the market. Unfortunately, there are no monthly series existing for a possible risk-free rate substitute for Turkey. Thus, a proxy for the risk-free rate should be found or created. There are some widely used proxies for such risk-free rate for Turkey. One of the proxies is to use the below formula and calculate the risk-free rate (Gursoy & Rejepova, 2007):

$$RF* = USTBILL + (INFTR - INFUS) + USTBILL * (INFTR - INFUS) \tag{6}$$

where $RF*$ is estimated monthly Turkish risk-free rate, USTBILL is monthly equivalent of three-month US T-Bill rate, *INFTR* is monthly inflation rate in Turkey and *INFUS* is monthly inflation rate in US monthly inflation rate series. The monthly inflation rate series for Turkey is calculated by using the logarithmic differences of the Consumer Price Index (Fama & Schwert, 1977).

CAPM Model

$$(R_{i,t} - R_{f,t}) = \alpha_{0,t} + \beta_{1,t}(R_{m,t} - R_{f,t}) + \nu_{1,t} \tag{7}$$

where $\alpha_{0,t}$ and $\beta_{1,t}$ are the parameters to be estimated and $\nu_{1,t}$ is the error term. $R_{i,t}$ is the continuously compounded monthly ISE-100 Index return series. R_m is the continuously compounded monthly ISE All Share Index return series that is used as a proxy for the return on a market portfolio that consists of all stocks in the Istanbul Stock Exchange. The monthly risk-free rate series for Turkey (R_f) is estimated using the formula in equation (6). Then, the CAPM regression is run by using equation (7)

with the OLS method and the fitted values of this regression are obtained. The fitted values of the CAPM model are named as *'CAPM'*[3].

The left-hand side of equation (7) represents the excess returns of the ISE-100 Index returns over the estimated risk-free rate of return. This part reflects the risky return component of the ISE-100 Index. The difference between the return on the market portfolio and the estimated risk-free rate of return is included in the right-hand side of the equation. This part is the risky return component of the market portfolio, or market risk premium, in the ISE as well. The coefficient beta shows the relationship between the excess returns of the ISE-100 Index and the market risk premium. The coefficient beta is positive and significant at 1 per cent level. The value of the beta coefficient is 0.99. If the value of this coefficient were 1, then it could be concluded that the excess returns of the ISE-100 Index moves exactly same with the market portfolio. However, the value of 0.99 shows that the relationship between the two excess returns is still extremely strong and significant.

The five-variable VAR model is run using CAPM model-fitted excess returns, rational sentiments of consumers and businesses and irrational sentiments of consumers and business.[4] The results at the consumer and business levels do not show any significant differences with previous results of the five-variable VAR model with the continuously compounded ISE-100 Index returns.[5]

Implications and Comparisons

There are implications of this study that might be of importance to individual and institutional investors, firms, creditors, governments, policy-makers and academic scholars. The response of the ISE-100 Index returns to a one-time SD increase in the fundamentals-driven (rational) component of sentiments is positive and significant for the first three months after the initial shock and becomes insignificant thereafter. However, the response of the same returns to a one-time SD increase in the irrational component of sentiments is insignificant. Increases in the fundamentals-driven component of sentiments indicate a good economic environment. This optimistic habitat is sourced from the actual improvements in the fundamental variables used in the study. It does intuitively make sense that stock returns are positively and significantly impacted by such optimistic environment. However, increases in the irrational component of sentiments do not cause any significant impact on the stock returns in Turkey. There may be two potential reasons for this insignificant effect:

(1) the effect of irrational component of sentiments is too small to be detected as significant, which show that the investors do not show much irrationality or (2) the number of individual investors in this relatively small stock market is too few compared to developed stock markets and therefore, the effect of the irrational sentiments on stock returns is wiped away easily and remains undetected. As it is indicated in the literature review section, individual investors are more prone to show exuberance compared to institutional investors and it is documented that the ISE has more institutional investors than individual investors. Such institutional investors are known to utilise more technical and fundamental analysis than individual investors (Gompers & Metrick, 2001). Another important factor regarding the number individual investors in emerging stock markets has to do with the usage of the online trading tools in these markets. It is assumed that online trading by individual investors is more common and popular in developed markets compared to emerging markets. A statistics released by Hong Kong Exchanges and Clearing Ltd. shows that the USA has the most developed online market with 19.3 million online investor accounts and 894,700 online equity trades per day as of December 2000 (http://www.hkex.com.hk/eng/stat/research/rpaper/documents/OTUS.pdf). In 2001, 22 per cent of retail investors traded via the internet in the USA. However, there is no clear-cut, exact statistics of these numbers for emerging markets. According to World Bank's fact book of 2010, 78 per cent of population in the USA have access to internet and they are active internet users whereas in Turkey this percentage is only 35. Using the percentage of internet usage as a proxy for online trading, it can be concluded that the percentage of individual investors that utilise online trading tools is much lower in Turkey as compared to USA. Thus, we believe as this percentage and individual investor participation in the stock market increase in Turkey, the effect of the irrational component of sentiments on stock returns may become significant.

The response of the fundamentals-driven (rational) component of sentiments to a one-time SD increase in the ISE-100 Index returns is positive and significant for the first two months and insignificant thereafter. On the other hand, the response of the irrational component of sentiments to a one-time SD increase in the returns is insignificant at all times. This result confirms that increases in the ISE-100 Index returns also create an optimistic environment for the market participants and affect the fundamental variables positively. The strong bidirectional causality between the ISE-100 Index returns and the fundamentals-driven (rational) component of sentiments is verified with this study. Previous literature's assumption of unidirectional causality between stock returns and sentiment is insufficient and inaccurate.

Another important implication is that the effect of the fundamentals-driven (rational) component of sentiments on stock returns is greater than the effect of the irrational component of sentiments in Turkey. This result is in line with previous studies of Verma et al. (2008) and Calafiore et al. (2009). The noise traders do not have enough power to influence the stock prices with their unpredictable sentiment changes in Turkey. Thus, the rational expectations theory of stock prices may be a valid argument in determining stock prices of the Istanbul Stock Exchange (Muth, 1961).

The analysis of the same relationships with the CAPM-fitted excess returns reveals the same results. The CAPM-fitted excess returns of the ISE-100 Index subtract the estimated risk-free rate from the continuously compounded returns. Thus, only the risky parts of the returns are considered in the CAPM for both, the ISE-100 Index returns and the ISE All Shares Index returns. The response of the excess returns on the ISE-100 Index, or equity risk premium, to a one-time SD increase in the fundamentals-driven component of sentiments is positive and significant for the first three months. The response of the CAPM-fitted excess returns to a one-time SD increase in the irrational component of sentiments is insignificant at all times. Moreover, the response of the rational component of the sentiments to a one-time SD increase in the CAPM-fitted excess returns is positive and significant for the first two months but the response of the irrational component of the sentiments to a one-time SD increase is insignificant at all times. Such robust results confirm that the VAR model in this study captures the postulated relationships well.

This is one of the pioneer studies that investigates the relationship between the stock returns and the investor sentiment for a second-generation emerging market. The results are completely consistent with the findings of Calafiore et al. (2009) and partly consistent with Verma et al. (2008). The studies by Calafiore et al. (2009) and Verma et al. (2008) focus on Brazil and USA, respectively. It can be concluded that the first-generation emerging markets and the second-generation emerging markets show similarities in their stock return responses to changes in sentiments and vice versa. The fundamentals-driven component of sentiments and the stock returns have significant effects on each other whereas the irrationality-driven component of sentiments and the stock returns have no significant impact on each other. The implication of such results is that emerging stock markets support the rational expectations of stock return argument. On the other hand, the effect of the irrational component of sentiments on the stock returns is significant in developed stock markets, which supports the noise traders' model argument. Utilising the analysis based on the fundamentals, variables used in the study may be

beneficial and practical in determining the future stock market responses in the emerging markets. Individual and institutional investors, firms, governments, creditors, policymakers and academic scholars may use these fundamentals analysis in their decision-making processes.

Conclusion

The purpose of this study is to examine the relative effects of fundamentals-driven (rational) and irrational components of consumer and business sentiments on the ISE-100 Index returns of Turkey. Previous literature prior to Verma et al. (2008) tends to classify investor sentiment as a complete irrational term which cannot be predicted using risk factors. However, it is a recent argument that consumer and business sentiments may be driven by both, fundamentals-driven (rational) and irrational factors in Turkey. In general, a five-variable VAR model is run and the following results are found: First, the impact of rational sentiments both at the consumer and business levels are greater than irrational sentiments on stock market returns in Turkey. Second, the immediate responses of the Istanbul Stock Exchange Index returns to sudden increases in the fundamentals-driven component of sentiments are positive and significant for the first three months and there are significant effects of past performance on rational sentiments. In summary, significant bidirectional relationship between stock returns and rational component of consumer and business sentiments is confirmed. Lastly, the impact of irrational sentiments on ISE-100 Index returns is insignificant both at the consumer and business levels. Contrary to the most previous studies and in line with Verma et al. (2008) and Calafiore et al. (2009), the results of this study supports that consumer and business sentiments are driven by both rational (fundamentals-driven) and irrational factors with distinctive effects on the stock market returns in Turkey. However, similar to Calafiore et al.'s (2009) study in Brazil but different from Verma et al.'s (2008) study in USA, the impact of the irrationality-driven component of sentiments on stock market returns remains insignificant for Turkey. One reason for this different result may be due to the distinction between emerging stock markets and developed stock markets. Brazil and Turkey as two important emerging stock markets show very similar behaviour in that irrational component of sentiments reveals insignificant effects on the stock market returns. Emerging stock markets are usually dominated more by institutional investors rather than individual- or consumer-level investors. The lack of consumer or individual investor may be the reason why the impact of irrational component

of sentiments is insignificant in these markets for now. As these markets develop more and the number of individual investors increases, we may be able to see significant effects of irrational component of sentiments in these markets.

The results have important practical implications for investors and policymakers. Since they point out a relationship between sentiments and stock returns, it is obvious that sentiments do have pricing power in the stock prices of Istanbul Stock Exchange. Thus, the rational expectations theory of stock returns is found to be a valid argument in Turkey under such evidence. Moreover, the insignificant effect of the irrationality-driven component of sentiments on stock returns reduces the possibility of underreaction and overreaction happening in the market. Consequently, reduced possibility of stock price distortion brings the stock prices to their intrinsic values. Overall, when the intrinsic values of the stocks are accomplished, the systematic risk of the Istanbul Stock Exchange may reduce. Decreased systematic risk in an emerging stock market like the Istanbul Stock Exchange may make the market more attractive to participants, which may also contribute to the further development of efficiency in the market.

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Notes

1. The results of the VAR estimate are available upon request.
2. The market risk premium, which is calculated as the difference between the rate of return on a market portfolio and the risk-free rate, is excluded in the fundamental risk factors variables. Otherwise, the interpretation of the results after application of an asset pricing model, such as CAPM would have been compromised. The question whether the irrational component of sentiments can be explained by the market risk premium is addressed by regressing the market risk premium against the irrational components of sentiments. The coefficients from these regressions are not significant, confirming that the irrational components of sentiments are not significantly affected by the market risk premium. The results of these regressions, both at the consumer and business levels, are available upon request.

3. Another CAPM model with no intercept term is run using the following equation (equation 8):$(R_{i,t} - R_{f,t}) = \beta_{2,t}(R_{m,t} - R_{f,t}) + \nu_{2,t}$ The fitted values of the CAPM models in equations (7) and (8) are compared and no statistically significant results are found between the values. Therefore, the five-variable VAR model, expressed in equation (3), is run using the fitted values of first CAPM model in equation (7).
4. The results of the VAR estimate with the CAPM-fitted returns are available upon request.
5. Graphs that show the generalised impulse response functions for the effects are available upon request.

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