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Full Length Research Paper

Herding in the Istanbul Stock Exchange (ISE): A case of behavioral finance

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In this study, the methodology which based on cross sectional volatility of stock rate of return and was carried out by Christie and Huang (1995) with Chang et al. (2000), was implemented to study the existence of herding behavior in Istanbul stock exchange (ISE) National 100 index. The existence of herding behavior was examined in terms of two models as rising and falling days and asymmetrical and nonlinear relationships were put forward. Index and traded stocks as part of an index were handled between 04.01.2000 to 04.01.2010 during realization of analyses and total 2479 return data on daily basis, which were obtained for every stock and index, were analyzed by using regression method. As a result of analyses, it was found that increasing index return rate in rising days of markets increased cross sectional volatility significantly and these findings were supported by other findings, which were obtained for falling days in markets. When the obtained results are evaluated, it can be argued that herding behaviour is valid in Istanbul stock exchange (ISE) National 100 index and a nonlinear relationship exists between them.

Key words: Herding behavioral, behavioral finance, Istanbul stock exchange (ISE).

INTRODUCTION

Herd behavior in financial markets is a concept that has been in place since the appearance of financial markets. From the tulip mania in the 17th century to the strong fluctuation in global stock markets between 1974 and 1982, the overvaluation in Japanese stock and real estate markets in the 1980s, and the media and telecom bubble forming in 2000, overvaluations and the resulting uprises or downfalls have been usually attributed to herd behaviors by financial markets (Ede, 2007). Decamps and Lovo (2002) argue that investors operate in the light of the information they obtain and such information is reflected in prices; this makes financial markets informationally strong-form efficient in the long run. However, the efficiency may disappear if investors imitate others in their transactions instead of acting on their own knowledge. This type of investor behavior designated as herding behavior forces investors to imitate each other rather than obtaining information about the market; yet, every similar investor behavior cannot be termed as herding behavior. Changing an investment decision in line with other investors' decisions is a prerequisite for an investor's behavior to be accepted as herding behavior (Bulbul, 2008).

Financial herding behavior should be distinguished from pseudo-herding behavior, even if it mimics other investors' behaviors. Pseudo-herding behavior involves similar decisions taken by investors with the same data set when they are faced with the same problem. Pseudo-herding behavior can also be termed as unconscious herding behavior. Unconscious herding behavior refers to similar investment decisions taken by a group in the face of similar uncertainties and information (Kandir, 2009). As different from conscious herd behavior, investment operations are not closely related in unconscious herding behavior because investment decisions are taken independently. In unconscious (pseudo) herding behavior, investment decisions made are effective decisions, for this type of herding behavior is based on similar information, similar investment strategies, and similar risk approaches (Bikhchandani and Sharma, 2001; Chen et al., 2007; Walter and Weber, 2006; Coban, 2009).

Two main approaches are employed to explain herd behavior, which are rational herd behavior and irrational herd behavior. The rational view focuses on the externalities that distort optimal decision-making process due to incentive elements or information difficulties. The irrational view, on the other hand, focuses on investor psychology, comparing agents' and individuals' behaviors to herds blindly following one another and claiming that they are based on previous rational analyses (Dom, 2003). When individuals engage in herding behavior, they tend to disregard coming information and mimic the previous behaviors of other people. This kind of behavior arises when people are convinced that the masses are better informed, disregarding its quality. Nevertheless, the classical rational expectations theory argues that this is impossible. However, it is irrational to claim that one can not possibly be influenced by others' behaviors. Once people are caught up in this wave, an individual is influenced by the decisions of the majority (Owen, 2002).

The present study investigated the presence of herding behavior in the market on the basis of 70 stocks traded in the Istanbul stock exchange (ISE) National-100 index and the daily returns of the index within the period between 2000 and 2010. In addition, a perceptional space was constructed in the study in order to determine the similar and different relations between the stocks and the index. The study focuses on a current analysis period and a specific index, which distinguishes it from other studies in the field. In this respect, the second section of the study discusses the findings of the studies conducted on the same subject in the literature; the third section deals with the data set used in the process of analysis; and the fourth section concerns the methodology applied. The fifth section presents the results obtained by analyses, while the final section evaluates the obtained results.

LITERATURE REVIEW

To measure herding behavior, various measurement methods have been used and different results have been obtained in the relevant literature. Therefore, even if different methods are used in the same markets, different results may be obtained, which results in a lack of consensus. Thus, various results of different studies are currently available in the literature. Lakonishok et al. (1992) investigated herd behavior by empirically testing tax-exempt funds held by the money managers in the US for the period between 1985 and 1989. The study results demonstrated that the money managers did not exhibit significant herding behavior. Christie and Huang (1995) first applied a methodology based on the cross-sectional standard deviation (CSSD) of returns and investigated the presence of herding behavior in US stock markets by examining the cross-sectional deviations of stock returns according to the market average. As a result, they did not find any significant herding behavior in US markets.

Grinblatt et al. (1995) examined the herding behavior among fund managers and the relationship of such behavior with momentum investment strategies and performance on 274 stocks and between 1974 and 1984, finding a low level of herding behavior. Chang et al. (2000) extended their empirical study around the model developed by Christie and Huang (1995) and examined herding behavior in USA, Hong Kong, Japan, South Korea and Taiwan, using a method based on cross-sectional absolute deviation (CSAD). The authors found a marked increase in stock return deviations during periods of extreme price up movements when compared to extreme price down days; revealed significant herding behavior in South Korean and Taiwan markets; did not find any evidence of herding behavior in US and Hong Kong markets; and identified partly herding behavior in Japan.

Demirer and Kutan (2006) examined herding behavior in Shanghai and Shenzhen stock markets, obtaining evidence of the presence of herding behavior in both markets. Similarly, Tan et al. (2007) also investigated in their study herding behavior in Shanghai and Shenzhen stock markets and unlike Demirer and Kutan (2006), their results indicated the absence of herding behavior. In their study, Farber et al. (2006) investigated the presence of herding behavior in Vietnam Ho Chi Minh City Securities Trading Center during the period between 2000 and 2006, finding evidence of herding behavior. Demirer et al. (2007) conducted a study covering six geographical regions and the period between 1998 and 2004, in which they empirically tested herding behavior. They examined the movements of returns in African, Asian, Eastern-Western-Central European, Central Asian, and Latin American markets according to S&P 500 and MSCI indices and oil prices. They failed to find any evidence of herding behavior in all of the markets, except for Asian and Middle Eastern markets. Caporale et al. (2008) investigated the presence of herding behavior in the Athens stock market under extraordinary market conditions during the period between 1998 and 2007 and identified the presence of herding behavior in this market.

In a study investigating the presence of herding behavior in the ISE between 1997 and 2008, Altay's (2008) results revealed that herding behavior existed. The study also concluded as a result of a research by sector that herding behavior was a common tendency in all sectors in the market, but the periods and the tendency of recovery from herd influence varied among sectors. Kallinterakis and Lodetti (2009) investigated in their study the influence of low trading volume on herding behavior in Montenegro New Securities Exchange for the period between 2003 and 2008. Their analysis utilizing the non-linear model revealed no evidence suggesting that low trading volume led to herding behavior. Chiang and Zheng (2010) investigated the presence of herding behavior in 18 countries in the global market during the period between 1988 and 2009. Their research demonstrated that herding behavior exists in advanced stock markets except for the US and that stock return dispersions in the US had a significant role in explaining the herding behavior in non-US markets.

DATA SET

The data set used in this study covers the period between 04.01.2000 and 04.01.2010 and consists of the ISE National-100 index and 70 stocks traded in the index. ISE National-100 index was selected because it is very important and efficient market of Turkey and many investors in the world have been investigating ISE National-100 index. In the study, a total of 2479 daily return data calculated on the basis of the closing prices of each stock and the index were analyzed using the regression method. Other stocks in the index were not included in the analysis since data for them were not available for the study period. The data used for analysis were obtained from the Istanbul Stock Exchange (ISE) Electronic Data Delivery System (http://evds.tcmb.gov.tr/) and Is Investment (http://www.isyatirim.com.tr/). Microsoft Office Excel 2010 was used to organize data and SPSS 16.0 software package "Table 1 presents the stocks analyzed along with their codes." was used to perform regression analysis. The following formulations were used to compute the stock and index returns:

Stock Return (SR) = $(S_t - S_{t-1} / S_{t-1})$
S_t: the closing price of the stock on period t
S_{t-1}: the closing price of the stock on period t-1
Index Return (IR) = $(I_t - I_{t-1} / I_{t-1})$
I_t: the value of the index on period t
I_{t-1}: the value of the index on period t-1.

METHODOLOGY

There are two measurement methods in the relevant literature to test herding literature: cross sectional standard deviation (CSSD) and cross sectional absolute deviation (CSAD). CSSD was first employed by Christie and Huang (1995) and is formulated as shown subsequently (Demirer et al., 2007). The $CSSD_t$ variable in the formula denotes the cross-sectional standard deviation of stock return rates from the market return rate in period t, variable $R_{i,t}$ denotes the return rate of stock i in period t, variable $R_{m,t}$ denotes the return on the market portfolio in period t, and variable N denotes the number of stocks.

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^{N}(R_{i,t} - R_{m,t})^2}{N-1}}$$

Christie and Huang (1995) argued that individuals suppress their personal interests and beliefs in favor of the market consensus during periods of extreme market movements. Therefore, Christie and Huang (1995) empirically examined whether stock return dispersions are significantly lower than average during periods of extreme market movements and formulated the model given aubsequently. In the formula, variable D^L assumes the value of 1 if the market return on day t lies in the extreme lower tail of the distribution and equals to 0 otherwise. Variable $D^{U,}$ on the other hand, assumes the value of 1 if the market return on day t lies in the extreme upper tail of the distribution and equals to 0 otherwise. The dummy variables, D^L and D^U, were designed to determine the differences in investor behavior in extreme up or down versus normal market periods. To measure extreme price movement conditions, Christie and Huang (1995) used 1% or 5% in the upper and lower tail of the market return distribution.

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t$$

The second method used to measure herding behavior is the CSAD method. Chang et al. (2000) used the CSAD of stock returns to identify the presence of herding behavior. In this approach, CSAD of returns is a linear and increasing function of the market return in rational pricing models. Obtaining a result that does not support it is regarded as an indicator of the presence of herding behavior in the market (Altay, 2008). Daily CSAD values of stock returns were computed by using the formula given below. In the formula, variable $CSAD_t$ denotes the cross-sectional absolute deviation of stock return rates from the market return rate in period t, variable $R_{i,t}$ denotes the return rate of stock i in period t, variable $R_{m,t}$ denotes the return on the market portfolio in period t, and variable N denotes the number of stocks.

$$CSAD_t = \frac{\sum_{i=1}^{N}|R_{i,t} - R_{m,t}|}{N}$$

In order to test herding behavior, the present study also employed the methodology based on the CSAD of stock returns developed by Chang et al. (2000). The two models used and hypothesis tested in the study are presented below.

Hypothesis

If γ_2 is significantly negative when dependent variable is CSAD, herd exists in ISE National 100 equity market; otherwise a significantly positive γ_2 indicates no evidence of herding.

Model 1

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP} |R_{m,t}^{UP}| + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t , \qquad \text{if } R_{m,t} \geq 0$$

Model 2

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} |R_{m,t}^{DOWN}| + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t , \quad \text{if } R_{m,t} < 0$$

Here, variable $CSAD_t$ (up) is the cross-sectional absolute deviation of stock returns from the market return when the index is up; variable $CSAD_t$ (down) is the cross-sectional absolute deviation of stock returns from the market return when the index is down; and variables $R_{m,t}$ (up) and $R_{m,t}$ (down) denote the absolute value of the equally-weighted returns of all available stocks on day t when the index up and down, respectively. Absolute values are used to facilitate the comparison of the coefficients of the linear term. When market participants extremely diverge from market average during

Table 1. The stocks analyzed.

Stock	Code	Stock	Code
Akbank	AKBNK	Isiklar Yatirim Hol.	ISYHO
Aksigorta	AKGRT	Kartonsan	KARTN
Aksa	AKSA	Koc Holding	KCHOL
Alarko Holding	ALARK	Kerevitas	KERVT
Anadolu Sigorta	ANSGR	Kipa	KIPA
Arcelik	ARCLK	Konya Cimento	KONYA
Aselsan	ASELS	Kardemir (D)	KRDMD
Aygaz	AYGAZ	Marti Otel Islt.	MARTI
Bagfas	BAGFS	Metro Tic. Mali Yat.	METRO
Banvit	BANVT	Migros	MIGROS
Boyner	BOYNR	Marshall	MRSHL
BSH Profilo	BSHEV	Netas	NETAS
Celebi	CLEBI	Net Holding	NTHOL
Deva	DEVA	Net Turizm	NTTUR
Dogan Gazetecilik	DGZTE	Otokar	OTKAR
Dogan Holding	DOHOL	Ozderici GYO	OZGYO
Dogan Yayin	DYHOL	Petkim	PETKM
DYO Boya	DYOBY	Pinar Sut	PNSUT
Eczacibasi Ilac	ECILC	Park San. Tic.	PRKTE
Eczacibasi Yatirim	ECZYT	Petrol Ofisi	PTOFS
Ege Gubre	EGGUB	Sabanci Holding	SAHOL
Ege Seramik	EGSER	Sasa	SASA
Eregli Demir Celik	EREGL	Sise Cam	SISE
Fortis	FORTS	Sekerbank	SKBNK
Ford Otosan	FROTO	Tek-Art Turizm	TEKTU
Garanti Bankasi	GARAN	Turk Hava Yollari	THYAO
Global Yatirim Hol.	GLYHO	Tire Kutsan	TIRE
Goltas Cimento	GOLTS	Tofas Fabrika	TOASO
GSD Holding	GSDHO	Turcas	TRCAS
Gubre Fabrikalari	GUBRF	Trakya Cam	TRKCM
Hurriyet	HURGZ	TSKB	TSKB
Ihlas Ev Aletleri	IHEVA	Tupras	TUPRS
İhlas Holding	IHLAS	Vestel	VESTL
Is Bankasi (C)	ISCTR	Yapi ve Kredi Bank	YKBNK
Is GYO	ISGYO	Yapi Kredi Sigorta	YKSGR

extreme price movements, a non-linear relationship will appear between average market return and $CSAD_t$. Non-linearity would be captured by a negative and statistically significant γ_2 variable (Chang et al., 2000).

Furthermore, in the study, multidimensional scaling analysis was performed and a perceptual space was constructed to reveal the similarities (proximity) and dissimilarities (distance) between the studied stocks and index returns. Multidimensional scaling helps determining the relationships among objects by representing the objects shown in a k-dimensional space in a conceptual space with fewer dimensions very closely to their original positions. This analysis mainly aims to demonstrate objects' structure (by using their distance values) as closely as possible to their originals using as few dimensions as possible. Through this technique, complex relationships between the objects or individuals in a multidimensional data matrix could be seen in more comprehensible and explicable dimensions (Hair et al., 2005).

Multidimensional scaling analysis is a combination of various methods and could be summarized in six steps (Ozdamar, 1999):

1. At the first step, the data are transformed by using a standardization method suitable for the data type. This step is indispensable.
2. The distances matrix is computed in relation to the data type used. The data matrix is constructed which includes the data distances between the ith and jth units.
3. A decision is made about in what dimensional space (X_1 , X_2 , . . . , X_k) object or unit n with p-variable p-dimensional data matrix (X_1 , X_2 , . . . , X_p), ($k \leq p$) would be represented. Furthermore, stress measure is calculated to determine the suitability of the solutions obtained for each k to the original distance matrix and a decision is made as to in which dimension the suitable solution occurs and what solution will be used. Regression of configuration distances is

computed according to the matrix of data distances by taking the data type into account.
4. Estimated configuration distances are identified by the regression equation determined. These estimated distances are called “disparity”.
5. To determine the fit between configuration distances and estimated distances, stress statistic is calculated as a suitable statistic.
6. At the last step, coordinates are obtained for units or observations according to k dimension. These coordinates are graphically shown in a k-dimensional space and positions of each unit or observation relative to other units’ observations are visualized. By interpreting these images, attempts are made to determine the relationships between units.

EMPIRICAL FINDINGS

Descriptive statistics results

According to the data in Table 2, for the period between 04.01.2000 and 04.01.2010, average daily returns of the stocks and the index, their maximum and minimum values and standard deviation values are presented. The average daily return of the ISE National-100 index was found to be 0.08%. During the study period, the ISE National-100 index achieved its highest daily return on 12.01.2001 with a rate of 19.44% and its lowest return on 30.03.2001 with a rate of -18.11%. Among all stocks, the first three yielding the highest daily average returns were found to be PRKTE (0.17%) EGGUB (0.14%), and KERVT (0.13%), respectively, while the first three yielding the lowest daily average returns were IHLAS (-0.08%), BOYNR (-0.06%), and KCHOL-SASA (-0.05%), respectively.

Multidimensional scaling analysis results

An examination of Table 3 regarding the basic statistical results of the multi dimensional scaling analysis reveals that the iteration was repeated until the value where the stress statistic is smaller than 0.001 for k = 2 and the iteration was stopped as the value -0.0015 was reached under the 4th iteration. The obtained solution has been considered to be appropriate since the stress statistic was found to be close to 0. From Table 4, it could be observed that the stress value calculated using Kruskal’s formula was found to be 0.5658, indicating that the stress value explains 56.58% of the data.

Euclidean distances between the variables were calculated in the perceptual space constructed in line with the stock and index returns (Figure 1). The analysis revealed the first three stocks that are closest and most distant to the index (ISE) return in accordance with the variables’ values (Euclidean distances). Thus, the first three stocks with the highest similarity (proximity) to index return are NETAS (0.204), SISE (0.227), and ISCTR (0.312), respectively, while the first three stocks with the highest dissimilarity (distance) are AKBNK (3.001), PRKTE (2.725), and YKSGR (2.721), respectively.

Arguably, the returns or losses yielded by the stocks that are similar to index return will be approximately the same as the index, while the dissimilar stocks may yield returns or losses that are different from the index. In addition, it could be argued that similar stocks could be included as alternatives to each in the portfolio formation process of investors, while those that are dissimilar cannot be used alternatives to each other. An examination of Figure 2 suggests that the distances between stocks and index display a linear relationship, thus pointing to compatibility between the actual distances and those demonstrated by the model.

Regression analysis results

Table 5 shows the results of the regression analysis between the cross-sectional absolute deviation and index returns when the market is up. The obtained results demonstrate that parameter γ_1 (up) is statistically significant and positive at the level of 1%. In other words, an increase in index returns significantly increases cross-sectional variability.

On the other hand, the result that parameter γ_2 (up) is negative and statistically significant at the level of 1% could be considered as an evidence of the presence of herding behavior in the market when it is up. The result obtained indicates that cross-sectional absolute deviation increases as index returns increase, but the increase is regressive. Therefore, in the case of extreme values in index returns, cross-sectional absolute deviation decreases and herding behavior is observed during these stressful days. All these results confirm the presence of a non-linear relationship and support the argument that herding behavior is a valid phenomenon in the ISE National-100 index.

Table 6 (Model 2) shows the results indicating the presence of herding behavior in the market when it is down. The results obtained confirm the results in Model 1 presented in Table 5. The results obtained by the regression analyses indicate that parameter γ_2 is negative and statistically significant. Thus, it could be argued that herding behavior in market direction is valid in the ISE National-100 index both in rising and falling markets but is not linear.

Conclusıon

In this study, the presence of herding behavior in market direction in the ISE National-100 index during the period between 04.01.2000 and 04.01.2010 was investigated by analyzing the cross-sectional variability of stock and index returns. In the analysis, in order to test the hypothesis that when the market is under extreme stress, investors will engage in herding behavior by disregarding mass decisions and mimicking the general market trend, the CSAD (cross-sectional absolute deviation)

Table 2. Descriptive statistics results.

Stock	Minimum	Maximum	Mean	Std. deviation
AKBNK	-0.53	0.21	0.0006	0.03684
AKGRT	-0.72	0.20	0.0002	0.04104
AKSA	-0.75	0.23	-0.0002	0.03634
ALARK	-0.91	0.19	0.0001	0.03401
ANSGR	-0.59	0.21	-0.0001	0.03834
ARCLK	-0.64	0.24	0.0001	0.03852
ASELS	-0.76	0.20	0.0005	0.04275
AYGAZ	-0.70	0.20	-0.0002	0.03663
BAGFS	-0.34	0.21	0.0009	0.03405
BANVT	-0.76	0.23	0.0001	0.03954
BOYNR	-0.62	0.22	-0.0006	0.04295
BSHEV	-0.73	0.26	0.0008	0.03947
CLEBI	-0.83	0.23	0.0004	0.04630
DEVA	-0.64	0.27	0.0009	0.04496
DGZTE	-0.57	0.23	0.0008	0.04486
DOHOL	-0.53	0.20	-0.0001	0.04366
DYHOL	-0.42	0.21	0.0002	0.04420
DYOBY	-0.51	1.93	0.0004	0.05848
ECILC	-0.79	0.22	0.0004	0.04112
ECZYT	-0.53	0.23	0.0003	0.03458
EGGUB	-0.51	0.23	0.0014	0.03677
EGSER	-0.55	0.28	0.0004	0.04155
EREGL	-0.91	0.22	0.0005	0.03931
FORTS	-0.58	0.18	0.0005	0.03916
FROTO	-0.74	0.20	0.0005	0.03821
GARAN	-0.65	0.19	0.0008	0.04108
GLYHO	-0.31	0.29	0.0002	0.04228
GOLTS	-0.53	0.54	0.0009	0.03548
GSDHO	-0.78	0.23	0.0000	0.04733
GUBRF	-0.87	0.22	0.0011	0.04465
HURGZ	-0.44	0.21	0.0001	0.04236
IHEVA	-0.66	1.53	0.0005	0.05761
IHLAS	-0.57	1.05	-0.0008	0.04632
ISCTR	-0.50	0.21	0.0002	0.03773
ISGYO	-0.27	0.19	0.0002	0.03260
ISYHO	-0.45	2.61	0.0008	0.06917
KARTN	-0.32	0.28	0.0007	0.03021
KCHOL	-0.66	0.20	-0.0005	0.03868
KERVT	-1.00	0.80	0.0013	0.05344
KIPA	-0.79	0.22	0.0003	0.03535
KONYA	-0.50	0.21	0.0011	0.03144
KRDMD	-0.72	0.23	0.0005	0.04724
MARTI	-0.51	0.23	0.0003	0.04151
METRO	-0.92	0.24	0.0001	0.04476
MIGROS	-0.85	0.22	0.0000	0.03919
MRSHL	-0.51	0.22	0.0001	0.03497
NETAS	-0.19	0.21	0.0005	0.03376
NTHOL	-0.65	0.23	0.0001	0.04303
NTTUR	-0.59	0.25	0.0003	0.04541
OTKAR	-0.68	0.22	0.0003	0.03896
OZGYO	-0.50	1.82	0.0011	0.05753

Table 2. Contd.

PETKM	-0.41	0.23	0.0000	0.03433
PNSUT	-0.68	0.22	0.0006	0.03983
PRKTE	-0.80	0.33	0.0017	0.05158
PTOFS	-0.80	0.26	-0.0002	0.03978
SAHOL	-0.68	0.20	0.0000	0.03594
SASA	-0.82	0.22	-0.0005	0.03813
SISE	-0.66	0.21	0.0000	0.03757
SKBNK	-0.59	0.72	0.0009	0.04519
TEKT	-0.51	0.25	0.0004	0.04176
THYAO	-0.80	0.20	0.0001	0.04037
TIRE	-0.65	0.23	0.0003	0.03787
TOASO	-0.62	0.26	0.0006	0.03934
TRCAS	-0.74	0.26	0.0002	0.04179
TRKCM	-0.39	0.21	0.0000	0.03360
TSKB	-0.43	0.24	0.0004	0.03804
TUPRS	-0.69	0.22	0.0003	0.03420
VESTL	-0.97	0.22	0.0000	0.03818
YKBNK	-0.62	0.20	0.0003	0.04171
YKSGR	-0.49	0.25	0.0011	0.04327
ISE	-0.18	0.19	0.0008	0.02564

Table 3. S-stress values and significance levels.

Iteration	S-stress	Improvement
0	0.6143	-
1	0.6251	-
2	0.4573	0.1678
3	0.4540	0.0032
4	0.4555	-0.0015

Table 4. Kruskal's stress value.

	Matrix		
Stress	0.3792	RSQ	0.5658

methodology developed by Chang et al. (2000) was applied and regression analysis was performed. Furthermore, in the study, multidimensional scaling analysis was performed and a perceptual space was constructed to reveal the similarities and dissimilarities between the stock returns and index returns. The results of the analysis revealed that the first three stocks with the highest similarity (proximity) to index return are NETAS, SISE, and ISCTR, respectively, while the first three stocks with the highest dissimilarity (distance) are AKBNK, PRKTE, and YKSGR, respectively. The results obtained by the regression analysis to determine the presence of herding behavior provided evidence for the fact that herding behavior exists in the ISE National-100 index on both rising and falling days. The results obtained are in agreement with those of other studies in the literature. For instance, Altay (2008) also demonstrated the presence of herding behavior in a study on the ISE National-All Index. Various researchers who also investigated the presence of herding behavior in developing and developed markets (Grinblatt et al., 1995; Demirer and Kutan 2005; Farber et al., 2006; Caporale et al., 2008; Chiang and Zheng, 2010) obtained results in their studies indicating the presence of herding behavior, in similar to the results obtained in the ISE. In the light of these results, it could be argued that in the ISE National-100

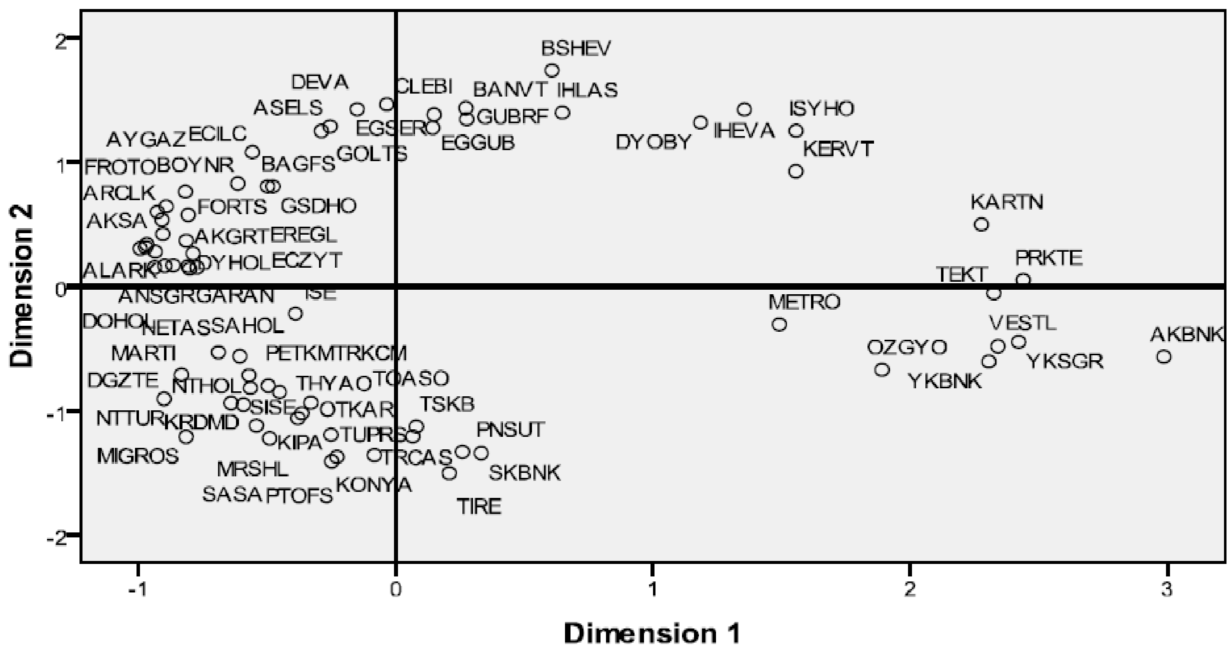

Figure 1. Euclidean distance model: Location of stocks and index in the perceptual space.

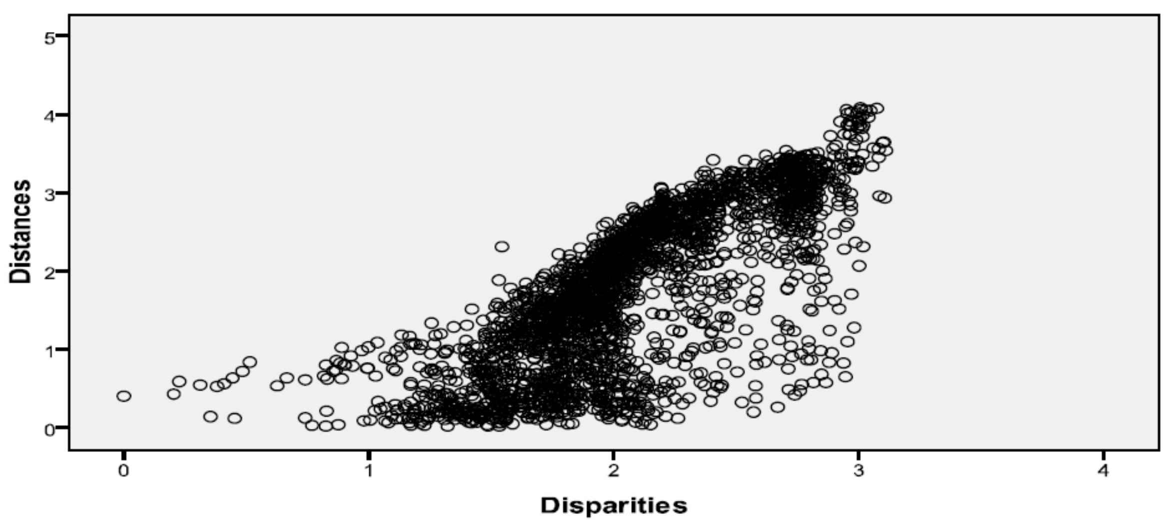

Figure 2. Euclidean distance model: Distribution of stocks and index.

Table 5. Up market regression results.

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP} \mid R_{m,t}^{UP} \mid + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t$$

	Coefficient	t	Sig
α	0.015***	46.131	0.000
γ_1 (up)	0.360***	18.008	0.000
γ_2 (up)	-0.700***	-3.848	0.000
F	404.889***	-	0.000
Adj. R^2	38.8%	-	-

*** represent the statistical significance level of 1%.

Table 6. Down market regression results.

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} \mid R_{m,t}^{DOWN} \mid + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t$$

	Coefficient	t	Sig
α	0.016***	42.629	0.000
γ_1 (down)	0.337***	14.342	0.000
γ_2 (down)	-0.963***	-3.834	0.000
F	237.523***	-	0.000
Adj. R^2	28.2%	-	-

*** Represent the statistical significance level of 1%.

Index, investors do not engage in rational investment behavior and there is no efficient resource distribution and price formation.

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