INVESTOR OVERCONFIDENCE: AN EMERGING MARKET ANALYSIS

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ABSTRACT

INVESTOR OVERCONFIDENCE: AN EMERGING MARKET ANALYSIS

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In finance theory, the investors are assumed to behave rationally, optimize their returns and risk-averse. Yet, there are anomalies in the market such as excess trading volume or excess volatility that need to explained whereas investors are assumed to be rational. The theories in the behavioral finance suggest that overconfidence is a notable bias that can be used to explain the anomalies in the market. The overconfident investors are more inclined to attribute their success to their abilities and knowledge rather than luck or the announcements in the market. This thesis examines the investors, whether individual or institutional, preferences of the stock characteristics and the outcome of their investments under bull and bear periods by using panel and regression analysis and interpret these findings according to the literature on the overconfidence hypothesis. The findings suggest that there is a relationship between the individual ownership level and the stocks with higher volatility and book-to-market values during the bull period. Besides, this relationship is even stronger during the bear period. Moreover, the individual investors are more likely to buy past loser and sell winner stocks. The results show that the institutional investors prefer stocks with low volatility and book-to-market during both of the bull and bear periods.

Keywords: Overconfidence, Bull and Bear Periods, Behavioral Finance

ÖZ

YATIRIMCI AŞIRI ÖZGÜVENİ: GELİŞMEKTE OLAN BİR PİYASA ANALİZİ

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Finans teorisinde yatırımcıların hareketlerinin mantıklı, geitirilerini maksimize eden ve riskten kaçınan yatırımcılar olduğunu varsaymıştır. Ancak rasyonel yatırımcıların yönettiği varsayılan piyasada açıklanmaya ihtiyaç duyan aşırı işlem hacmi veya aşırı dalgalanmalar gibi anomalilikter de gözlemlenmektedir. Davranışsal finans teorileri yatırımcıların aşırı özgüven hareketini bu anomalilikleri açıklayıcı dikkate değer bir özellik olarak belirtmiştir. Aşırı özgüvenli yatırımcılar edindiklerini olumlu getirileri piyasadaki duyurulardan veya şanslarına nazaran kendi becerilerine ve bilgilerine atfetmeye meyillidirler. Teorik ve empirik çalışmalara göre bu aşırı özgüvenli yatırımcılar piyasaları önemli ölçüde etkilemektedirler. Bu çalışma Türkiye'deki, gerek bireysel veya kurumsal yatırımcıların artış ve düşüş gösteren piyaasalarda hisse seçimlerinde nasıl tercihlere yöneldiklerini ve yatırımlarının sonuçlarını panel ve regresyon analizleri yoluyla inceleyip bu bulguları literaturdeki aşırı özgüven hipotezlerine göre yorumlamaktadır. Bulgulara göre yükseliş piyasalarında yatırımcıların bireysel mülkiyet seviyeleri ve daha yüksek dalgalanmaya, piyasa değerine kıyasla defter değeri daha yüksek olan hisseler arasında bir ilişki tespit edilmiştir. Bunun yanı sıra, düşüş piyasalarında bu ilişkinin daha güçlü olduğu tespit edilmiştir. Ayrıca bireysel yatırımcılar geçmişte negatif getiri getiren hisseleri tekrar satın almaya, geçmişte pozitif getiri sağlayan hisseleri de satmaya meyilli oldukları bulunmuştur. Kurumsal yatırımcılarsa düşüş veya yükseliş piyasalarında daha düşük riskli ve piyasa değerine kıyasla defter değeri daha az olan hisseleri tercih etmektedirler. Sonuç olarak, bireysel ve kurumsal yatırımcılar değişik piyasa koşullarında farklı hisse tercihler yapmaktadırlar.

Anahtar Kelimeler: Aşırı Özgüven, Yükseliş ve Düşüş Piyasası, Davranışsal Finans

To My Grandfather

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AMEX	American Express Company
BIST	Borsa Istanbul
BM	Book-to-Market
BV	Book Value
CLT	Central Limit Theorem
CSM	China Stock Market
HEX	Helsinski Stock Exchange
MTURK	American Amazon Mechanical Turk
MV	Market Value
NBER	National Bureau of Economic Research
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
SD	Standard Deviation
U.S.	United States
VAR	Vector Autoregression

CHAPTER 1

INTRODUCTION

Studies show that the investors exhibit irrational behaviors and their actions affect the market. In finance, it's a puzzle and an attractive subject why excessive volatility, trading volume and short-term momentum exist in the market.

The existence of the irrational investors are affecting the market in a considerable extent. Daniel et al. [19] argues that the investors' false judgement affect the market substantially.

Many studies have shown that the overconfidence bias and excess trading volume in the market are related [5, 8, 15, 28]. Daniel et al. [18] define overconfidence as the bias that investors have that causing them to overreact their knowledge and abilities and underreact the recent or publicly information in the market. The prevalence of the overconfidence bias both affects the trading volume, volatility and the expected returns of the investors and causes anomalies and mispricing in the stock market. De Bond and Thaler [21] interpret the overconfidence bias as, "..The key behavioral factor needed to understand the trading puzzle is overconfidence''.

The aim of this thesis is to analyze the behavior of the institutional and individual, whether domestic or foreign, investors in Turkey in different market circumstances, especially, to inspect whether these investors exhibit different investing strategies in the stock market. We're interested in if the individual ownership level relates to stock characteristics under different market conditions in Turkey, such as bull and bear periods. For instance, how the stock preferences of the investor change as the size of the investors change? Do these investors perceive the risk measures, such as volatility or beta, interchangeably during bull and bear

periods? Do institutional or individual investors hold their overconfidence behavior as the market switches from bull to bear period? How the past returns of the investor affect the investors' trading decisions during bull and bear periods?

Consequently, this study contributes to the literature in several ways. First, there aren't many studies that use a systematic approach to determine bull and bear periods in Turkey, and this study examines the bull and bear periods in an emerging market by using a method that successfully replicates the NBER business cycle turning points. Secondly, the relationship between the ownership level in the stock market and overconfidence bias examined based on the stock characteristics; such as volatility, beta, book-to-market and investor performance during the bull and bear market periods using panel analysis. Lastly, this relationship is also examined using regression analysis.

All of the analysis are conducted using R Studio with version 4.0.4. The study has five chapters. Chapter 2 presents the literature on determination methods of bull and bear periods and overconfidence hypothesis. Chapter 3 presents the data obtaining and processing, stock characteristics and portfolio construction and lastly, regression models. Chapter 4 shows the results of the relationship between the individual ownership level and stock characteristics on panel analysis and regression analysis results. Then, the study ends with the conclusion and suggestions on the further analyses.

CHAPTER 2

LITERATURE REVIEW

2.1 Overconfidence Hypothesis

In the literature, many studies show that the investors suffer from their emotion-based decisions and cause the market to display anomalies. The overconfidence bias considered to be an explanatory bias for these anomalies. The measures of the overconfidence can vary in terms of whether individualistic or social characteristics.

One topic that can be discussed is "What are factors that influence the investors to become overconfident in their choices, where does overconfidence bias stem from? ". Glaser and Weber [28] propose that the miscalibration, the better-than-average effect, illusion of control and unrealistic optimism affect the actions of these investors. Svenson [52] conducts a survey among 1203 individuals in American Amazon Mechanical Turk (MTurk) and ran OLS regressions to test the relationship between the level of skills the people think they have and their gender, age and driving experience. More than the 50% of the participants are more inclined to believe that they are above the average, suggesting that these individuals tend to believe that they're better at driving, make better investments and their children are better than the others, and so on. Langer [40] propose that the illusion of control is a bias that causes investors to overweight their control over the events, even if they don't have any control over it. Kunda [38] states that the self-attribution bias induce the overconfident investors to be more inclined to attribute their success in their investments as their own ability while they attribute their losses as bad luck or fault

of the others. However, these factors alone can't be proxy for overconfidence bias. Odean [48], Kylie and Wang [39] suggest that overconfidence is a bias that is akin to miscalibration. Odean [48] develop a model to investigate if the overconfident investors are really doing better in their investments as they think they do. However, his findings suggest that these investors have less expected utilities and their portfolios are more likely to be under-diversified, and in some cases, not only they are doing poorly, they are not even being able to compensate their losses after trading costs.

"How do they affect the market, if so, how do these overconfident investors affect the market" or "Can these investors even survive in the market?" can be discussed. As Fama [24] suggests, to argue the validness of a hypothesis in finance, the assertions should be observed on a market level data rather than for a specific group of investors. Barber and Odean [7] carry a study to examine the investment strategies of the brokerage accounts that with 78k households investments during 1991 and 1996, and showed that their poor trading choices didn't stem from their under diversified portfolio selection, but stemmed from their excess frequency of trading and paying unnecessary amounts of trading costs. The trading frequency is considered to be a good measure to identify overconfidence behavior [5, 15, 28, 47, 54] .

Benos [8], Barber and Odean [47] propose that cause of this as these investors are tend to believe that they have better information than the other investors, even if they don't have it. Odean [48], Daniel et al. [18] relate the excess amount of trading to the investor' behavior to overweight their private information, and underweight the public information. Moreover, during their analysis, Barber and Odean [7] propose that the households with higher turnoner investments prefer the stocks with lower betas, suggesting that the overconfident investors are more likely to ignore risk in the market that they are taking. Kim and Nofsinger [36] suggest that overconfident investors are more likely to hold the stocks of the firms with higher book-to-market values during the bull period because they view these stocks undervalued in the stock market. Griffin et al. [31] employ a VAR model to investigate whether past positive returns affect the trading volume among 46

countries and show that these positive returns cause a significant increment in trading volume in 26 countries after ten weeks, and the results are even stronger for the developing countries than for developed ones.

Odean [48] suggest that investors lowers their expected returns and increase the market depth. Gervais and Odean [27] propose that the aggressive trading activities of overconfidence investors lowers their profits, and influences the volume and volatility in the stock market. Many more studies have shown that the excess trading can cause excessive volatility in the market [8, 15, 18, 48].

Benos [8] also propose that the overconfident investors can survive in the market in long run under some conditions, such as where market marker is assumed to be risk neutral. However, Kylie and Wang [39] argue that there's a chance that overconfident investors can survive only in bull market conditions, because overconfident investors are willing to make riskier choices and these riskier choices can generate positive returns in the bull period, hence, causing the investors to trade more. Besides of surviving, Kylie and Wang [39] propose that the overconfident investors may dominate the market in the long run if their excess trading generate more positive returns, suggesting that these investors remain overconfident because they generate more positive returns if they were rational. Moreover, as in the model of Hirshleifer and Luo [34], the excess amount of the overconfidence investors may cause noise in the market and this noise may induce misevaluation in the market. And this situation may lead overconfidence investor to benefit from this noise and generate higher returns.

The experienced investors are expected to be more mature and make more rational choices rather than emotion-based choices. However, psychological biases can also observe among sophisticated, such as experienced investors. Before discussing whether an experienced or an inexperienced investor exhibits a greater overconfidence, one needs to define what an experienced investor means first. It can define as an investor who is older, wealthier or highly educated. According to Chen et al. [14], it can be defined as an investor who is at a younger age with a frequent trading activities. Chen et al. [14], Locke and Mann [44] propose that the

more experienced the investor, then there's a better chance they're more rational and less prone to cognitive biases. Similarly, Gervais and Odean [27] also propose that experienced investors are less overconfident in their investment strategies and attribute their positive returns as their own abilities and knowledge. Moreover, Chen et al. [14] propose that experienced investors can also suffer from overconfidence bias. They conducted a study by following Odean's [47] method; they tracked the average subsequent returns after buying and selling activities of individual and institutional investors in China Stock Market during 1998 and 2002.

And they conclude these experienced investors experience higher turnover rate and positive returns whereas the investors with larger accounts have more well-diversified but experience losses. Moreover, By following the method of Chuang and Lee [15], Korkmaz and Çelik [37] conduct a study to test if overconfidence investors contribute to the trading volume for the period between 1995 and 2006 using firms' closing stock prices and trading volume in the market in Turkey. They found significant increase in the trading volume after investors gain positive returns in the stock market.

There are also empirical studies that examine if there is a pattern in overconfidence level between genders in trading activities. Barber and Odean [5] analyze the trading activities by using brokerage data of 37,664 households for the period of 1991 to 1997 in U.S, and they use monthly portfolio turnover to investigate the trading activities, compared the results with monthly gross and net returns of men and women. And they found that men are in hurt more by their excess trading, and they have lower monthly net returns and prefer stock investments with higher betas than women. Grinblatt and Keloharju [33] examine the portfolios of the households during January 1995 and November 2002 in Finland and suggest that male investors trade more than women and proposed that overconfidence and trading volume are related, however. Many more studies suggest that men tend to be more competent, hence exhibit more overconfidence in the market. [2, 6, 14, 30, 33]

Unfortunately, there is a lack in studies about overconfidence behavior in Turkey. Tekçe and Yılmaz [53] analyze the investment choices of the investors in Turkey

They use all buying and selling data during 2011 in Turkey, where they consider this year as a bearish period. By following the method of Barber and Odean [5], they calculate the average monthly turnover rate for a year and model a regression analysis where independent variables are either age, gender, experience, level of wealth or region. Their results suggest that the younger, male, investors that live in more developed regions and the investors with low portfolios in Turkey exhibit a higher degree of overconfidence.

It's natural to expect one group of people who share the same culture behave similarly or to have similar biases, hence the people in the similar culture might have similar patterns in their stock preferences in the market. Fan and Xiao [26] and Statman [50] propose that cultural differences have effect on investment choices. However, there isn't a consensus whether more individualistic or collectivist cultures exhibit more overconfidence behavior. Hofstede [35] propose that Turkish investors belong to the collectivist cultures, such as Asian countries. Fan and Xiao [26] demonstrate that individual investors in collectivist cultures exhibit more overconfidence in their investments since these investors are more likely to be less risk-averse because they will count on other people that surrounds them whenever they make riskier choices, hence this will enable them to make riskier choices in their investments. Acker and Duck [2] relate the overconfidence level of Asians to their over-optimism and underweighting the risk in their investments. Kim and Nofsinger [36] show that Japanese investors exhibit overconfidence behavior where Japan experiences a bull period in the late 80's. Chen et al. [14] also propose that Chinese investors are prone to be more overconfident in their choices than American investors. However, Yates et al. [56] argue that people in individualistic cultures, such as U.S, grow up in a culture where they are encourage to question whereas the students in China are more focused on following the traditions, hence, causing the people in individualistic cultures to show less cognitive biases. By using Hofstede's [35] individualism index, the study of Chui et al. [17] propose not to link momentum profits with investment strategies of the investors in the collectivist cultures. They propose that individual investors are more likely to be certain of their

views and overweight their own information rather than considering the information of their peers.

Ekholm [22] use the investor size as a good proxy to overconfidence and investigate the measures of overconfidence, such as investor size, in terms of trading volume and their reacts to the news as the new information arrives. They state that larger investors sell the less amounts of their holdings as the new positive information arrives in the market. By using Ekholm's [22] framework, Ekholm and Pasternack [23] hypothesize the larger investors are more likely to react more positively/negatively than the smaller investors as a new announcement perceived as positive/negative by the market. And they estimate the OLS to investigate the cumulative abnormal returns for the subsequent periods after not so extreme firm specific news are announced by using all the transaction data in The Finnish Central Securities Depository during 1994 and 2000 and show that larger investors react more positively to public information and smaller investors experience higher losses as the negative news are announced. Suggesting that the larger investors are more likely to weight more on the public information rather than their private information whereas the overconfident investors are more likely to overweight their private information.

Moreover, Chuang and Susmel [16] use Granger causality tests and multivariate SUR analyses to investigate the relationship between the portfolio volume and lagged market returns among institutional and individual investors for all the stocks listed on Taiwan Stock Exchange from 1995 to 2005 and their findings state that the relationship is stronger for the individual investors.

According to the literature, it's easier to exhibit overconfidence behavior in the bull market, since it's easier for investors to take into account the success to their abilities. [20, 27]. Statman [51] states this as, "It's easier to confuse brains with a bull market". Gervais and Odean [27] propose that overconfident behavior can observed significantly during the bull market periods because the investors are more likely to believe that the result of their positive stock returns stem from their investment strategies, not from market conditions. Hence, their model predicts that

this market condition will easily result in overconfidence bias to foster, and these positive market returns make overconfident investors trade even more. To investigate their results, Statman et al. [51] use turnover time series analysis using VAR models and impulsive-response functions and their study show that the past market returns and turnover rates are highly related. Moreover, Chuang and Lee [15] conduct a study by using all firms data that is available for more than 4 years during the period of 1963 and 2001 and listed on NYSE and AMEX. They use Vector Autoregression (VAR) models and NBER specified dates for the bull and bear periods and show that investors are more prone to trade aggressively for subsequent periods, especially during the bull period._Additionally, Daniel et al. [20] propose that overconfident investors are more like to ignore the market indicators, such as beta values, during the bull market periods.

A critical argue is that Kim and Nofsinger [36] state that most of the studies in the literature are carried out in the 90's in U.S and Europe, where a bull period observed mostly. Most of the studies; Odean [7, 5, 46, 47], Bange [3], Grinblatt and Keloharju [32], are conducted during the 90's. However, they argue that the overconfidence behavior needs to be examined during different market conditions in order to have better observations of this bias on a market level.

Another topic in the literature is that the direction and duration of the attention of the overconfidence investors. Daniel et al. [18], Chuang and Lee [15] argue that the overconfident investors are more likely to overreact their own knowledge and ignore or underreact the available information in the market, this can cause the investors to buy the stocks that have positive returns and sell the stocks with negative returns in the past. This is called "positive feedback trading". Similarly, negative feedback is defined as the behavior of "selling winners and buying losers". Kim and Nofsinger [36] argue that positive feedback can foster in the bull market stronger. According to the literature, the investors' neglecting the recent events in the market and the unfoundedly optimism hurt their returns [8, 15, 16, 20]. Moreover, Bange [3] measure and conduct regression analysis to investigate the relationship between the past excess returns on S&P500 index and the investors'

equity holdings, and his findings show that the investors are more likely to hold their equities when they are bullish.

Barber et al. [4] propose that sensation seeking is a behavior aligned with the overconfidence. Grinblatt and Keloharju [33] examine whether there's a pattern between overconfidence and sensation seeking, and they show that these factors are related to the trading volume, however, sensation seeking and overconfidence aren't correlated significantly.

Graham et al. [30] link overconfidence with competent trading. Competent traders are more likely to overestimate their knowledge and abilities and make investments more frequently with such optimism. In their study, they conduct a survey analysis among 1000 households (more than 60% of them are well-educated) that have more than $10,000 in their investments, by calling them every month and asking their trading frequency and their expected returns for the next 12 months (if they believe they can beat the market) around their demographics in 1996. The results suggest that the sophisticated investors (well-educated and with well-diversified portfolios) and male investors are more likely to make more frequent investments and perceive themselves as competent than women and investors with not so diversified portfolios.

2.2 Bull and Bear Periods Determination

In the literature, there isn't a consensus about the unique definition or a systematic determination of bull and bear periods. Chauvet and Potter [13] define bull periods where prices rise, or at least they are expected to rise and conversely, bear markets are where prices fall. To summarize these studies, we can divide them into two approaches; the methods that are conducted where the mean return switching points are identified in the stock index, in other words, in order to define a bull or a bear period, a stock price must decrease or increase for a specific period of time. And

the other approach focuses on the increment or decreasement of the stock prices from the last peak or troughs.

Lunde and Timmermann [41] suggest a method to define two thresholds in the stock prices during the transition from bull to bear period, or bear to bull period. For instance, the stock market price should be greater than the first threshold from the last trough where period switches to bull period. This method mainly focuses on the significant rise or fall in the market and then tracking the movements after that rise/fall in the stock market.

Maheu and McCurdy [42] use Markov Regime Switching Model and estimate bull and bear periods as high-return and low-return states, respectively. And they relate the bear periods with higher conditional values in the market.

Welch [55] states the buying or selling suggestions of the analysts affect expectations and their forecasts of the next analysts, leading a herding affect in the market in short-term. And the optimism of the investors can cost them dramatically as the market conditions are switching from bull to bear period. Hence, suggesting that the bull periods more fragile. And he suggest to investigate the returns in the last 60 days to conclude the bull or bear periods.

And one of the well accepted methods to determine bull and bear periods is developed by Bry and Boschan [10]. This method concentrates on identifying the business cycle turning points under several rules. The significance of this method is that this method propose a formal and evaluable way of determining the periods while replicating the metrics of National Bureau of Economic Research (NBER) to decide which periods are bull or bear. The method focuses on duration of bull and bear periods under certain rules. In specific, they set certain rules for the at least amounts of durations of a cycle (15 months), phase (5 months) and window (6 months).

Bry and Boschan propose to keep a phase as minimum of 5 months, according to them a phase under 5 month isn't enough to reflect the position of the market. After this method, Pagan and Sossunov [49] and Gonzales [29] discuss the modifications on the method of Bry and Boschan. Pagan and Sossunov [49] propose the phase can

be at least 4 months. And as suggests by Canova [11, 12], they propose not to smooth the data, because these large points can indicate significant movements and the notable information in the market, and the results are weakened by reducing these points.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Collecting Data and Data Processing

3.1.1 Ownership Data

The sample covers of 409 firms weekly data where the period starts from January, 2009 to March, 2020. The ownership level data is used as a limitation while calculating the other metrics. As such, to be included in this analysis, a firm must have ownership data first, and for the other metrics; the period that is used during the analysis of the stock prices, BM and MV values, and BIST index values are limited based on the period of the ownership data. Since we're interested in analyzing the behavior of the investors in Turkey on an individual level, it's logical to assume that these investors can be domestic investors and foreign investors as well. From the weekly ownership data that is obtained from Istanbul Settlement and Custody Back, Inc for the period of time January 2009 and March 2020.

During the cleaning and preparing the ownership data, the following conditions are applied:

- There are mainly three types of investors in the data in manner of nationality: "Domestic", "Foreigner" and "Undefined". During the analysis, the undefined investors aren't included in the calculations since the type of these investors in unknown.

- Investor Types are defined as Real, Mutual Fund, Corporate, Other and Undefined. Ownership data is filtered based on "Real" condition, to calculate the individual ownership level.
- If the shares aren't traded on BIST, then the firms aren't included in the calculations.

After assigning these conditions, the individual ownership level is calculated as "the fraction of the firm's total shares outstanding that is owned by individual investors" defined by Kim and Nofsinger [36] for every week. Then, the monthly average of the individual ownership is calculated as the average of these weekly ownership levels for every firm. As a result, the dataset includes of a 409 firms in total.

$$\text{Individual Ownership Level} = \frac{\text{Monthly Average of Individual Ownership}}{\text{Monhtly Average of Firm's Total Shares Outstanding}}$$

3.1.2. Stock Price Data and BIST Data

All daily stock adjusted close prices are from January 2009 to March 2020 is obtained from Refinitiv. The reasoning behind this selected data range is to investigate the investors' behavior towards stocks during the specific date range where the ownership level data range is valid.

First, the daily data converted into weekly data, to do this, the last values of the every week for every month are obtained for every firm. And then, the last adjusted close stock price of month is used in monthly calculations. To calculate the monthly returns of the stocks, the formula is formed as,

$$Rt = \left[\left(\frac{P_t - P_{t-1}}{P_{t-1}}\right)\right] \times 100$$

Where Rt represents the rate of return of the stock at time t, Pt refers to the adjusted close price of the stock at time t, and Pt-1 refers to the previous adjusted close price of the stock.

For the market index calculations, the daily and monthly adjusted close stock prices of BIST30 for the period January 2009 and March. 2020 from Yahoo Finance. [1] The reason the BIST30 is used is that BIST30 is proxy that shows more reliable results due to its high market capitalization and depth.

3.1.3. Book and Market Value Data

Book and market values of equity values are obtained from Refinitiv. Book value of equity values represent the annual book values of a firm, where the market value of equity represents the ending of the fiscal quarter. Market value of equity values are multiplied by 1,000,000 in order to obtain the data accuracy. And the firms with negative BM values aren't included during the calculations. Also, if a firm doesn't have a market value, then the firm isn't included in the calculations since it's not possible to obtain a valid BM value if the market value is equity isn't available. Moreover, the firms with negative values of BM values and BM values with higher than 3 aren't included in the analysis. After processing the data, the book-to-market values are calculated as the division of book value of equity and market value of equity.

3.2. Variable Calculations

3.2.1. Calculation of Beta

Beta value is defined as a measure of volatility of either a stock or a portfolio. Beta value is calculated as the ratio of covariance between stock's return and market return and the variance of the market's return. To illustrate,

$$\beta\ coefficient = \frac{Cov[Re, Rm]}{Var[Rm]}$$

Where Re represents the return of an individual stock, and Rm represents the return of the market. In this case, the beta values that represents every bull and bear period are calculated. To do this, the weekly rate of return of the firms during the bull and bear periods are calculated to represent the rate of return of the stocks first:

$$Rt = \left[\left(\frac{P_t - P_{t-1}}{P_{t-1}}\right)\right]$$

Where Rt represents the return of the stock, Pt refers to the adjusted close price of the stock, and Pt-1 refers to the previous adjusted close price of the stock. The similar rate of return operation is also applied to the BIST30 stock index. And the variance of the market is calculated as,

$$\sum_{t-1}^{n} \frac{(R_t - \bar{R}_t)^2}{n-1}$$

Where the Rt refers to the rate of return of the BIST30 at time t, $\bar{R}_t$ refers to the mean value of the rate of return at time t and n refers to number of values in the sample. After obtaining these results, the beta formula can be applied.

As mentioned in the Results and Analysis, there are 5 bull and 5 bear periods in total. For each period, the covariance between market index BIST30 and the logarithmic returns of the firms are calculated and then divided by variance of the market returns. Variance is calculated as the standard deviation of returns on a weekly basis. This calculation assigns a beta value to the firms for the related bull or bear periods.

However, during the calculations, a couple of limitations and their solutions are worth to mention. Firstly, since the duration of the bull and bear periods differentiate in terms of months leaves us the question of do these durations cover the availability data ranges of the firms' stock prices? For instance, the last bull period spans of 4 months, in other words, 16 weeks. However, a firm's adjusted close stock price can only cover of 3 weeks in that period, for some reasons. This situation may not give us reliable results. To control the firm numbers during a period, a condition is applied, such as, to be included during the beta calculations, a firm must have at least 80% of the total number of weeks of the relevant period. For instance, if a period lasts for 22 months (88 weeks) then the count of returns of a firm must have at least 70 weeks of data. And the range of the bull and bear periods varies between 4 and 22 months, and since the duration with the least duration of

month is 4 months, the weekly returns are preferred rather than monthly returns during the calculation of betas for each period.

Table 3.2.1.1 The Firm Statistics During Bull and Period Periods

	# Of Durations (Months)	Total # Of Firms	Most Common Week Availability	# Of Firms With Less Than 90% Weekly Data	# Of Firms With Less Than 80% Weekly Data	Percentile of the Remaining Of Firms With 80% Of Weekly Data in the Sample
1st Bull Period	22	298	91	22	20	93.28%
2nd Bull Period	16	355	66	34	32	90.98%
3rd Bull Period	12	373	50	24	21	94.36%
4th Bull Period	15	355	62	16	14	96.05%
5th Bull Period	4	346	16	2	2	99.42%
1st Bear Period	14	327	58	28	24	92.66%
2nd Bear Period	9	367	37	15	13	96.45%
3rd Bear Period	22	371	88	26	23	93%
4th Bear Period	8	350	33	8	7	98%
5th Bear Period	12	349	49	10	8	97%

As in the Table 3.2.1.1., the number of durations (months) and the total number of firms available during the relevant period represented. For instance, during the first bull period, there are 22 duration of months, 298 of total firms, 91 most common weekly availability of the firms. And 22 of the 298 (total firms during the period) firms have less than the most common weekly number of data. After eliminating

the firms that have less than 80% of weekly stock data during the relevant period the remaining percentile of the firms are represented on the last column in the Table. Which means, after this operation, we still have more than 90% of the firms during each of the bull and bear period.

3.2.2. Calculation of Volatility

By following Kim and Nofsinger. [36], the volatility values of the firms are calculated by the standard deviation of the stock returns during the bull and bear periods using the weekly returns of the firms. The volatility measure, the standard deviation, is estimated as,

$$s = \sqrt{\frac{\sum(X - \bar{x})^2}{n-1}}$$

In this formula, standard deviation is equal to the square root of the sum of the squares of the each sample minus the sample mean divided by the number of the values minus one.

3.3. Detecting of Bull and Bear Periods

To conduct this study in a more systematic manner, a specific method is needed to determine these market periods.

In this study, the method that is proposed by Pagan and Sossunov [49] is applied. The monthly adjusted close prices of BIST30 is used to determine the bull and bear periods. As using the approach of Pagan and Sossunov' [49], the stock data wasn't smoothed in order not to lose noncasual movements the in the series.
The method focuses on detecting cycle turning points with a few constraints in the series, in order to apply these constraints, a few definitions in the algorithm need to be explained;

$$\left(\tau_{window}, \tau_{censor}, \tau_{phase}, \tau_{cycle}, \theta\right) = (8, 6, 4, 16, 20)$$

- As in Pagan and Sossunov [49] approach, **a cycle** should at least last for 16 months (peak to peak or trough to trough points).

- **A window** is defined as the points that are higher or lower than the specific point, in this case, a window should at least last for 8 months**.**
- **A phase** is defined as the interval that is from peak to trough or trough to peak.
- **The threshold (**θ) is defined as a limit that prevent the stock returns that have higher or lower values than 20%.
- **A cycle** is defined as the interval that is from peak to peak or trough to trough.

As Pagan and Sossunov [49] approach; a cycle, window, phase should be at least of 16, 8 and 4 months, respectively. And a threshold is 20% in returns.

First, the peak and trough points are identified in the series of logged returns in the sample. The logged returns, rt, are calculated as,

$$r_t = \ln\left(\frac{P_t}{P_{t-1}}\right) = \ln(P_t) - \ln(P_{t-1})$$

Where P_t and P_{t-1} represent the stock's adjusted close price at current and previous date, respectively.

The corresponding parameters are used to detect the turning points in the series of logged returns of BIST30 for the period of January 2009 And March 2020:

$$\left(\tau_{window}, \tau_{censor}, \tau_{phase}, \tau_{cycle}, \theta\right) = (8, 6, 4, 16, 20)$$

First, to identify the turning points, peak and trough points are detached in the series using the window parameter. In other words, a peak point should be selected where it's 8 months (τ_{window}) higher than the either sides of that point, and vice versa for trough point. Then, if the peak and trough points share a period, the algorithm enforces that a cycle (τ_{cycle}) should span at least of 16 months, by identifying highest of multiple peaks and lowest of multiple troughs.

Then, using these peak and troughs, the censoring operations are conducted: First, the peak and trough points are eliminated within 6 months (τ_{censor}) of both of the ending of the series. Secondly, unless the relative change over a month exceeds the threshold (θ) , the phases that span less than 4 months (τ_{phase}) are eliminated. After

censoring processes, the algorithm checks if a cycle span of at least 16 months. (τ_{cycle})

Based on these conditions, different selection of period of ranges or smoothed data may give different bull and bear periods. The results are produced by using *bbdetection* package in R. First, the monthly data of adjusted close prices of BIST30 is changed to a zoo object and the algorithm is applied until the conditions in the method satisfy.

3.4. Ownership Portfolio Sampling and the Stock Characteristics

3.4.1. Ownership Portfolio Sampling and Panel Analysis

After determining bull and bear periods, since we're interested in the investment preferences of investors as the ownership level changes, portfolios that represent the ownership level during the relevant bull and bear markets are formed.

The whole sample divided into two parts and portfolios are formed for each of the bull and bear periods based on their monthly average of individual ownership values. In other words, For each of the bull and bear periods, all firms are sorted into 5 portfolios at the beginning of the relevant period based on their monthly average of individual ownership level, where Quantile 1 represents the lowest level of individual ownership level (the highest level of institutional ownership level) and Quantile 5 represents the highest level of individual ownership level (lowest level of institutional ownership level). For instance, at the beginning of the first bull period, all the firms sorted into 5 parts based on their monthly average of individual ownership level, calling these portfolios as A1, A2, A3, A4 and A5. Similarly, all firms are sorted into 5 more portfolios B1, B2, B3, B4, B5 during the second bull period, and then the third portfolio is also formed for the third bull period. This operation continues until the portfolios are formed for all bull periods. Afterwards, the portfolios with the lowest level of individual ownership are combined from each bull period, such as A1 + B1 + C1 + D1 + E1, this portfolio represents the lowest individual ownership level portfolio for a bull market. And all the portfolios that differ in their level of individual ownership levels during the bull periods are

combined. The similar operation also implemented to the portfolios in the bear periods. Consequently, there are 10 portfolios in total; 5 portfolios with different level of ownership levels during the bull period, and 5 more portfolios in the bear period. And what is worth to mention, is that institutional ownerhip level portfolios are built on the lowest individual ownership portfolios, meanig that they are indirectly formed.

Also, during the forming of the portfolios at the beginning, if a period has a number of firms that is not equally dividable by 5, then the remaining of the firms are included in the Quantile 5. For instance, if there are 204 firms in a period, the last of the 4 firms are included in the Quantile 5.

And then, monthly average of ownership level is calculated for every firm, specifically, the individual ownership level is defined as the ratio of shares of outstanding of domestic and foreign investors to total shares of outstanding of the firms that are available.

Based on the study of Kim and Nofsinger [36] examining the behavior of Japanese investors during bull and bear markets, they conducted their studies on a continuous series of bull and bear markets. Moreover, they assumed that Japan has experienced bull period in the late 80's, and bear period during the 90's based on the average rate of returns on these periods. And they examined the relationship between investor level and the annual mean values of the stock characteristics. However, in this study, as the in the Chapter 4, the bull and bear markets results display partial durations of bull and bear markets during the January 2009 and March 2020.

One approach to overcome this situation is to calculate value-weighted mean values of the stock characteristics during relevant periods.

To conduct panel analysis, all the mean characteristics (volatility, beta, book-to-market, abnormal returns) are noted for the individual ownership portfolios during each bull and bear periods. After that, the value-weighted mean values of these stock characteristics are calculated based on the weight of relevant period. The reason behind this operation is that the duration of months of bull or bear periods differentiate, hence, not all the periods have the equal amplitude. This operation

enable us find a representative mean value of the stock characteristics for each period.

After reporting all the stock characteristics for the investor-level changing portfolios, F-test, two-sided t-test and Mann-Whitney tests are applied to test if there is a difference in the stock characteristics for the lowest individual ownership portfolio (Quantile 1) and the highest individual ownership level portfolio (Quantile 5) during both bull and bear periods. Based on the literature, the null hypothesis should be rejected.

3.4.2. Method of F-Testing, Two-Sided T-test and Mann-Whitney Test

During the panel analysis (comparing the lowest and the highest level of the ownership level portfolios characteristics) to test the significance in differences of means, three tests are implied: F-test, two-sided t test and Mann-Whitney test.

Two Sample T Test for Means Test

Paired t-test method is used to test the difference in means between both two groups in a sample. To obtain reliable and healthy results, a few assumptions are needed during the tests:

- The data should be normal. (If the sample size is less than 30, this rule can be admissible)
- There should be independence between the observations.
- There shouldn't be extreme outliers.

A violation in the applications can induce unusual disadvantage the model.

Mann-Whitney U Test

Mann-Whitney U Test compares the means of the samples that derive from the same population. This test is usually used when one of the assumptions in the t-test doesn't meet. The general assumptions of the test are:

- The sample that is selected must be random and independent.

- The sample size should be sufficiently large.

The underlying assumption of the test is that when the sample size is larger than 30, the outcome is more likely to be normally distributed according to the Central Limit Theorem. [43]

In this study, the Mann-Whitney test results are considered to exhibit more proper results due to its assumptions that the sample distributions don't need to follow the normal distribution. Moreover, to have more valid results the two samples should be equal in size during paired t-test. However, during the analysis, there isn't a condition on the number of firms in Quantile 1 and Quantile 5, hence, Mann-Whitney test results can be considered to be more endorsable compared to two sample t-test results. More importantly, the reason of this selection is that it's not clear that the variance of the datasets are equal or if the sample follows normal distribution. Nevertheless, both paired t-test and Mann-Whitney results are applied with the confidence interval of 95% and are reported on the panel analysis.

3.4.3. Abnormal Return Portfolios

To investigate the performances of the institutional and individual investors, abnormal returns portfolios are formed for every firm during bull and bear periods.

To measure abnormal returns, portfolios are formed by using Fama-French [25] method that is based on size and book-to-market values for relevant period, in this case, bull or bear periods. As mentioned in the Chapter of Result and Analysis in detail, bull or bear periods differ in terms of their durations. For instance, a bull period can span of 4 months. During the forming of size portfolios, one limitation in this case is how to utilize the relevant date of book or market values. The problem is overcomed by tracking the most recent available market value prior to the beginning of the relevant bull or bear period. After that, for the book values, the most recent available book value is used that is prior to available market value. The reason behind this logic is that in order to classify firms based on their sizes or BM values, these values must be announced and available in the market at the beginning of the period, hence, the most available book or size values are chosen. For instance,

if a period starts on November 2010, the most recent MV that is announced on June 2010 and prior to the announcement date of the MV, BV that is announced at the end of the year, December 2009 are used during the calculations.

To form the size portfolios, first, the firms are categorized as small or big based on their relevant MV. To do this, first, the median value of MV of the relevant period is found, then the firms that have greater MVs than the median value categorized as big, the ones with smaller MVs are categorized as small. Then, these firms are categorized into three more groups: Low, Medium or High, based on their quantile during the relevant period, where firms with BM with lower than 0.3 represent low, higher than 0.7 as high, and medium in between these values. By combining these S/M and H/M/L portfolios, six portfolios are created for every bull or bear period: S/M, S/H, S/L, B/L, B/M and B/H. After that, assigning every firm into relevant portfolios, the rate of returns of the firms are calculated by using the adjusted close stock prices. Moreover, the rate of return is calculated for each six portfolios as the mean value of the returns of the firms for every period. Then, the abnormal return of the stocks is calculated as subtracting the portfolio return which the stock belongs from the mean return value of the stock during the period. Lastly, all portfolios are combined based on the relevant bull or bear periods, in other words, six size portfolios that created for every bull or period are attached together to form a time series that represent either bull or bear period.

3.4.4. Ownership Level Portfolios and Regression Analysis

To examine if there is a relationship between individual ownership level and stock characteristics, regression analysis is conducted by following the method of Kim and Nofsinger [36].

$$\text{Level} = \alpha_1 + \delta_1 \times \text{Independent Variable} + \alpha_2 \times D_{Bear} + \delta_2 \times D_{Bear} \times \text{Independent Variable}$$

The left side of the formula represents the ownership level of the firm at the beginning of the period, as the dependent variable. Independent variables are such as volatility, beta, combination of volatility and beta, book-to-market, abnormal returns and the combination of these variables, on the right side of the formula.

These mean values are calculated as the mean values of the firms during the periods.

Here, α_1 and δ_1 represent the coefficient values of the bull period, where α_2 and δ_2 inform us whether these is a significant difference in the bear period than the bull period. D_{Bear} represent the dummy variable that is equal to 1 if the corresponding period is bear period.

3.5. Abnormal Ownership Change Portfolios and Stock Characteristics

3.5.1. Abnormal Ownership Change Portfolios and Panel Analysis

To investigate the consequences of investment strategies of the investors, abnormal returns of the abnormal change portfolios over the different periods are examined.

As explained previously, abnormal return portfolios are formed based on Fama-French [25] method.

To form the abnormal change in ownership portfolios, first, the percent change in individual ownership on periodic basis are calculated. It is calculated as the ratio of the difference in the individual ownership levels at the beginning and ending of the period to the individual ownership levels at the beginning.

As mentioned in Chapter 4 with details, the data sample starts with a bull period on January 2009. One of the challenges in this step is that since there is no prior period before the very first bull period, percent change in individual ownership of the first bull period needed a different method to calculate the change level. To overcome this problem, the January 2009 and June 2009 as are considered to be as the starting month and the last month during the percent change in individual ownership calculations respectively due to nonexistent of the prior periods.

Then, as the ownership level portfolios that are constructed previously, stocks are sorted based on their percent of individual ownership. These portfolios are called as A, B,…, E, where A represent the lowest individual ownership level and E represents the highest ownership level. Then these portfolios are sorted again into five more portfolios based on their percent change in ownership individually. Now, these portfolios can be called A1, A2, A3, A4, A5, …, E1, E2, E3, E4, E5, where 1 refers to the lowest percent change in ownership quintile and 5 refers to the highest percent change in ownership quintile. Hence, there are a total of 25 portfolios for each bull and bear periods. Then, for each of these portfolios, the lowest percent change in ownership quintile portfolios together, then the next lowest quintile, such as; A1 + B1 + C1 + D1 + E1, …., A5 + B5 + C5 + D5 + E5. This method leaves us with 5 portfolios where they share similar degree of individual ownership in each period, but differ in terms of individual ownership on periodic basis. By using the portfolios, "bull" and "bear" period portfolios are formed by combining the relevant portfolios. Then, for each of the each bull and bear period, the average change in ownership for all stocks is calculated. Afterwards, this amount is subtracted from the change in ownership for individual stocks in order to maintain the stability and thereby calculated an abnormal change in ownership for each stock.

For the portfolios, abnormal returns are also calculated. Abnormal returns are calculated by subtracting the "portfolio return" from the individual stock's return where "portfolio" refers to the double-sorted size and B/M portfolio to which the individual stock belongs. These portfolios are used as our "new sorted portfolios" in the next steps. Then the changes in abnormal return are analyzed for different market periods.

3.5.2. Abnormal Ownership Change Portfolios and Regression Analysis

The similar regression formula in the previous model is applied for the different independent variable variations. The model is estimated as,

$$\text{Abnormal Change Level} = \alpha_1 + \delta_1 \times \text{Abnormal Return} + \alpha_2 \times D_{Bear} + \delta_2 \times D_{Bear} \times \text{Abnormal Return}$$

As in the model, the dependent variable is the abnormal change level in the ownership portfolios. Similarly, as in the first model, α_1 and δ_1 still represent the coefficient values of the bull period, where α_2 and δ_2 inform us whether these is a significant and strong relationship in the bear period than the bull period. D_{Bear} represents the dummy variable that is equal to 1 if the corresponding period is bear period.

And the independent variables in the model are:

(1) The abnormal return in the change period,

(2) The abnormal return in period prior to change,

(3) The abnormal return in period after change

Model (1) investigates the relationship between the abnormal change levels in the portfolios with the abnormal return in the change period. In other words, the regression analysis applied for the portfolios with similar degree of ownership level, either low or high, but experience different changes in individual ownership during the relevant bull or bear period and their relevant abnormal returns are estimated around this change.

Model (2) estimates the abnormal returns during the bull period and change in the relationship between bull and bear periods prior to change in ownership period. This is the part where the feedback trading can be observed. According to the literature, we expect stronger results during the bull period, where the overconfident investors neglect the relevant information in the market and buy past winner stocks. [3, 15, 16, 20]

Model (3) investigates the relationship between the abnormal change levels in the portfolios with the abnormal return in following year.

CHAPTER 4

RESULTS AND ANALYSIS

4.1. Bull and Bear Periods Determination

This section provides the bull and market period results based on Pagan and Sossunov [49] method.

First, for exploratory analysis, the rate of returns of the BIST30 index is reported in the Figure 4.1.1.

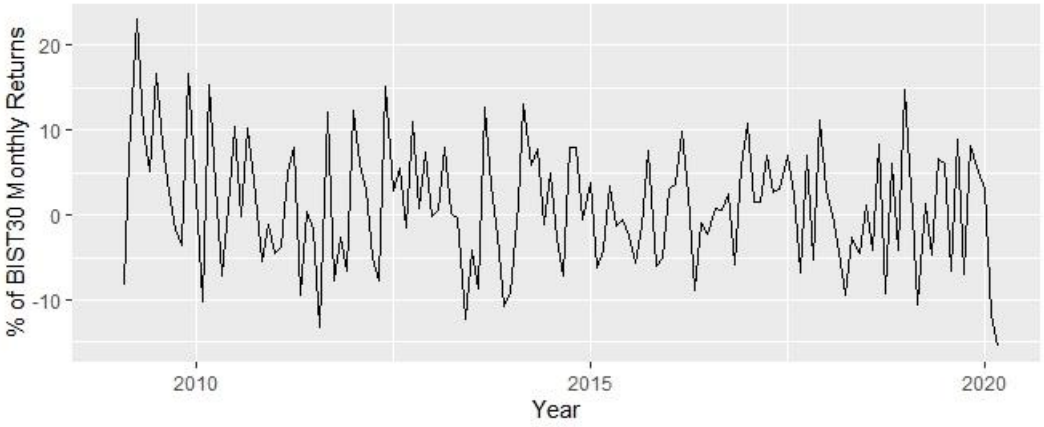

Figure 4.1.1 Rate of Returns of BIST30 for the Period of January 2009 and March 2020

As mentioned in 3.3. The parameters are used to detect the turning points in the series of logged return of BIST30 for the period of January 2009 and March 2020.

$$\left(\tau_{window}, \tau_{censor}, \tau_{phase}, \tau_{cycle}, \theta\right) = (8, 6, 4, 16, 20)$$

First, the peak and trough points are identified in the series of logged returns in the monthly sample by using the window parameter (8 months) during January 2009 and March 2020.

After that, alternation of turning points are enforced by finding several peaks and troughs. Then, the phases that span less than 4 months are eliminated because there isn't a return in the series higher or lower than 20% in the logged returns.

And lastly, the cycles that last less than 16 months are deducted. This algorithm is repeated many times until the conditions in the algorithm satisfy.

Figure 4.1.2. Presents the log returns of the BIST30 and relevant bull and bear periods that are produced from bbdetection package in R. The gray areas symbolize the bear periods, whereas the other areas symbolize bull periods. But as mentioned in the Chapter 3, the results of Pagan and Sossunov [49] method will more likely to give different results for different sample choices because the peak and trough points and the censoring operations depend period of the sample.

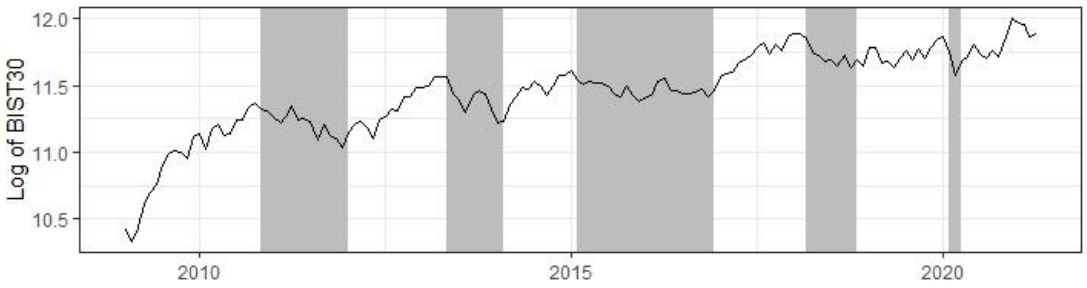

Figure 4.1.2 Bull and Bear Periods Based on BIST30 Based on Log of Prices Between 2009 January and 2020 March

As in the Table 4.1.1., there are five bull and bear periods but with different durations and amplitudes for the period of January 2009 and March 2020. In the Table 4.1.1., the duration implies the number of months during a period, and amplitude implies the measurement in percentiles. There's a higher range in the bull period than the bear period, where the duration changes from 4 months to 22 months in the bull market, whereas it changes from 8 months to 22 months in the bear

market. Also, it's worth noting that, the starting date of the Covid, November of 2019 and afterwards are in the bear period in the model.

Table 4.1.1 Bull and Bear Period Durations and Their Amplitudes

	Duration	**Amplitude**
The Bull Period		
Jan 2009 – Oct 2010	22	160
Jan 2012 – Apr 2023	16	53
Feb 2014 – Jan 2015	12	45
Dec 2016 – Feb 2018	15	53
Nov 2018 – Feb 2019	4	10
Bear Period		
Nov 2010 – Dec 2011	14	-25
May 2013 – Jan 2014	9	-29
Feb 2015 – Nov 2016	22	-13
Mar 2018 – Oct 2018	8	-20
Mar 2019 – Mar 2020	13	-15

Descriptive Statistics about Bull and Bear Periods

Table 4.1.2 presents the summary statistics about the bull and bear periods. Both of the periods have equal number of phases and similar durations in terms of means. While both of the periods have the same maximum duration, the minimum duration is lower for the bear period. And the median number of months is also higher for the bull periods.

Table 4.1.2 Descriptive Statistics About Bull and Bear Periods

	Bull Period	**Bear Period**
Number of phases	5	5
Minimum duration	4	8
Average duration	14	13
Median duration	15	9
Maximum duration	16	22
Minimum amplitude	47	-18
Average amplitude	60	-24
Median amplitude	62	-23
Maximum amplitude	72	-30

Table 4.1.3 represent the mean returns and standard deviations during the relevant periods. Not surprisingly, bull periods show more positive returns compared to the

bear periods. However, the results aren't don't show a pattern in terms of standard deviations during either bull or bear periods.

Table 4.1.3 The Mean Returns and Standard Deviations During the Bull And Bear Market

	Mean Phase Return	**SD**
Bull Period		
Jan 2009 – Oct 2010	0.07	0.06
Jan 2012 – Apr 2013	0.02	0.07
Feb 2014 – Jan 2015	0.03	0.07
Dec 2016 – Feb 2018	0.04	0.06
Nov 2018 – Feb 2019	0.05	0.06
Bear Period		
Nov 2010 – Dec 2011	0	0.07
May 2013 – Jan 2014	-0.01	0.07
Feb 2015 – Nov 2016	0	0.07
Mar 2018 – Oct 2018	-0.03	0.06
Mar 2019 – Mar 2020	0.05	0.07

4.2. Descriptive Analysis of the Sample

Table 4.2.1. Shows the sample characteristics of the ownership and stock data for the whole sample, and during the bull and bear periods.

Table 4.2.1 Descriptive Statistics of the Sample

	Mean	**Median**	**SD**	**10 perc**	**90 Perc**
The Complete Sample					
Individual Ownership Fraction	0.07	0.08	0.05	0.0129	0.123
Change in Ownership	0.02	0.00	0.23	-0.204	0.256
Monthly Return	0.02	0.00	0.17	-0.124	0.173
Monthly Volatility	0.15	0.14	0.07	0.094	0.220
Beta	0.84	0.84	0.35	0.467	1,157
Book-to-Market	0.458	0.398	2.201	0.101	1.074
Bull Period					
Individual Ownership Fraction	0.07	0.08	0.05	0.013	0.1233
Change in Ownership	0.01	0.00	0.22	-0.205	0.2543
Monthly Return	0.04	0.02	0.16	-0.094	0.184
Monthly Volatility	0.15	0.14	0.06	0.093	0.218
Beta	0.65	0.65	0.21	0.403	0.895

Table 4.2.1- *Continued*

	Mean	**Median**	**SD**	**10 perc**	**90 Perc**
Book-to-Market	0.401	0.358	0.527	0.094	0.842
Bear Period					
Individual Ownership Fraction	0.07	0.08	0.04	0.0127	0.123
Change in Ownership	0.02	0.00	0.23	-0.206	0.2583
Monthly Return	0.01	-0.01	0.17	-0.140	0.162
Monthly Volatility	0.16	0.14	0.07	0.094	0.221
Beta	0.93	0.96	0.24	0.619	1,091
Book-to-Market	0.514	0.452	3.058	0.112	1.301

The change in ownership is calculated as the ratio of the difference of the individual ownership level during the period and the individual ownership level at the beginning of the period.

The individual ownership fraction is similar in bull and bear periods, but the change in ownership differentiate. The individual ownership level tend to increase during the bear period. Not surprisingly, the monthly returns are higher during the bull period compared to the bear period. Monthly volatility values are slightly higher during the bear period. Moreover, the mean value of the beta values during the bear period with the value of 0.93 is higher than the bull period (0.65). Moreover, book-to-market values are also higher during the bear period.

4.3. Relationship Between Ownership Level and Stock Characteristics During Different Market Periods

On Table 4.3.1 the panel analysis results are reported. The individual ownership levels are moving from the lowest level to highest level as the moving to the right side of the table. For each Panel, the value-weighted mean characteristics of the relevant Quantiles are reported on the first two rows for either bull or bear periods. On the last two columns, paired t-test and Mann-Whitney test results are reported for the confidence level of 5% to whether there is a difference between Quantile 1 and Quantile 5. Also, F-test results also test if there is a difference in the variances between Quantile 1 and Quantile for the significance level at 5%. These results

enable us to interpret how the stock preferences changes as the individual investor levels change as during the same bull and bear periods.

Moreover, in each Panel, the test results are also obtained to test if there is a difference in means for the relevant bull or bear period. In other words, for the same level of ownership portfolios, such as Quantile 1 and Quantile 5, their value-weighted mean values of the stock investments are reported during bull or bear period. By doing this, we can interpret how the institutional (lowest level of ownership level) and individual investors behave under different market conditions. The significance test results are given below the value-weighted mean values of the variables.

This panel analysis enable us to interpret the investment choices and compare the investment results (to compare abnormal return levels) for both of institutional and individual investors.

Table 4.3.1 Relationship Between Ownership Level and Stock Characteristics During Different Market Periods

	Quantile 1	Quantile 2	Quantile 3	Quantile 4	Quantile 5	F-test	t-test	Mann-Whitney
Panel A: Individual Investor Ownership								
Bull Market	0.0145	0.0428	0.0780	0.100	0.118	<2.2e-16	<2.2e-16	<2.2e-16
Bear Market	0.0129	0.0446	0.0765	0.100	0.116	<2.2e-16	<2.2e-16	<2.2e-16
F-statistic	0.30				0.53			
t–statistic	0.19				0.13			
Mann-Whitney	0.1949				1.80E-09			
Panel B: Monthly Return Volatility								
Bull Market	0.1075	0.1230	0.1242	0.1269	0.1643	<2.2e-16	2.08E-05	1.22E-12
Bear Market	0.1173	0.1226	0.1329	0.1453	0.1782	0.01319	2.75E-09	<2.2e-16
F-statistic	0.00566				1.19E-09			
t-statistic	0.08466				0.3353			
Mann-Whitney	0.0004239				0.00239			
Panel C: Beta								
Bull Market	0.6604	0.6640	0.61	0.58	0.53	0.06076	0.0003509	1.51E-02
Bear Market	0.83	0.86	0.82	0.80	0.77	4.71E-02	0.0999	0.1103
F-statistic	6.37E-05				0.001494			
t-statistic	0.0003509				5.14E-07			
Mann-Whitney	1.51E-02				2.42E-10			
Panel D: Book-to-Market Ratio								
Bull Market	0.325	0.439	0.465	0.519	0.424	1.08e-06	0.0002877	0.0005131
Bear Market	0.456	0.627	0.611	0.698	0.667	5.45E-04	0.01751	0.02197
F-statistic	<2.2e-16				<2.2e-16			
t-statistic	1.05E-04				3.22E-02			
Mann-Whitney	5.40E-03				0.0003681			
Panel E: Abnormal Return								
Bull Market	-0.002	0.001	-0.00031	0.0005	0.0010	1.40E-08	0.2037	0.5015
Bear Market	0.0005	-0.001	0.0006	0.001	0.000015	0.04935	0.5758	0.6467
F-statistic	0.8228				8.31E-03			
t-statistic	0.4289				0.2811			
Mann-Whitney	0.7195				0.2694			

In Panel A, the formed portfolios represent the increment in the individual ownership levels by design, as a result, it's not surprising that individual ownership level increases from Quantile 1 to Quantile 5, as they are introduced in the methodology.

The value-weighted ownership level increases from 1.45% (Quantile 1) to 11.8% (Quantile 5) during the bull market period, and it increases from 1.29% (Quantile 1) to 11.6% (Quantile 5) during the bear market period. The columns that are next to Quantile 5 represent the test results during the same market period, but for different ownership-level portfolios, such as Quantile 1 and Quantile 5. The F-test, t-test and Mann-Whitney tests that are below the Quantile 1 or Quantile 5 mean values show the significance results of the mean values of the same quantile, but for different market periods. In Panel B, volatility values increase monotonically as the level of individual ownership increases during both market conditions. The value-weighted volatility value starts with %10.75 (Quantile 1) and increases to 16.43% (Quantile 5) in the bull period and it increases from 11.73% to %17.82 in the bear period. The mean difference is significant for Quantile 1 and Quantile 5 during the both of bull and bear market periods according to the t-test and Mann-Whitney, which means that as the individual level increases, the investors are more prone to make riskier investments in Turkey. And what is noticeable here is that volatility values in bear period are greater than the bull period, which indicates that individual investors are more likely to make riskier investments in the bear market period. In Quantile 1, as the lowest level of individual ownership level, these investors (institutional) are more likely to make riskier investments during the bear market period, but the result is only significant according to the F-test and Mann-Whitney test, not t-test. Similarly, for highest level of ownership level, the individual investors are also more likely to make riskier investments during the bear market period, and the results are also significant based on only F-test and Mann-Whitney tests.

These findings aren't completely aligned with overconfidence hypothesis, the individual investors in Turkey tend to hold riskier stocks in the bear market but according to the literature, higher values of volatility are expected in the bull period

because overconfident investors are more willing to make riskier investments during bull periods. [5, 20, 36]

In Panel C, the changes in the beta values are shown as the individual ownership level changes. Similarly to Panel B, Quantile 1 represent the lowest level of individual ownership level and Quantile 5 represent the highest level of individual ownership level. And as the individual ownership level increases, there is a decrease in beta for both bull and bear market periods. As expected, the beta values starts and ends with higher values during the bear market period than the bull period. The beta value starts with 0.66 in Quantile 1 and decreases to 0.53 in Quantile 5 during the bull market period. And according to the results, all of the mean tests are significant. In other words, the individual investors in Turkey are more likely to make investments in stocks with lower degrees of betas during the bull period. The similar results can be seen during the bear period; similar to individual investors, the institutional investors tend to make riskier investments during the bear period as well. Daniel et al. [20] interpreted this behavior as the overconfident investors are more likely to ignore the risk in the market during the bull periods.

Moreover, during the bear period, as the level of individual of ownership level increases, the beta values also show a decline. The results are significant for the F-test and two-sided t-test, but not for the Mann-Whitney test.

The tests are significant for every combination of portfolios in both bull and bear periods, which suggests that the individual investors are more likely to prefer stocks with lower beta estimations, especially in the bear period. Also, it’s worth to note that as the individual ownership level increases in the bear period, the mean value of the volatility increases but the beta value decreases, which suggests that Turkish individual investors might perceive beta and volatility differently in terms of risk in their investments.

In Panel D, BM values present an increase as the individual ownership level increase during both of the bull and bear periods. As the individual ownership level increases, the BM value increases from 0.325 to 0.424 in the bull period and it increases from 0.456 to 0.667 in the bear period. There’s a little decrease in the

average value of BM as switching from Quantile 4 to Quantile 5 but there's an increase in general. Specifically, there is tendency to prefer stocks with greater BM values in bear period among individual investors. The results are significant for the Quantile 1 and Quantile 5 are significant for both bull and bear periods according to the t-test and Mann-Whitney. These findings are consistent with overconfident hypotheses, because the stocks of the firms with high BM ratios might be considered as undervalued by the investors. And overconfident investors are more likely to believe that they hold undervalued stocks that might be more valuable in the future, these findings are consistent with studies of Barber and Odean [7], Daniel et al. [20], Bloom and Michaely [9].

For the institutional investors in Turkey, Quantile 1, the investors are more likely to hold the stocks with high BM values, during the bear period (0.45) compared to the bull period (0.32), where the difference in mean is significant during bull and bear period. Similarly, the individual investors also prefer the stocks with higher BV during bear periods, where all tests exhibit significant results. These can be considered as an interesting results, both of the institutional and individual investors prefer the stocks with higher BV during the bear periods.

In Panel E, the value-weighted abnormal returns for the Quantile 1 and Quantile 5 are -0.002 and 0.0010, respectively. We can interpret these results as the individual investors generate slightly better returns during the bull period. What is notable is that individual investors are more willing to prefer stocks with higher risk and book-to-market values during bull periods according to the previous results, and earn positive returns. In the literature, it's observed that overconfident investors experience a greater losses during the bull market. [15, 36]. Meanwhile, abnormal returns of the individual investors display a decrease in the bull period from 0.0005 to 0.000015, as moving from Quantile 1 to Quantile 5. Which suggest that the individual investors experience increased (decreased) abnormal returns during bull (bear) periods. This finding isn't aligned with overconfidence hypothesis in general, because they are expected to face losses due to their aggressive trading. On the other hand, this can be explained as Hirshleifer and Luo [34] state that the overconfident investors can cause noise in the market and hence, generate extra profits from the

misvalued stocks in the market. However, there is no significant relationship between abnormal returns and individual ownership level according to the F-test, t-test and Mann- Whitney. In other words, the results show that we don't have enough evidence to prove that the investors are able to experience extra profits or losses during bull and bear periods as the individual ownership level increases.

The abnormal returns of the institutional investors exhibit an increase in the bear period compared to bull period from -0.002 to 0.0005, however, the difference in means tests aren't significant during bull and bear period for the Quantile 1.

4.4. Regression Analysis of Individual Ownership Level and Stock Preferences

The following regression equation is estimated to test the relationship between ownership level and the independent variables; either volatility, beta, the combination of volatility and beta, book-to-market, abnormal return, and all the independent variables combined.

$$\text{Level} = \alpha_1 + \delta_1 \times \text{Independent Variable} + \alpha_2 \times D_{Bear} + \delta_2 \times D_{Bear} \times \text{Independent Variable}$$

The left side of the model is a time series of the ownership portfolios that is formed during the ownership portfolio sorting step. The right side of the equation are the relevant independent values for these portfolios. The dummy variable D_{Bear} is added to the model, as one, if the corresponding period is a bear period.

Table 4.4.1. Presents the model coefficients, the p-values that are reported in the parentheses and the t-values in the {brackets}. The null hypothesis is that there is no relationship between the individual ownership level and the all independent variables. The coefficient values are marked with significance levels. ***, **, * indicate significance at the 1%, 5%, 10%, respectively.

The upper part of the Table 4.4.1., reports the model estimations during the bull period, whereas the lower part represents the coefficients and the significance results of the change in relationship of the portfolios.

Table 4.4.1 Regression Analysis of Individual Ownership Level and Stock Preferences

Model	**Volatility**	**Beta**	**Volatility/ Beta**	**BM**	**Abnormal Return**	**All**
Intercept	0.0633 (<2e-16) {38.14}***	0.074 (<2e-16) {45.9}***	0.070 (<2e-16) {34.98}***	0.0601 (<2e-16) {30.02}***	0.0660 (<2e-16) {64.74}***	0.059693 (<2e-16) {23.62}
Volatility	0.0382 (8.1e-0) {3.946}***		0.0359 (0.0001) {3.86}***			0.0420 (0.000) {3.68}
Beta		-0.0117 (3.96e-08) {-5.50}***	-0.005 (0.0662) {-1.830}.			-0.0042 (0.26) {-1.10}
BM				0.0164 (7.06e-07) {4.97}***		0.0108 (2.34e-07) {5.18}
Abnormal Return					0.0197 (0.315) {1.005}	0.0165 (1.88e-08)
			Additional Effect of Bear Periods			
Intercept *D_{Bear}	-0.0069 (0.007) {-2.693}**	-0.0004 (0.871) {-0.162}	-0.0117 (2.58e-28) {-5.58}***	0.00629 (0.0108) {2.55}*	-0.0007 (0.607) {-0.514}	-0.0008 (0.9730)
Volatility *D_{Bear}	0.0457 (0.002) {2.973}**		0.057 (0.0001) {3.89}***			0.0854 (3.06e-06)
Beta *D_{Bear}		0.004 (0.173) {1.36}	0.0006 (0.829) {0.21}			-0.0003 (0.91)
BM *D_{Bear}				0.014731 (8.43e-05) {3.93}***		0.0136 (3.79e-05)
Abnormal Return *D_{Bear}					-0.0126 (0.663) {-0.436}	-0.114 (0.001)
Adj-R^2	0.01815	0.01095	0.0342	0.007	0.0004553	0.0509

(1) Volatility

In the first model, where the independent value estimated as the volatility, the coefficient values are 0.0382 and 0.0457 in the bull and bear markets, respectively. Both t-statistics and p-values display significant results in the bull market and are equal to 3.946 and 8.1e-05, respectively. Which means that individual ownership level and the volatility are positively related to each other during the bull market in Turkey. This finding is in line with the overconfidence hypothesis. Gervais and Odean [27] and Daniel et al. [20] also proposed that overconfidence bias is more likely to foster in the bull market because overconfident investors tend to make excess trading, and this excess trading in the market can cause excess volatility.

In the meantime, the coefficient of the change the in relationship during the bear market is 0.0457 and the t-statistics is significant with the value of 2.973. This result confirms that the level of individual ownership and volatility are also related during the bear market, and this relationship is even stronger during the bear market than the bull market. These results show that as the level of individual ownership level increases, the investors are more likely to make riskier investments during both of the bull and bear markets in Turkey. However, we expected a stronger relationship between individual ownership level and volatility during the bull market rather than the bear market that is based on the hypothesis in the literature, it's open to discussion if investors are still keep their overconfidence during the bear period, where they face the losses in their investments.

(2) Beta

The second model provides another regression analysis of the individual ownership level and another measure of volatility; beta values, as the independent variable. The coefficient of the change in the relationship is -0.0117 with t-statistics value of -5.506, which is a significant level. This result shows that the investor ownership level and beta values are negatively correlated in the bull market in Turkey. It's notable that the investor ownership level and volatility are positively correlated in

the bull market, based on the results that previously provided. Which means that individual investors view the volatility and beta values differently during the bull markets, besides from they are different forms of risks in the market.

Moreover, the coefficient of the model is 0.004 with t-statistics value of 1.36 in the bear period. The results show that the relationship investor ownership level and the change during the bear period aren't significantly stronger than the bull period.

(3) Volatility and Beta Combined

In the third model, the dependent variable is investor ownership level, but the independent variable is both volatility and beta combined. The reason of this model to estimate whether investors perceive these type of risks interchangeably.

While combined, the coefficients of the volatility and beta values are 0.0359 and -0.005, with the significant p-values of 0.0001 and 0.0662. Which means the volatility and individual ownership level are positively related to each other where beta is negatively related to ownership level in the bull market. But during the bear period, while the change in relationship between volatility and the individual ownership level is significantly positive and stronger, it's not significant for the variable of beta value.

(4) Book-to-Market:

In the fourth model, the results show that the coefficient of the model is 0.0164 and the mean return difference of 0.0164 is significant at the 1% level using t-statistic during the bull period. This suggest that investor ownership level and preferences to stocks with higher book-to-market are positively correlated. This result ties well with the previous studies in the literature.

The coefficient of the model is 0.014731 with t-statistics 3.93 during the bear market, which means that the relationship in change between the ownership level and book-to-market is strong and positively correlated in the bear market compared to bull market which suggests that the individual investors prefer stocks with higher book-to-market values in the bear period.

(5) Abnormal Returns

In the fifth model, the coefficient of the model is 0.0197 with t-statistics value of 1.005 during the bull period. And for the bear period, the coefficient is -0.0126 where the t-statistics is -0.436. However, the results suggest that there isn't enough evidence to prove if the level of ownership and abnormal returns are aligned in bull period and bear markets.

Nevertheless, according to the literature, stronger results are expected from the results of this estimation, because overconfidence investors are more likely to hurt their portfolio returns and lower their expected utilities. [5, 18, 28, 47]

(6) All the Independent Variables Combined

After implementing all the variables as the independent variables, the relationship between individual ownership level and volatility and BM are significantly positive in the bull market with the significant values of 3.68 and 5.15, respectively.

4.5. Relationship Between Abnormal Change in Ownership Portfolios and Abnormal Returns During Different Market Conditions

The relationship between these formed abnormal change in ownership portfolios and abnormal returns of during, prior to, and after the change in ownership period are presented in Table 4.5.1.

Table 4.5.1 Relationship Between Abnormal Change in Ownership Portfolios and Abnormal Returns During Bull and Bear Periods

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quantile 5	F –stat	t-test	Mann-Whitney
Panel A: Abnormal Change in Individual Investor Ownership								
Bull Market	-0.281	-0.120	-0.057	0.008	0.310	<2.2e-16	<2.2e16	<2.2e-16
Bear Market	-0.286	-0.144	-0.066	0.016	0.343	<2.2e-16	<2.2e-16	<2.2e-16
F-statistic	2.76E-05				0.005			
t–statistic	0.537				0.798			
Mann-Whitney	0.0304				0.030			
Panel B: Abnormal Returns for Period During Change in Ownership Period								
Bull Market	0.001	-0.0025	0.0019	0.0004	-0.0009	2.40E-11	0.861	0.814
Bear Market	-0.0028	-0.00072	0.0012	0.0016	0.0011	0.749	0.583	0.812
F-statistic	1.45E-11				0.887			
t-statistic	0.8016				0.65			
Mann-Whitney	0.2803				0.22			
Panel C: Abnormal Returns for Period Prior to Change in Ownership Period								
Bull Market	0.0122	0.006	-0.0029	-0.00298	-0.013			
Bear Market	0.0180	0.003	-0.0027	-0.0005	-0.0169			
F-statistic								
t-statistic								
Mann-Whitney								
Panel D: Abnormal Returns for Period After Change in Ownership Period								
Bull Market	-0.001	-6.60955E-05	0.001	-0.0012	0.0003			
Bear Market	-0.0028	-0.0005	-0.001	0.0004	0.0014			
F-statistic								
t-statistic								
Mann-Whitney								

In Panel A, the abnormal change in ownership increases from Quantile 1 to Quantile 5, in other words, for the ownership-change portfolios. During the bull period, the abnormal change in ownership increases from -28% to 31%, where the two-sided t-test and Mann-Whitney results are significant. Similarly, the abnormal change in ownership rise from -28% to 34% where the statistics summary displays significant results. Since these portfolios are designed to exhibit increment in abnormal change in the ownership-change portfolios in the first place, these results are not surprising.

In Panel B, the abnormal returns during the change in ownership display a decrease in the bull period, from %1 to -0.09%, respectively as moving from Quantile 1 to Quantile 5. Which means, while the stocks that investors sell earn 1% in returns, and the stocks they buy earn -0.09%, which means the stocks of the investors sell outperform the stocks that they buy in the bull period. However, this decrease that is mentioned isn't monotonic and doesn't show a pattern. And the difference in mean tests are not significant according to the two sided t-test and Mann-Whitney tests. During the bear period, an increase in abnormal returns can be seen from moving Quantile 1 to Quantile 5, with the values of -0.28% and 0.11%, respectively. This shows that while the stocks that the individual investors sell earn -0.28% in returns, the stocks they buy earn 0.11%, which means that their purchases outperform the stocks they sell during the bear period. However neither two-sided t-test test nor Mann-Whitney tests display significant results. These results show that the investment results around the abnormal change in the ownership portfolios in Turkey don't show a significant pattern (positive or negative abnormal returns) during the bull or bear periods. However, when comparing our results to the studies in literature, the stronger results are expected.

In Panel C, the feedback trading relationship around the abnormal change portfolios is investigated. In the model, the stocks that individual investors sold earned %1.2 in the bull market, and their purchases earned - %1.3, according to the prior period. This means during the bull period, as the abnormal change in individual ownership increases, the investors are more likely to buy stocks with past lower returns and sell stocks with higher returns during the bull period. This behavior can be perceived as negative feedback trading (contrarian trading), where investors buy

past losers and sell past winners. On the other hand, there's higher decline in the abnormal returns (from 1.8% to -1.69) as moving from Quantile 1 to Quantile 5 during the bear period. In other words, the stocks that the investors sell outperformed the ones they buy by 3.49%.

However, stronger positive feedback results are expected during the bull market, because overconfident investors are likely to believe that their knowledge is more relevant rather than the public information in the market. [8, 15, 48, 47] And this may cause these investors to buy past winner stocks and sell past loser stocks [3, 45].

The significance tests in Panel C and Panel D aren't applied. Because in the previous steps, since the calculations are made prior to change in ownership period, the abnormal returns aren't available for the first bull period in Panel C (In this case, the very first period of the dataset is the first bull period). And the abnormal returns aren't available for the last bear period in Panel D, because there's no dataset after the last period, which is a bear period.

In Panel D, as moving from Quantile 1 to Quantile 5, the abnormal returns after the change in ownership period are -1% and 0.03% during the bull period, respectively.

The results don't exhibit a particular pattern during the bull period. And the results are 0.28% and 0.14% for Quantile 1 and Quantile 5 during the bear period, respectively. And since the significance tests aren't applied in Panel C and D, it's harder to interpret the results.

4.6. Regression Analysis of Abnormal Change in Ownership and Abnormal Returns

As in the previous steps, the similar regression model is applied.

$$\text{Abnormal Change Level} = \alpha_1 + \delta_1 \times \text{Abnormal Return} + \alpha_2 \times D_{Bear} + \delta_2 \times D_{Bear} \times \text{Abnormal Return}$$

Similarly, the dependent variable is the abnormal change portfolio during the relevant period. And the independent variables are either, (1) Abnormal returns for

period during change in ownership period, (2) Abnormal returns for period prior to change in ownership period, or in (3) Abnormal returns for period after change in ownership period. The coefficients in the model represent the relationship between the dependent and independent variables during the bull period or the *change* in the relationship between during the bull and bear periods. The parentheses represent the t-values while the {brackets} represent the p-values.

Table 4.6.1 Regression Analysis of Abnormal Change in Ownership and Abnormal Returns

Model	**Abnormal Return in Change Period (1)**	**Abnormal Return in Period Prior to Change (2)**	**Abnormal Return in Period After Change (3)**
Intercept	-0.024 (-3.08) {0.0020}**	0.0263 (1.78) {0.073}	0.0340 (2.38) {0.041}*
Abnormal Return in Change Period	-0.0859 (-0.55) {0.58}		
Abnormal Return in Period Prior to Change		-2.010 (-7.04) {2.41e-12}***	
Abnormal Return in Period After Change			0.072 (0.23) {0.81}
Additional Effects of Bear Periods			
Intercept *D_{Bear}	-0.0036 (-0.321) {0.748}	-0.053 (2.43) {0.0150}	0.089 (3.97) {6.58e-05}***
Abnormal Return in Change Period *D_{Bear}	0.111 (0.48) {0.631}		
Abnormal Return in Period Prior to Change *D_{Bear}		-0.173 (2.43) {0.071}*	
Abnormal Return in Period After Change *D_{Bear}			0.320 (0.72) {0.467}
Adj-R^2	0.0014	0.0309	0.0053

Estimation results are presented in the Table 4.6.1. Similar to the previous model, the coefficient values are marked with significance levels. ***, **, * indicate significance at the 1%, 5%, 10%, respectively.

In the Model 1, the model coefficient is -0.085 in the bull period and 0.111 in the bear period, however the t-statistics and p values aren't significant. Which means that we don't have enough evidence to prove if the abnormal returns of the investors increase/decrease as the abnormal ownership level changes according to the relevant period. This revealed no statistical differences on the abnormal returns around the individual ownership change during the relevant ownership change period. Based on this result, we can't interpret if the investors are doing poorly or well during the periods. The results are consistent with the previous findings.

In model 2, the model coefficient in the bull period is -2.01 and it's -0.53 in the bear period, both of the coefficients are negatively significant, suggesting that investors tend to be negative feedback traders in both bull and bear periods. And this result is even stronger during the bear period at the 1% significance level.

In model 3, the results display the regression results of after the change of individual ownership change and abnormal returns. While the model coefficient is 0.072 in the bull period, with t-statistics of 0.81, which suggests that the stocks that the individual investors buy outperform the stocks they sell in the year following the change in ownership. However, the results aren't significant. For the bear period, the model coefficient is 0.320 and the t-statistics is 0.72. Nevertheless, similar to the bull period results, these results aren't significant either.

CHAPTER 5

CONCLUSION

This study investigates the relationship between the ownership level and overconfidence bias among the individual and institutional investors in Turkey under different market conditions (bull and bear periods) by using panel and regression analysis.

Results also show that whether individual or institutional investors, perceive volatility and beta risk factors differently under similar market environments in Turkey. While institutional investors prefer stocks with higher betas during both of the bull and bear periods, the individual investors prefer stocks with lower betas only in the bull periods. Also, both of the investors prefer stocks with higher volatility during both of the bull and bear periods, by comparing this result to previous one, this leads to conclusion that the individual investors perceive volatility and beta values of stocks differently.

It is also found that, the individual investors prefer stocks with higher book-to-market values during both of the bull and bear periods, which means that these investors are more likely to hold the stocks that they think undervalued but might be more valuable in the future. Moreover, both of the institutional and individual investors prefer the stocks with higher book-to-market during the bear period, and this relationship should be examined in the further studies.

Furthermore, as the individual ownership level of investors increase, they are more prone to buy past loser stocks and sell the winner stocks (negative feedback trading) especially during the bear period. This result is not aligned with the overconfidence hypothesis in general, but it gives valuable insights about the investment strategies of the investors in an emerging market.

This study leads us to conclusion that both of the investors, they behave differently under similar market environments and suffer from psychological biases in Turkey.

For the future studies, a bull and bear determination model that focuses on the substantial rises or falls in the stock market can also be considered during the calculations to investigate the investor behavior. Also, an extended period of time can be studied on for the bull and bear market determination to study the behavior of the investors under different market conditions.

Overall, the results also demonstrate exploratory analysis about the stock characteristics of the investors in such an emerging market.

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APPENDIX

The Code Sample of Bull and Bear Determination on R:

```
# activate the necessary packages

library(dplyr)

library(bbdetection)

library(lubridate)

library(zoo)

library(ggplot2)

library(xtable)

library(readxl)

library(writexl)

library(psych)

df <- read.csv("C:/Users/OneDrive/Documents/XX30.csv", header=TRUE, row.names="Date") # read bist30 data

as.Date("2009/01/01", format="%Y/%d/%m")

td = seq(as.Date("2009/01/01"), as.Date("2020/03/01"), "months")

data_ordered = zoo(x=df$Close, order.by=td) #change date format

#Apply Pagan and Sossounov method on BIST30 index

bist30 <- data_ordered # choose the monthly data

dates <- index(bist30) # retrieve dates

dates <- as.yearmon(dates) # convert dates to "yearmon" format if monthly data

Sys.setlocale("LC_TIME", "English") #change system language

price <- as.vector(coredata(bist30)) # retrieve prices

price <- as.numeric(price)

setpar_dating_alg(8, 6, 4, 16, 20) # parameters for monthly data
```

```
bull <- run_dating_alg(price) # detect the states
bb.dating.states(price, bull, dates)
pagan_summary <- bb.summary.stat(price, bull) #summary statistisc of the periods
```

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