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# AN ANALYSIS OF FIRM-SIZE EFFECTS IN BORSA ISTANBUL

MELİSA ERDOĞAN

THESIS ADVISOR: ASSOC.PROF.(PHD) MEHMET OĞUZ KARAHAN

INTERNATIONAL TRADE AND FINANCE DEPARTMENT

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# ABSTRACT

AN ANALYSIS OF FIRM-SIZE EFFECT IN BORSA ISTANBUL

Erdoğan, Melisa

MA, International Trade and Finance

Advisor: Assoc.Prof.(PhD) Mehmet Oğuz Karahan

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In this study, firm size anomaly on stock returns of 331 firms included in ISEALL indices of Borsa Istanbul between 01/03/2011 - 30/09/2020 was analyzed using panel data analysis. Excess returns of stocks are used as the dependent variable in the study. Market capitalization, Market-to-Book Value ratio, free float ratio, earnings per share, market excess return, and 10-year bond yield data of Turkey were used as independent variables.

Results of the panel data analysis indicate that for the stocks included in the Borsa Istanbul ISEALL index market capitalization has a positive effect on stock returns. However, it is observed that this positive effect is lower for stocks included in the ISE100 index.



**keywords:** firm-size anomaly, stock return, panel data analysis, market capitalization, Borsa Istanbul

# ÖZ

BORSA İSTANBUL'DA FİRMA BÜYÜKLÜĞÜ ETKİ ANALİZİ

Erdoğan, Melisa
Yüksek Lisans Tezi, Uluslararası Ticaret ve Finans
Danışman: Doç.Dr. Mehmet Oğuz Karahan
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Bu çalışmada, 01/03/2011 - 30/09/2020 tarihleri arasında Borsa İstanbul'un BIST endekslerinde yer alan 331 firmanın hisse senedi getirilerindeki firma büyüklüğü anomalisi panel veri analizi kullanılarak analiz edilmiştir. Çalışmada bağımlı değişken olarak hisse senetlerinin getiri fazlası kullanılmıştır. Bağımsız değişken olarak piyasa değeri, Piyasa Defter Değeri oranı, halka açıklık oranı, hisse başına kazanç, piyasa fazla getirisi ve 10 yıllık Türkiye tahvil getirisi verileri kullanılmıştır. Panel veri analizi sonuçları, Borsa İstanbul BISTTÜM endeksinde yer alan hisse senetleri için piyasa kapitalizasyonunun hisse senedi getirilerini olumlu etkilediğini göstermektedir. Ancak bu olumlu etkinin BIST100 endeksinde yer alan hisse senetleri için daha düşük olduğu görülmektedir.

**Anahtar Kelimeler:** firma büyüklüğü, hisse senedi getirisi, panel veri analizi, piyasa değeri, Borsa İstanbul

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I would like to express my enduring love to my parents, who are always supportive, loving and caring to me in every possible way in my life.

Melisa Erdoğan

İzmir, 2021

## TEXT OF OATH

I declare and honestly confirm that my study, titled “AN ANALYSIS OF FIRM-SIZE EFFECTS IN BORSA ISTANBUL” and presented as a Master’s Thesis, has been written without applying to any assistance inconsistent with scientific ethics and traditions. I declare, to the best of my knowledge and belief, that all content and ideas drawn directly or indirectly from external sources are indicated in the text and listed in the list of references.

Melisa Erdoğan

08.07.2021

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## SYMBOLS AND ABBREVIATIONS

ABBREVIATIONS:

| | |
|---|---|
| R&D | Research and Depelopment |
| ISE30 | İstanbul Stock Exchange 30 Index |
| ISE50 | İstanbul Stock Exchange 50 Index |
| ISE100 | İstanbul Stock Exchange 100 Index |
| ISEALL | İstanbul Stock Exchange All Index |
| MARKETCAP | Market Capitalization |
| MV/BV | Market Value/Book Value |
| EPS | Earnings Per Share |
| P/E RATIO | Price/Earnings Ratio |
| USA | United States of America |
| GNP | Gross National Product |
| D/E RATIO | Dept-to-Equity Ratio |
| SME | Small and Medium Enterprises |
| CAR | Cumulative Abnormal Return |
| CAPM | Capital Assets Pricing Model |
| P/B RATIO | Price/Book Value Ratio |
| DPS | Dividend Per Share |
| UK | United Kingdom |
| OLS | Ordinary Least Squares |
| BRICS | Brazil, Russia, India, China and South Africa |
| ROA | Net Profit/Total Asset |
| CF/P RATIO | Cash Flow/Price Ratio |
| ROI | Return on Investment |
| Y/B RATIO | Yield-to-Book Ratio |
| EBIT | Earnings Before Interest, Taxes |
| ROE | Return on Equity |
| CMB | Capital Market Board |
| CBRT | Central Bank of Republic of Turkey |
| TCC | Turkish Commercial Code |
| ART. | Article |
| GDP | Gross Domestic Product |

| | |
|---|---|
| CR | Compound Return |
| E(R) | Expected Return |
| TL | Turkish Lira |
| APT | Arbitrage Pricing Theory |
| FF3F | Fama-French 3-Factor Model |
| SMB | Small Minus Big Factor |
| HML | High Minus Low Factor |
| FF4F | Fama-French 4-Factor Model |
| WML | Momentum Factor |
| FF5F | Fama-French 5-Factor Model |
| RMW | Robust and Weak Profitability Factor |
| CMA | Conservative and Aggressive Returns Factor |
| CPI | Consumer Price Index |
| FED | Federal Reserve |
| S/P | Sales Per Share |
| MVE | Stock Market the Value |
| BETA | Beta |
| NPM | Net Profit/Total Sales |
| DA | Total Debt/Total Asset |
| ANOVA | Analysis of Variance |
| SL | Small and Low Portfolio |
| SH | Small and High Portfolio |
| ICAPM | Intertemporal Capital Asset Pricing Model |
| UMD | Sensitivity Factor (Market Leverage and Total Debt ) |
| LMH | Liquity Factor |
| RM-RF | Market Return- Risk Free Rate |
| GMM | Generalized Method of Moments |
| BIST | Borsa İstanbul |
| FEM | Fixed Effects Model |
| REM | Random Effects Model |
| PDP | Public Disclosure Platform |

# CHAPTER 1
# INTRODUCTION

An important issue in the finance literature is the firm size anomaly. The firm size anomaly is the stock returns of companies with a larger firm size obtain lower returns than the stock returns of companies with smaller firm size. In other words, the stock returns of small firms are higher than those of large firms, or the stock returns of large firms are less than the stock returns of small firms. Firm size anomaly is a type of anomaly that is also followed in stock markets.

One of the most critical elements of firms in the financial environment is to learn the effect of firm size on growth and financial performance. There are many factors that affect the growth of a firm. Some of these are firm size, firm age, the ownership structure of the firm, the firm's sector, R&D activities, and macroeconomic factors. But the most important of these factors is firm size.

When the literature about the size of the firm is conducted, it has been revealed that many researchers have investigated this issue. In some of the studies on this subject, it has been revealed that the stock returns of small firms provide higher returns than the stock returns of large firms. In other words, since there is a negative situation between firm size and stock returns, it is called a size anomaly. Especially in the late 1970s and early 1980s, the firm size effect emerged for the first time. Banz (1981) and Reinganim (1981) examined this anomaly for the first time in the American stock markets. Banz (1981) proved that small firms earn higher returns than large firms. The pricing of the risk factor has been added to this abnormal situation. This resulting term has been called the size effect. Banz (1981) and Reinganim (1981) have contributed many studies on the firm size anomaly to the world of academia.

It has been revealed in the finance literature that there is a connection between firm size and stock returns. In some studies, it has been revealed that the stock returns of

small firms provide higher returns to their investors compared to the stock returns of large firms. In others, the opposite results have been found. The reason why these results are different is the models, methods, and variables used. Some of these variables are stock market value, equity book value/market value, price/earnings ratio, price, debt ratio, total assets.

This study, which was carried out in order to examine the existence of company size anomaly above the returns of the stocks owned by 331 companies included in the ISE ALL index in Borsa Istanbul in Turkey, consists of 5 sections.

In the first chapter, a general introduction to the research subject is made. In the second chapter of the study, the concept of firm size and literature research are included. The topics examined in the second part are Growth Motives and Growth Speed in Firms, Growth Models of Firms, Growth Directions in Firms, Types of Firms in Terms of Economic Combinations, Firm Size Criteria, Classification of Firms in Terms of Size and Literature Review on Firm Size.

In the third chapter of the study, the concept of stock returns and the literature research are given. The topics covered in the third section are Definition of the Stock, Rights and Obligations of the Shareholder, Types of Stocks, Value Definitions of Stocks, Public Offering of the Stocks, Factors Affecting The Stocks (Macroeconomic Factors & Microeconomic Factors), Types of Return in Stocks, Risk Types in Stocks, Stock Valuation Methods, Methods Used to Estimate Stocks Returns and Literature Review about Stocks.

In the fourth part of the study, panel data analysis was performed for 331 companies included in the ISEALL index of Borsa Istanbul between 01/03/2011 - 30/09/2020 to investigate the effect of firm size anomaly on stock returns.

In the fifth part (last part) of the study, the results and recommendations of the research are given.

# CHAPTER 2
# FIRM SIZE EFFECT AND RELATED LITERATURE

## 2.1. Definition of Firm Size Anomaly and Size Concept in Firms

First of all, if we look at the concept of growth, it in firms is a qualitative and quantitative transformation process, starting from a specific time and dimension, and combining material and human elements (Koçel, 1993). The concept of growth in the company, the increase in the income from sales, the increase in the amount of production, and the increase in the number of employees indicates that there is a firm size in that company. Growth in terms of accounting and finance means an increase in the total assets on the active side of the balance sheet and the capital on the liabilities side of the firm's financial statement (Koçel, 1993). The size and growth concepts of the firm are different from each other. Therefore, it is necessary to know the difference between these two terms. Although growth and size arise from each other, these two terms describe different situations for firms. Growth is dynamic while the size is static. While growth takes a long time, size does not move with time. Growth is that the size of the firm differs in two different periods for firms. Size is indicative of the firm's one-off volume. However, since these concepts are interrelated, they cannot be considered independently from each other (İskenderoğlu, 2008).

The impact of firm size on growth and financial performance has made firms become the most curious critical factor in financial circles. There are many factors that affect growth, some of which are firm size, firm age, firm ownership structure, firm's sector, R&D activities and macroeconomic factors. Among these terms, the most emphasized issue is undoubtedly firm size (İskenderoğlu, 2008). The size effect is that investing in small firm stocks returns a greater amount of return than investing in stocks of large firms. Firm size is also used as market value. Market value, that is the size of the firm, is the result obtained by multiplying the stock price the firm owns by

the number of stocks (Francis, 1993). Although the concept of firm size (market value) implies a tangible unity, it is actually a difficult term to identify. Firm size; It is the gathering of all means of production of entrepreneurs, the volume and capacity of the firm (Kılıçkaplan & Baştürk, 2007).

Firm size has been studied by many researchers. Especially in the late 1970s and early 1980s, the firm size effect appeared for the first time (Hsia & Fuller, 1996). This effect has been called the firm size effect, as small firms return higher returns than large firms based on risk (Kim & Burnie, 2002).

Banz (1981) has proven that small firms generate higher returns. The pricing of the risk factor has been added to this abnormal situation. This resulting term is called the size effect.

According to the studies conducted in the finance literature, it has been concluded that investors who create investment strategies according to various information such as firm size, equity book value/market value ratio, price/earnings ratio, price, debt ratio earn more returns than they expected (Arıoğlu, 2007).

One of the firm knowledge is that firm size, called stock market value, is a value that investors take into account when determining investment tactics to provide supernormal returns (Horasan, 2008).

When we look at the studies in the literature, it is seen that firm size and financial theories are not very compatible. Because stocks that yield above normal returns are in disagreement with firm earnings data. According to the results, it has been revealed that there is an unfavorable relationship between the size and P/E ratio of a firm and the average return on the stocks of that firm (Baştürk, 2004).

According to Shaheen and Malik (2012), firm size is the production capacity of a firm or the number and variety of services the firm will offer to its customers at the same time. The purpose of economies of scale is to achieve higher efficiency and profitability by reducing the cost per unit. Therefore, economies of scale and firm size are very important for current firms. Large firms can produce products at a lower

price than smaller firms due to economies of scale and the ability to make mass production. Today's companies want to increase their size by reducing production costs and increasing their market shares in order to stay in the market (Shaheen & Malik, 2012).

It has been determined that there is a connection between firm size and stock returns in finance literature. In some of the researches, it has been revealed that the stock returns of small firms provide higher returns to their investors than the stock returns of large firms. According to other studies, this can also be the opposite. The reason why these results are different is the models, methods and variables used. Some of these variables are stock market value, equity book value/market value, price/earnings ratio, price, debt ratio, total assets. According to the result of the research between firm size, beta and BV/MV variables and stock return, the average return of large firms is higher than the average return of small firms (Yalçıner & Boztosun, 2005).

Firm size is one of the most used terms to explain the debt level of a business. In most of the studies conducted, it has been revealed that firm size is proportional to the use of firm debt. If a large firm is in the market, there must be much information. In this case, it reduces information asymmetry and it becomes easier to obtain financial resources from lenders (Marete, 2015).

According to Gökhan and Özcan (2002), it was determined that the stocks of large firms yield fewer returns than the stocks of small firms. In other words, as the value of the rate at which firms are bought and sold on the stock exchange increases, the return decreases; the lower the value of the rate of purchase and sale in the stock market, the higher the return.

When we look at past studies, it is determined that there is a link between firm size and stock returns. In some of the studies, it has been revealed that the stock returns of small firms provide higher returns than the stock returns of large firms. In other words, since there is a negative situation between firm size and stock returns, it is called a size anomaly. Banz (1981) and Reinganum (1981) examined this anomaly for the first time in the American stock markets. They have brought many studies on

the firm size anomaly to the world of academia. However, some studies indicated that the size effect will change over time (Banz, 1981; Reinganum, 1981).

One of the most famous issues in finance is the firm size anomaly. According to the firm size anomaly, stocks of companies with the high market value generated lower returns than stocks of companies with low market value (Arıoğlu, 2007).

Firm size anomaly is a type of anomaly that is also followed in stock markets. According to the firm size anomaly, the stock returns of small firms are higher than the stock returns of large firms. According to the efficient market hypothesis, it is emphasized that the prices existing in the markets contain all kinds of information, therefore it is impossible to obtain an abnormal return using this information. But, according to some tests, firm size anomaly has been proven to be valid (Uğurlu & Demir, 2016).

## 2.2. Growth Motives and Growth Speed in Firms

We can divide the growth reasons of firms into 2 as internal economic factors and external economic factors. Profit maximization, taking advantage of economies of scale, full uses of resources, willingness to open up to new markets are internal economic factors. Factors such as technological developments and economic developments are external economic factors. In addition to these, there are also factors of ambition, creativity, and dynamism as psychological and social factors of business owners, managers, and employees (Akgüç, 1998).

Like all institutions in our life, it is a system created by entrepreneurs, managers, and employees in businesses. Everyone in this system wants and affects the growth of the company. Growing the company is moral contentment for the entrepreneur (Tosun, 1992).

One of the internal economic factors, the economy of scale is one of the main factors of growth. The growth of the company allows the enterprise to carry out its R&D activities more economically and efficiently and reduces the risk. It also increases recruiting specialized people and reduces overall costs through mass production.

Thus, companies benefit from economies of scale to be more efficient, productive, and profitable (Akgüç, 1998).

Certainly, one of the economic factors that drive the growth of the firm is profit maximization. The positive difference between the costs incurred during the production of a good or service and the income obtained from the sale of that good or service is called profit. Consequently, the profit of the firm increases with the decrease in cost per product with economies of scale (Özalp, 1975).

When a business wants to grow, it knows that it must use its resources efficiently. Accordingly, the company looks for resources that it can use at full capacity. The machines in the institutions increase the production amount by working at full capacity and full time. As a result, production costs per unit decrease (Özalp, 1975).

If a company enters new markets and introduces new products, the purpose of this company is to grow its business. If companies want to enter new markets with product diversification in the product line, they must first do good market research. Thus, they see the current and possible demands in that market. Entering new markets provides extra expense for businesses. But they grow their companies in return for these expenses (Özalp, 1975).

Looking at the achievements of today's large companies, it is seen that they work in harmony with technological developments. Modern techniques emerging with the development of technology support the growth of the company (Özalp, 1975).

In any case of the size of the business, economic developments in the country have an impact on all companies. Inflationary pressures drive firms in developing countries to grow. If inflation is high, it causes a demand boom in firms. In this case, it is inevitable for businesses to grow (Özalp, 1975).

The growth speed in businesses shows how much the size criteria of the firm have increased within a certain time period. The growth speed is found by dividing the increase of capital elements of the enterprise by the unit of time (Tosun, 1990).

Large businesses grow faster, according to A. Marshall. This means that large firms get more tired as they grow faster. A. Marshall explained this situation with an example. It indicates that the fast-growing seedlings have stopped growing after time has passed and they have become weak. J.M. Clark explains that when establishing a company, it is necessary to establish a volume that exceeds market research. In addition, J.M.Clark supports startups to have idle capacity. Thus, the problems that the company may encounter in the future have been solved in the first place (Tosun, 1990).

The growth speed of the companies should be at least at a level that can cope with the competitors in the sector. If the business cannot withstand the competition, it is at risk for the firm to continue. Companies that cannot stand the competition may go bankrupt. While there is rapid growth in industries dominated by technology, growth is slow in older industries.

## 2.3. Growth Models of Firms

There is a close relationship between the growth models of the firm and its structural characteristics and the conditions of the environment in which it operates. Generally, growth takes place in two ways. One of them is internal growth, that is, growth through auto finance, the other is growth through external growth or mergers.

### 2.3.1. Internal Growth (Auto finance)

The growth model that the firm has made with its own resources is called internal growth. A firm that grows through auto-finance will either receive additional capital from its partners or grow by holding a portion of the profits the firm earns (Özalp, 1975).

Internalized growth occurs by integrating factors such as knowledge, capital, and technological progress into growth models. Internal growth patterns have increased since the 1990s (Demir, Üzümcü & Duran, 2006).

Businesses can achieve internal growth by allocating the resources they obtain and

the resources they provide for new investments to grow (Akgüç, 1998). The growth of the firm with internal resources is due to its growth with resources, net profit, depreciation, reserves, and other internal funds that occur as a result of the operations of the company (Berk, 2000).

The internal growth concept is defined as the growth of the business without using any external resources. The highest growth rate of the firm without outsourcing is the 'Internal Growth Rate'. Growth in a business without external financing is called internalization of the growth rate. Therefore, when outsourcing is zero, an internal growth rate is encountered when retained earnings are compared to operating assets. That is, the company with higher retained earnings relative to assets will be able to increase its growth without providing external financing (Brealey, Myers & Marcus, 2001).

### 2.3.2. External Growth

Businesses grow to a certain extent with their own resources without outsourcing. However, if companies want to grow further, they need to get support from external sources. This type of external growth is called fusion growth. All kinds of economic gathering, mergers, and concentrations of economic factors are called mergers (İlkin, 1988).

If rapid growth is desired, the method of unification is applied. Because, with external growth, it rises to all assets of a company in an instant (Özalp, 1975). First, in the 19th century, economic mergers began to be made. With the development of the industry, enterprises have diversified the ways of merging (İlkin, 1988).

After the 1950s, the importance of mergers both in terms of economy and business in Western Europe has been understood. Therefore, first of all, the mergers have increased in Europe. Since 1950 as the first mergers in the banking sector it has begun in Turkey. Later, it derives from other branches of industry and trade. The merger of Istanbul Bank and Ziraat Bank in 1962 can be given as an example of this situation. Also in 1988, Anadolu Bank and Turkey are united in Türkiye Emlak Kredi Bank (Aydın, 1988).

Among the driving concepts of growth is the synergy effect of external growth, holding the market, being a monopolist, and strengthening its position in the market. Firms combine and reveal all their strengths. They fix the weaknesses of the firm and do business more efficiently by reducing their costs (Okka, 2006).

## 2.4. Growth Directions in Firms

Company mergers are generally examined in three groups. The classification in question is Horizontal Mergers, Vertical Mergers, and Conglomerate Mergers (Green, 1990).

### 2.4.1. Horizontal Mergers

The growth of a firm to increase its market share in its sector is called a horizontal merger. Firms do horizontal mergers by sharing the funds they have created for investments in the same sector or by buying or merging companies that produce similar products. Firms make decisions to merge with companies in the same business line in order to compete in the market. With horizontal growth, it is possible to become a monopolist in the market. The merger of the television production company and another television production company is a horizontal merger (Civan & Ekşi, 2001).

The merger of companies in the same field is called a horizontal merger. Horizontal mergers are important to increase the company's market share and create synergy value. While the incomes of the companies that made this merger increase, their expenses decrease (Sudarsanam, 2003).

The mergers of companies consist of waves. Most merger waves occur with horizontal mergers. In times of economic expansion, firms' desire to merge increases. This situation is also reflected in the stock prices of companies. Firms that want to keep up with technology first tend towards horizontal mergers. Considering the liberalized sectors, this type of merger has been preferred since the end of the 20$^{th}$ century (Brealey et al., 2011).

Firms choose horizontal mergers in order to cope with competition in the market and to benefit from economies of scale. As a result of the horizontal merger, the firm's market share and productivity increase. In addition, the firm becomes able to withstand the competition. Firms that dominate the market by horizontal mergers manage to affect market prices alone (Martin, 1994).

Enterprises that plan to grow horizontally focus their resources on investment elements. Institutions achieve this kind of growth by purchasing or merging companies that produce the same product (Akgüç, 1998).

### 2.4.2. Vertical Mergers

Vertical growth is the execution of all steps from processing a product as a raw material to its sale by an enterprise. The merger of companies that carry out all activities from the production of raw materials to the marketing of the final product or the transfer of funds is called vertical growth (Akgüç, 1998).

Many companies are needed from the production of a product to the end-user. Therefore, a vertical merger brings together two or more companies that produce goods or services in different branches (Çolak, 2006).

Vertical merger basically has 2 different forms. The first is a backward vertical merger. In this vertical merger type, the company returns to its suppliers. The second is the forward vertical union. In this merger, the company deals with the companies that buy their own goods (Civan & Ekşi, 2001).

In other words, mergers with the purpose of gathering the stages from production to sale of a good or service under only one firm are called vertical mergers. If a firm that makes durable consumer goods opens a retail store, the forward turn would have made a vertical merger. In this way, the company makes more efficient sales without the need for another retail store. Without keeping up with the current technology, an automobile company that produces gasoline tanks, produces wheels, or merged with other manufacturing companies has merged vertically backward (Baş, 1990).

The gathering of companies at different points in the production stages is called a vertical merger. If there is a merger with a movement towards the raw material, there is a backward expansion. If there is a merger in the product direction, there is forward expansion. One of the most striking examples of vertical merger may be the 2008 acquisition of Tele Atlas by TomTom, the world's largest manufacturer of car navigation products. After this merger, TomTom used digital map data to make simultaneous satellite navigation updates, using Tele Atlas' technological infrastructure (Brealey, Myers & Allen, 2011).

### 2.4.3. Conglomerate Mergers

The merger and acquisition of companies that do not have a direct relationship with their main field of activity are called conglomerate/unrelated mergers. When we look at the literature for this type of merger, it is possible that it may appear as a contrary or unrelated merger (İçke, 2007). A cluster merger is the merger of companies operating in different sectors (Çolak, 2006).

Conglomerate mergers, also known as economic diversification, are among the most used merger options to enter the market as soon as possible. Sectoral diversification reduces operational risk. Technology manufacturing companies in different markets often do this merger type (Çelik, 1999).

In other words, the merger of a firm by investing or purchasing companies with different fields of activity is called cross growth. One of the reasons why companies choose cross growth is that they want to share this risk if there are companies with high risk (Akgüç, 1998).

## 2.5. Types of Firms in Terms of Economic Combinations

External growth can occur in a variety of ways. Agreements made between companies with different content and terms are important in terms of revealing how the business grows. The agreements we are talking about can generally be divided into six groups: gentlemen's agreements, consortium, cartels, trusts, holding, and

mergers.

### 2.5.1. Gentleman's Agreement

Businesses may need to make some agreements to reduce competition in the market and stand stronger against their competitors. A gentleman's agreement is an agreement that includes requests from each other of the parties involved in the agreement. There are no sanctions if one of the parties involved in the agreement relinquishes the agreement. These agreements can be in written or verbal form.

A gentlemen's agreement is an agreement applied by companies that want to be a temporary or permanent monopoly in the market. The purpose of this agreement is to bring together two or more companies and share raw material suppliers or markets to end price competition. In this case, with this agreement, the seller companies become stronger than the buyers or their competitors in the market (Mucuk, 2013).

### 2.5.2. Consortium

A consortium is temporary cooperation between two or more firms without combining their legal and economic rights to run a very large business or project. Companies from the same or different countries, in the same field or with different areas of expertise, can conclude this contract. The important thing here is that companies combine their financial and technological structures. Thus, winning a national or international tender is easier for more expensive jobs (Tükenmez & Süleyman, 1999).

There is no need to establish a new company for the consortium. The consortium agreement is signed for the completion of a project that will take a long time. When this project is finished, the consortium agreement ends automatically (Mutlu, 1999).

### 2.5.3. Cartels

A cartel is a union formed by protecting the independence of companies operating in the same branch in order to prevent competition from companies that manufacture

the same or similar goods and services. The purpose of companies in establishing a cartel is to become a monopoly in the market. The product for which the cartel agreement will be made must be one of the main items in production. The important difference that distinguishes cartels from trusts is that both management and organization of companies that make cartel agreements remain independent. Cartels are basically divided into 4. These are price cartels, quota cartels, sales cartels, and production cartels (Şahin, 1989).

Firms that organize and come together to cope with consumers and competitors form a cartel. The aim of the monopoly community formed by companies coming together is to prevent competition by holding the majority of certain goods or services in the market. In order to become a leader in the market, all parties must comply with the terms of the cartel agreement (Mucuk, 2013).

### 2.5.4. Trusts

Companies that combined their management systems by making giant mergers to become a monopoly in the market benefited from the trust. In the 19$^{th}$ century, the first trust agreements started to be formed in America. As an example of a trust, the first trust Standard Oil Company was established in 1879 (Fund et al., 1937).

It is one of the aims of the trust to bring two or more firms together by combining their management. The companies that will make a trust will replace their trust shares with their own shares. Trusts are framed by law in most countries. Because trusts reveal monopoly in countries (Tükenmez & Süleyman, 1999).

### 2.5.5. Holding

Holdings are mergers made in the form of a private trust. Holdings come together by holding the shares of other companies without engaging in commercial or industrial activities. Holdings are legally independent. To have a say in a company, they must own at least 51% of that company's shares (Akgüç, 1998).

At the end of the 19$^{th}$ century, holdings started to form in the USA and Europe. In

1886, in London, Nobel Dynamite Trast Company Ltd. was established as the first holding (Tümer, 1975).

### 2.5.6. Merger (Fusion)

A complete merger means that at least two or more companies buy each other or consolidate (Akgüç, 1998).

A merger is when at least two companies come together and act as a company. These businesses can buy each other or establish a new company. Firms can combine according to their scales and increase their size even more (Mucuk, 2013).

## 2.6. Firm Size Criteria

There are many factors that affect firm size and growth. The main factors affecting firm size and growth can be summarized as follows:

**Production Amount:** With the developing industry, companies started mass production. In this case, it enables us to obtain information that can be recorded in evaluating the number of goods or services produced (Şahin, 1989).

**Sales Revenue:** It is used to determine the size of all other economic units, especially companies. Generally, it is the volume of sales made by the company within 1 year (Şahin, 1989).

**Amount of Capital:** All of the resources created by human by processing his/her labor into nature is called capital. All values used to produce a good or service, such as machinery, buildings, land, raw materials, patents, licenses, constitutes capital (Tosun, 1990).

**Number of Personnel:** The number of employees working in an enterprise represents the size of that firm. Changes in the number of personnel in companies all over the world affect the size of the firm (Akgüç, 1998).

**Firm Age:** The firm's age criterion affects the company's maximum profit earning and growth. According to the empirical studies conducted so far, there is a negative relationship between the age of the firm and the growth of the firm (İskenderoğlu, 2008).

**R&D Expenditures:** It is called research and development when companies enrich their scientific and technical knowledge with current methods. New product development, production, and marketing are included in the scope of R&D (Mucuk, 2013).

**Structure of the Sector:** The sector owned by the firms enables them to shape their capital structure and cope with their competitors. The sector in which the firm operates affects the size of the firm and its optimum size (Tükenmez & Süleyman, 1999).

**Macroeconomic Factors:** These factors include factors such as Gross National Product (GNP), inflation, and interest. These factors significantly affect the growth and size of firms (İskenderoğlu, 2008).

**Anti-Trust Laws:** The laws that prevent the merger of very large companies created by the state to protect consumers are called Anti-Trust laws. These laws were created in order to prevent the structure created by companies with a monopoly in the market. Anti-Trust laws are generally observed in developed countries. The merger of big companies in the market with giant companies is restricted or prohibited (İskenderoğlu, 2008).

**Total Asset:** All the tangible and intangible asset accounts in a firm's balance sheet are called total assets. Reducing the share of equity in total assets and trying to run companies with more debt causes the financial situation of the firm to deteriorate. In this case, the firm may narrow its size (Aşıkoğlu & Ögel, 2006).

**Firm Value:** One of the most preferred factors for firm size is firm value. It is formed by multiplying the number of stocks owned by the company with the market value of that share (Uğurlu & Demir, 2016). The company value is directly

proportional to the stock price and shareholder wealth (Rika & Islahudin, 2008).

**Market Capitalization:** It arises by multiplying the closing price of a firm's stocks by the number of stocks in circulation. The concept of market capitalization can be used to assess the size of markets. The market capitalization of all companies traded in a market is called the market capitalization of the stock market (Sayılgan & Süslü, 2011).

**Equity Market Value:** According to the firm size anomaly, there is an inversely proportional relationship between stocks with equity market value and returns to investors (Horasan, 2008).

**Book Value/Market Value Ratio (BV/MV):** Market value is the price formed by companies' stocks in line with supply and demand in the stock market. Book value is the price per share of the equity value included in the firm's financial statements such as the balance sheet. According to BV/MV anomaly, it is inversely proportional to the return obtained from the portfolio formed by stocks where this ratio is small (Ünal & Akbey, 2016).

**Price/Earnings Ratio (P/E):** The price/earnings ratio is obtained by dividing the price of the stocks owned by the firm by each share's own profit. The yield performance they show with stocks with a price/earnings ratio is inversely related. It is similar to BV/MV with this feature (Civelekoğlu, 1993; Kaldırım, 2017).

**Debt-to-Equity Ratio (D/E):** The liabilities side of a firm's balance sheet creates short and long debts and equity. This ratio shows the ratio of debts and equity to each other. The debt ratio may increase or decrease according to the firm's resources and investment expenditures. If the funds created in the firm are insufficient, the firm will have a higher indebtedness ratio (Ata & Ağ, 2010). Also, this ratio is inversely related to firm size (Gupta, 1969).

## 2.7. Classification of Firms in Terms of Size

Businesses are basically divided into 2 in terms of size. There are 5 different firm sizes in the first option. These are micro firms, small firms, medium-sized firms, large firms, and giant firms. Secondly, known as SMEs (KOBI) are companies in Turkey. SMEs (KOBI) include small, medium, and large enterprises. All the mentioned firm sizes are explained below (Arslan, 2011).

### 2.7.1. Micro Firms

Micro firms do not even have full-time employees. Micro firms are mostly found in small settlements. If micro firms are to be given an example, they are blacksmiths, shoemakers, tailors, and barber owners (Arslan, 2011).

### 2.7.2. Small Firms

In small firms, the number of employees is usually between 1 and 6. Small business owners run their businesses with members of their own family, and family employees may not be paid. Working times can be over 8 hours. Small firms can increase their firm size by increasing their capital. In terms of economy, it is advantageous to have a number of small firms in countries (Arslan, 2011).

### 2.7.3. Medium Firms

Medium-sized companies are mostly established as limited companies. As in small companies, it is managed by family members in medium-sized companies. The number of employees is between 6 and 50. Medium-sized firms mainly produce durable or non-durable consumer goods. In markets where competition prevails, medium-sized companies are more successful in countries such as Switzerland and Japan. These companies succeed in the market because the board of directors makes quick decisions according to the socio-economic conditions (Arslan, 2011).

### 2.7.4. Large Firms

Large firms are usually established as joint-stock companies. Staff numbers are between 50 and 2000. In industrially developed countries, the number of large companies is also high. Hence, there is a direct link between industrialization and building large firms. In order for a company to grow, it must invest in research and development (Arslan, 2011).

### 2.7.5. Giant Firms

There are more than 2000 employees in giant companies. Giant firms must be able to withstand intense competitive power. In addition, giant company owners should be able to control large capital, many shareholders and company owners, and their market share. Giant companies generally operate in areas such as health, oil, weapons, and dams. As can be understood from these fields of activity, giant companies make large investments in R&D in order to follow technology closely (Arslan, 2011).

### 2.7.6. Small and Medium Enterprises (SME) (KOBI)

When looking at developed and developing countries, small and medium-sized companies are very important. SMEs constitute 95% of firms in Turkey. The definition of SME may differ from country to country. In addition, both quantitative and qualitative criteria should be taken into account when making these definitions. The qualitative criteria include the presence or absence of independent management, the size of the capital share, or the number of employees. SMEs are needed to support large companies. Because large companies cannot reduce the supplier prices of intermediate and auxiliary goods without small companies. Therefore, large enterprises and small enterprises need each other (Sabuncuoğlu & Tokol, 2001).

## 2.8. Literature Review on Firm Size Effect

Considering both national and international literature, there are many studies about firm size. In this part of the study, findings of previous studies on firm size and stock returns will be included.

Many researchers, focusing on the size of the firm, obtained different results by using different variables, different methods, and models. There are some variables that are generally used in research. These are market value, equity market value, book value/market value, firm size, beta, price/earnings ratio, financial indebtedness ratio, leverage ratios, sales growth rate (total sales), growth rate, cash flow/price ratio, dividend yields (profitability, profitability anomalies, asset profitability, dividend distribution), momentum, total assets (return on assets), economic news and accrual.

When we look at the literature, Capital Asset Pricing Models, different regression analyzes and Fama French's 3-factor model is mostly used in the studies. In addition to these models, the market model, cumulative abnormal return (CAR), 4-factor model, Gibrat law, and classification approaches were also used.

The researchers obtained different results depending on the variables or models. According to the results of the researchers, it is revealed that there is a firm size effect or there is no firm size effect or the firm size effect is uncertain.

### Market Value

Banz (1981) was the first to notice the financial interaction between stock returns and market value and to investigate firm size anomaly. Banz (1981) used equity market value to represent the firm size in his study. After adding firm size as an explanatory variable to the Capital Assets Pricing Model, which Banz (1981) used in his study, it was found that small firms earned more returns than large firms. According to Banz (1981), this is because the risks taken by small firms are higher. After Banz (1981), discussed this issue in Reinganum (1981) and Roll (1981) in the same year. Reinganum (1981) examined its relationship with stock returns by adding the beta and price/earnings ratio as well as equity market value. Banz (1981) and

Reinganum (1981) reached the same conclusion using the same model. However, according to Reinganum (1981), when the firm size anomaly is examined together with the price/earnings anomaly, it has been revealed that the firm size anomaly is more effective. Reinganim (1981), Roll (1981), and Keim (1983) examined stocks traded in NYSE and AMEX in their studies. The results in the studies of Roll (1981) and Keim (1983) are the same as those of Basu (1983) and Reinganim (1981). In other words, according to the results of the researches of Roll (1981) and Keim (1983), the portfolios of small firms provided more returns. Cheung et al. (2015) used the market index and other variables (book value/market value ratio (BV/MV), firm size, dividend yield, momentum, and volatility) while investigating firm size in their studies. Cheung et al. (2015) used multiple regression in their studies. But the result found by Cheung et al. (2015) is the same as those of Banz (1981), Reinganim (1981), Roll (1981), and Keim (1983). Dang, Li, and Yang (2018) made use of market value and other variables (total assets and total sales) while examining the size effect in their study. Dang, Li, and Yang (2018), in Cheung et al. (2015) used OLS regression, which is a regression model. However, as a result of their studies, Dang, Li, and Yang (2018) reached an ambiguous conclusion by stating that different variables affect firm size in different ways. Hashmi, Gulzar, Ghafoor, and Naz (2020) made regression and correlation analyzes by explaining firm size with market value and other variables (total assets, total sales, number of employees) in their studies. According to the analyzes, firm size is related to the variables (Hashmi, Gulzar, Ghafoor, & Naz, 2020). Cakici, Fabozzi, and Tan (2013) investigated the value and momentum variables in the stock market in their article. The models used by Cakici, Fabozzi, and Tan (2013) in their studies are CAPM, three-factor model, and four-factor model. Local factors added to the models showed that market segmentation increased (Cakici, Fabozzi, and Tan, 2013).

**Book Value/Market Value**

When we look at those who add the Book Value/Market Value ratio to their research, we come across Chan, Hamao, and Lakonishok (1991). Chan, Hamao, and Lakonishok (1991) consider first firm size, book value/market value ratio, then return on earnings, and cash flow return to examine stock returns. According to the results of the research, it has been revealed that BV/MV ratio and cash flow return have an

impressive positive effect on stock returns (Chan, Hamao, & Lakonishok, 1991). Fama and French (1992), one of the leading names in the financial world, added equity book value/market value ratio and other variables (beta, firm size, financial indebtedness ratio, price/earnings ratio) as the explanatory variable to their Capital Asset Pricing Model. As a result of their studies, Fama and French (1992) realized that the explanatory power of firm size and equity book value/market value ratio was more dominant than other variables. If stock returns are realistic, this is best explained by firm size and book value/market value ratio (Fama & French, 1992). The results found by Fama and French (1992) and Chan, Hamao, and Lakonishok (1991) are in agreement. Fama and French conducted another study three years after their study in 1992. Fama and French (1995) used fewer variables in their study compared to their 1992 study. Fama and French (1995) examined average stock returns, firm size, and BV/MV ratio as variables. According to the three-factor model and regression analysis used by Fama and French (1995), small firms have a high BV/MV ratio while large firms have a low BV/MV ratio. Therefore, small firms have provided more returns than large firms. However, large firms are more profitable than small firms in firm size portfolios created according to the gain factor (Fama & French, 1995). Kothari, Shanken, and Sloan (1995) and Banz and Breen (1986) tried to explain the stocks in NYSE and AMEX with beta, firm size, and equity book value/market value ratio. Kothari, Shanken, and Sloan (1995) and Banz and Breen (1986) used regression in their studies, as in Fama and French (1992, 1995). Kothari, Shanken, and Sloan (1995) and Banz and Breen (1986) concluded that the firm size anomaly changes according to the obtained database.

Claessens et al. (1995) analyzed stock returns, mainly firm size, BV/MV ratio together with other variables (transaction volume, P/E ratio, and dividend yields). Claessens et al. (1995), using cross-sectional regression analysis, found that large firms yield more returns than small firms. This result found by Claessens et al. (1995) contradicts the result found by Fama and French (1995). Strong and Xu (1997) examined the stocks traded on the London Stock Exchange between the years 1960-1992. Strong and Xu (1997) added stock returns and firm size, equity book value/market value ratio, the debt amount, price/earnings ratio, and beta as explanatory variables to the Capital Asset Pricing Model they used. In addition, according to the simple regression results used, it was revealed that there is a very

positive relationship between returns and equity book value/market value ratio. However, when the equity book value/market value ratio is added to the model used, the explanatory power of firm size disappears (Strong & Xu, 1997). Knez and Ready (1997) tested the risk premium for firm size and equity book value/market value ratio with Least Trimmed Squares, a different version of the standard least squares regression model. According to the results of Fama and French's 1992 work, they thought that the extraordinary observations led to them. Unusual observations were not included in the sample in this study. As a result, when the unusual observations are excluded in the studies of Fama and French in 1992, the effect of firm size and risk premium disappears (Knez & Ready, 1997).

Chui and Wei (1998) used firm size and equity book value/market value ratio to evaluate the stock returns traded on the stock markets of 5 developing Pacific Countries (Hong Kong, Korea, Malaysia, Taiwan, Thailand). According to the results of the Capital Asset Pricing Model used by Chui and Wei (1998), while the relationship between stocks in Hong Kong, Korea, and Malaysia stock exchanges and equity book value/market value ratio was successful, it was concluded that the firm size anomaly exists in all countries except Taiwan. Allen and Cleary (1998) used the variables of firm size, BV/MV ratio, and market risk in cross-section regression in their study. Allen and Cleary (1998), as a result of parametric and non-parametric tests, proved that there is a firm size effect in Malaysia without including some sub-periods. Kousenidis, Negakis, and Floropoulos (2000) started their research based on the work of Fama and French (1995). In the study, they analyzed the stock returns in the Athens stock exchange with firm size and BV/MV factors. Fama and French (1995) obtained portfolio returns using monthly stocks, but Kousenidis, Negakis and Floropoulos (2000) created a portfolio with annual stock returns. As a result, firms with a high BV/MV ratio are less profitable than firms with a low BV/MV ratio. In addition, the firm size effect was revealed to be suspicious as a result of the study (Kousenidis, Negakis, & Floropoulos, 2000). Connor and Sehgal (2001) used firm size, equity book value/market value, and price/earnings ratio in the Capital Asset Pricing Model as variables in their studies. According to the results of the research, it is seen that both of them are in a directly proportional relationship as the BV/MV ratio increases in small firms and the stock return also increases. While the BV/MV ratio decreases in large firms, the stock return also decreases (Connor &

Sehgal, 2001). Lam (2002), in his research on stocks traded in Hong Kong Stock Exchange, added firstly the firm size and equity book value/market value ratio, secondly leverage and price/earnings ratio to the Capital Asset Model as explanatory factors. According to Lam (2002), firm size, equity book value/market value ratio is successful in explaining stock returns.

Lau, Lee, and Mcinish (2002) examined stock returns and firm size book value/market value ratio, sales growth rate, beta, price/earnings ratio, cash flows/price ratios in Singapore and Malaysia stock markets. The relationship between stock returns and firm size in both countries is negative. In Drew and Veeraraghaven (2002), Lau, Lee, and Mcinish (2002) investigated the relationship between the firm size effect and the BV/MV ratio on returns exceeding the risk-free interest rate for Malaysia, such as stock returns. According to the results of the study, it was revealed that stocks with small size and high BV/MV ratio yield higher returns than stocks with large size and lower BV/MV ratios (Drew & Veeraraghaven, 2002). Charitou and Constantinidis (2004) examined stock returns in the Japanese market by size measure and BV/MV ratio variables with the Fama-French three-factor model. Looking at the results in terms of firm size, the return on stocks of small firms with a low BV/MV ratio was very low, while stocks of large firms yielded very high returns. As a result; the firm size effect and BV/MV effect in Japan are not clear. The explanatory power of the size variable outweighed the explanatory power of the BV/MV ratio, as the portfolios tested consisted of small-sized stocks. If the portfolios tested were large stocks, the results would show the opposite (Charitou & Constantinidis, 2004). In this study, Fama and French (2008) examined the variables of firm size, BV/MV ratio, momentum, growth rate, accrual, net stock issue, and profitability anomaly in the Classification approach and Fama-MacBeth cross-section regression analysis. In the classification approach, firm size and BV/MV ratio were not examined. According to the findings of Fama and French (2008), it has been concluded that firm growth anomaly is not seen in large companies and there is no continuity. In addition, it has been revealed that the reason why the firm size effect is significant in all size firm groups is due to the presence of micro firms (Fama & French, 2008).

Fan (2011) examined the variables of firm size, BV/MV ratio, momentum, growth

rate, net stock issuance, accrual, return on assets, and the ratio of investments to assets using the newly developed Fama-French three-factor model. The results of investment strategies in most of the countries surveyed show that there are firm size, BV/MV ratio, and momentum anomalies. When all countries are brought together, the existence of all anomalies has been revealed. Fan (2011)'s Turkey if we look at the results of firm size, BV/MV ratio and return on assets are explained that the anomaly encountered. The variables used in the studies of Artmann et al. (2012) are firm size, BV/MV ratio, growth rate, market beta, P/E ratio, leverage ratios, return on assets, and momentum. Artmann et al. (2012) analyzed stock returns with these variables using Fama-MacBeth cross-section regression analysis. When all variables are evaluated together, it is determined that the growth rate is insignificant on stock earnings. Hoffman (2012) examined stock earnings together with other variables (momentum, net stock issuance, profitability, accrual, and growth rate), especially firm size, BV/MV ratio. According to the classification and cross-section regression analysis, BV/MV ratio was found to be significant and positive in all firms except the small group. Fama and French (2012) created BV/MV Portfolios and Momentum Portfolios in the subject they examined, and regional average stock returns were found appropriate according to the asset pricing model. Cheung et al. (2015) 's multiple regression model, in addition to having previously examined their studies in the equity market value part, on the BV/MV variable, small firms with a high BV/MV ratio are more likely than large firms with a low BV/MV ratio have earned a return. Cheung et al. (2015)'s result was found to be consistent with the result of Drew and Veeraraghaven (2002).

Akdeniz, Altay, and Aydoğan (2000) used a method similar to that of Fama and French (1992) in their research. The variables considered in his studies are BV/MV ratio, market risk effect, firm size effect, and P/E ratio. According to the results of the research, the more the BV/MV ratio increases/decreases, the more increases/decreases the monthly stock returns. In other words, BV/MV and stock earnings move in the same direction (Akdeniz, Altay, & Aydoğan, 2000). Yıldırım (2005) looked at the effects of firm size and book value/market value (BV/MV) in the IMKB in his research. Yıldırım (2005) was inspired by the Fama and French (1993) method while researching this issue. The classification is based on stocks, company size, and median of BV/MV ratios. Portfolios show that the firm size effect

and BV/MV effect are dominant, especially when IMKB performs well. Güzeldere and Sarıoğlu (2010) investigated the Firm Size and Book Value-Market Value Anomaly that contradicts with the Efficient Market Hypothesis using regression analysis and variance analysis. As the variance analysis, the same variance analysis used by Cook and Rozeff (1984) to test the equality of portfolio earnings was used. Small firms subject to the research made more profit than large firms. The assumption that firms with a high BV/MV ratio will have high returns creates a contradiction with the literature in the world markets. In addition, according to the results of this research conducted in IMKB, the effect of firm size and BV/MV ratio showed its existence in the main periods of 2000-2009, but it did not show any effect in the interim periods. In this case, IMKB is thought to have a weak form of efficiency according to the assumption of Fama's Efficient Market Hypothesis (Güzeldere & Sarıoğlu, 2010). In the articles of Cakici, Fabozzi, and Tan (2013), which were previously examined in the section of market value, it was revealed that regional factors are more dominant in the CAPM model by obtaining portfolios according to size, BV/MV ratio, and momentum. Ünal and Akbey (2016) questioned the existence of firm size anomaly and book value/market value (BV/MV) anomaly in Borsa Istanbul in their article. According to the cumulative abnormal return method of Ünal and Akbey (2016), the results of the trading strategy used when both anomalies are together provided fewer abnormal returns than the anomalies examined separately. Agırman and Yılmaz (2018) used four financial variables including price/book ratio (P/B), price/earnings ratio (P/E), dividend per share (DPS), and firm sizes in their study. According to the regression results, it is understood that firm size is more dominant than earnings per share and BM/MV ratio (Agırman & Yılmaz, 2018).

**Beta**

There are many authors who use beta as an explanatory variable to express firm size. Reinganum (1981), previously mentioned in the market value section, examined the equity market value, especially beta, and the price/earnings ratio in the Capital Assets Pricing Model. According to the research results of Reinganum (1981), when the investigated variables were examined one by one, it was found to be meaningful. Kothari, Handa, and Wasley (1989) investigated the change in the

time interval of returns according to firm size anomaly and beta on stocks traded in NYSE and AMEX. According to the research results of Kothari, Handa, and Wasley (1989), it was determined that betas of more risky firms in the market increased in the long return calculation time interval used. On the other hand, it has been proven that the betas of low-risk businesses in the market decrease as the time interval used for return calculation get longer. This is because stocks are not traded very often in the market. In addition, according to the regression results used, the annual beta value has explanatory power (Kothari, Handa, & Wasley, 1989). Keim, Jaffe, and Westerfield (1989) and Davis (1994), who conducted research on the same markets as Kothari, Handa, and Wasley (1989), used beta while investigating stock returns. In addition, other variables are firm size, stock price, equity book value/market value ratio, price/earnings ratio, sales growth rate, and cash flow/price ratio. It is stated that the growth rate of the firm's sales has a negative relationship with stock returns (beta). However, this relationship was not statistically significant (Davis, 1994). Fama and French (1992), previously examined in the BV/MV section, added beta as a variable to CAPM. The main result is that beta does not have explanatory power. In this case, beta, when both sub-periods and all periods are examined together, there is no beta variability in stock returns (Fama & French, 1992). Jegadeesh (1992), while examining stock returns in his article, portfolios were created for beta estimation methods added to the firm size anomaly. The correlation between beta and firm size in the portfolios created has been reduced. It turns out that not all betas (monthly and annual betas) can explain stock returns (Jegadeesh, 1992), Herrera and Lockwood (1994) analyzed the relationship between stock returns and market beta using CAPM. As a result of their studies, Herrera and Lockwood (1994) stated that there is a positive relationship between market beta and stock.

In the regression models used by Kothari, Shanken, and Sloan (1995) and Banz and Breen (1986), which we previously examined in the BV/MV section, firm size and equity book/market value ratio were added in addition to beta. As a result, the existence of an anomaly varies depending on the database used (Kothari, Shanken, & Sloan, 1995; Banz & Bren, 1986). In Strong and Xu's (1997) research, it was revealed that the beta variable included in the Capital Assets Pricing Model mentioned in the BV/MV section has no explanatory power. According to simple regression results, there is a positive relationship between stock returns and beta

(Strong & Xu, 1997). Chui and Wei (1998) stated that the relationship between stock return and beta is not very dominant according to CAPM in the stock exchanges examined in their studies. According to the cross-section analysis in the article of Allen and Cleary (1998), there is no positive relationship between market risk beta and stock returns. In the studies of Heston, Rouwenhorst, and Wessels (1999), the explanatory nature of stock returns variability on beta and firm size was examined. Contrary to the studies conducted in the USA, this study revealed the explanatory power of beta and firm size on stock earnings. When all the countries subject to the study are evaluated together, there is a firm size risk premium (Heston, Rouwenhorst, & Wessels, 1999). Using cross-sectional regression analysis and the Fama-French three-factor asset pricing method, Wu (2011) revealed that market beta has no explanatory power. In this study performed in China A stock markets, no significant size effect was found. Artmann et al. (2012) also considered beta as a variable in their research. According to the results of Artmann et al. (2012); Given that there is no difference in beta, size, asset growth, and stock returns, it shows that these variables do not have a significant effect on Fama-MacBeth regressions. Gupta (2012) added beta as a risk factor to portfolios in addition to dividend policies in the portfolios he created in his study. Even when standard risk factors are eliminated, firms that make up their profit payments provide a substantially different return compared to firms that do not pay profit (Gupta, 2012). Civelekoğlu (1993) calculated the market risk in stocks by adding the return amounts of 24 months before that year for each year in the portfolios he created while researching the size of the company in Borsa Istanbul. According to the results of Civelekoğlu's (1993) study, when the beta is evaluated with price/earnings ratio and firm size, it has been revealed that it has no effect on stock returns.

**Price / Earnings Ratio**

When the finance literature is examined, some researchers have added the price/earnings ratio as an explanatory variable to the models or methods they use when expressing the firm size anomaly. Reinganum (1981), who conducted a study on this subject, saw in his study that stocks earn different earnings by adding the beta, equity market value, and price/earnings ratio to the Capital Assets Pricing Model to explain the variability in stock returns. When the firm size anomaly and

price/earnings anomaly are examined independently from each other, their existence is mentioned. However, when the two anomalies were examined collectively, it was seen that the price/earnings anomaly remained passive compared to the firm size anomaly (Reinganum, 1981). Basu (1983) created a portfolio like Reinganum (1981) and used firm size and price/earnings ratio as variables in CAPM. Basu (1983) found a link between earnings of stocks in the NYSE and firm size. Stocks with a high P/E ratio bring more risky earnings than stocks of firms with a low P/E ratio. In addition, small companies have made more profit than large companies. In this case, it is concluded that the earning effect of stocks is inversely proportional to the size of the firm (Basu, 1983). Cook and Rozeff (1984) examined the firm size and P/E ratio together in their study. Reinganum (1981) and Basu (1983) reviewed their research. Cook and Rozeff (1984), using the Black-Scholes pricing model, found that stock earnings are related to both firm size and price/earnings ratio. The reason why the low price/earnings coefficients in the current COMPUSTAT file in the study of Banz and Breen (1986) are dominant over the return is the previous adjustments for the size effect. However, a dependent low P/E effect is seen in the COMPUSTAT portfolio, which is collected sequentially. Keim, Jaffe, and Westerfield (1989) deal with the relationship between the returns of stocks traded in NYSE and AMEX and firm size and price/earnings ratio. As a result, it was revealed that there were effects of price/earnings ratio and firm size during the research period (Keim, Jaffe, & Westerfield, 1989). The result obtained by Keim, Jaffe, and Westerfield (1989) and the result of Cook and Rozeff (1984) are in harmony with each other. But it is incompatible with Banz and Breen (1986), Basu (1983) and Reinganum (1981) Keim, Jaffe, and Westerfield (1989). In addition, in January, it was concluded that P/E and firm size are significant (Keim, Jaffe, & Westerfield, 1989).

Chan, Hamao, and Lakonishok (1991) used the return on earnings, firm size, BV/MV ratio, and cash flow return as variables when examining stock returns. While the price/earnings ratio and firm size anomaly are explanatory in some sub-periods, they are not explanatory in some sub-periods. In addition, when the variables are evaluated collectively, it is revealed that the price/earnings ratio and firm size are more dominant than the other variables (Chan, Hamao, & Lakonishok, 1991). One of the variables used by Fama and French (1992) while examining stocks traded on NYSE, AMEX, and NASDAQ is the price/earnings ratio. However, when all

variables (beta, firm size, financial indebtedness ratio, equity book value/market value ratio, and price/earnings ratio) are used together in regression analysis, it has been determined that price/earnings ratio and financial indebtedness ratio are more significant than other variables (Fama and French, 1992). Davis (1994) examined the cross-section of stock returns between 1940-1963 in his article. For this, he used the book-to-market equity, earnings return and cash flow return. It has been found that these variables have significant power in explaining stock returns. According to the results of Davis (1994), it was found that the book-to-market equity, earnings return, and cash flow return were strong in explaining stock earnings in the period before COMPUSTAT. Kothari, Shanken, and Sloan (1995) proved that the firm size anomaly and price/earnings ratio anomaly they used while examining stocks occur depending on the data used. Strong and Xu (1997) analyzed the UK's stock returns with market value, book/market value, leverage value, price/earnings, and beta variables. It turns out that in stock price and market value portfolios, larger market value decimals are lower equity from book to market, lower leverage ratio, and lower P/E ratio. According to the Fama – MacBeth Two-Pass Regressions result, the P/E ratio has become the dummy variable for unprofitable stocks. It has taken its place in the regression model as the real P/E ratio is positive earning stocks. In addition, in regression analyzes involving market value and other accounting variables, both earnings variables lost their importance (Strong & Xu, 1997). Connor and Sehgal (2001) used the Fama-French three-factor model to investigate stock returns in India with the market, size, and book-to-market values. The link between common risk value in earnings and stock earnings is insecure. The third finding in the model used; the same type of market, size, and value factors are quite common in the P/E ratios. This earning value can be associated with the return on equity. However, this article does not find the third finding reliable. As a result, it was found to be generally compatible with the applied Fama-French model (Connor & Sehgal, 2001).

The price/earnings ratio, one of the variables used by Lam (2002), successfully explained the difference in stock earnings according to the result of the Capital Asset Pricing Model. Lau, Lee, and Mcinish (2002) carried out their studies in both Singapore and Malaysia markets. The variables used in their studies together with stock returns are price/earnings ratio, beta, firm size, cash flow/price ratio, BV/MV, and sales growth rate. The result of the research shows that there has been a positive

interaction between stock earnings and price/earnings ratio in the Malaysian stock exchange (Lau, Lee, & Mcinish, 2002). Artmann et al. (2012) used the value characteristics and momentum effect for the German stock market in explaining stock returns. The results of a 4-factor model that includes the price/earnings factor give more clear results than other models. According to the results of the study; Ten popular firms saw an increase in the P/E ratio of stock returns. In Fama and Macbeth's (1973) regression model, it is determined that the power between stock earnings and price/earnings ratio is explanatory. The interesting thing is that the value effect is not only in the BV/MV ratio. The value effect was also seen in the price/earnings ratio (Artmann et al. 2012). Civelekoğlu (1993) has created portfolios of stocks according to the previous year's price/earnings ratio and firm size values every year to investigate the effect of firm size and P/E ratio in Borsa İstanbul. The result of this study shows that the price/earnings ratio anomaly still exists, albeit a little. Akdeniz, Altay, and Aydoğan (2000) examined the effect of market risk measured by â on monthly stock returns, the effect of firm size, and the P/E ratio in their articles. According to the results of the study, while there was an effect of BV/MV ratio and firm size, there was no effect of the P/E ratio (Akdeniz, Altay, & Aydoğan, 2000).

**Financial Debt Ratio**

The researchers included the financial indebtedness ratio as a variable while investigating the firm size. Fama and French (1992) added the financial indebtedness ratio to the CAPM they used in their studies. While a high indebtedness ratio is considered normal for financial enterprises, it is the opposite for non-financial companies. Therefore, financial firms were excluded from the research. When regression analyzes were created with all variables, the explanatory power of the financial indebtedness ratio remained passive compared to other variables (firm size and equity book value/market value ratio) (Fama & French, 1992). One of the variables Strong and Xu (1997) used in their study, where they analyzed stock earnings, is the debt ratio. Regression results reveal that there is a certain positive link between stock returns and market value of debt, BV/MV ratio, and beta. In addition, there is a negative link between average stock earnings and the market value and a book value of debt. When BV/MV ratio and the debt ratio are added to

the model used, firm size becomes meaningless (Strong & Xu, 1997). Sayılgan, et al. (2006), according to the panel data analysis on manufacturing firms, there are non-debt tax shields, firm size, firm's profitability, growth rate, and fixed asset ratio as variables to examine the capital structure. According to the results of the study, there is no positive relationship between profitability and borrowing rate (Sayılgan, et al., 2006).

**Leverage Ratios**

One of the important variables encountered when examining the firm size anomaly is leverage ratios. One of the variables used by Artmann et al. (2012) while examining the German stock market is the leverage ratio. Artmann et al. (2012) listed ten popular firms in one dimension. In this case, average stock returns increased with the market leverage ratio (Artmann et al., 2012). Sayılgan, et al. (2006) analyzed the data of companies registered in IMKB by using panel data analysis. According to the results of the research, it was revealed that there is a positive relationship between firm size and leverage ratio. Leverage ratio was used as a control variable in the study of Samosir (2018). Accordingly, when the relationship between leverage ratio on stock earnings is examined, no effect has been observed.

**Growth of Sales, Total Sales**

The authors took into account the growth rate of the firms' sales and their total sales while doing research on firm size and stock returns. Davis's (1994) study focuses on book-to-market equity, earnings return (price/earnings), cash flow return, (cash flow/price) and past sales growth. According to the regression results of Davis (1994), the effect between sales growth and returns is not strong before 1963. In their article by Lau, Lee, and Mcinish (2002), the sales growth rate is among the variables they use while examining the Singapore and Malaysian stock markets. According to the results of the analysis conducted by Lau, Lee, and Mcinish (2002), it was determined that the relationship between stock earnings and sales growth rate was negative for the Singapore stock market. Dang, Li, and Yang (2018) used total assets, total sales, and stock market value to evaluate the firm size in their study. All firm size values researched are important. When these values are used, total assets and

sales have a positive value. The firm size coefficient assessed only by the sales journal is important for the Pooled OLS regression. In Dang, Li, and Yang (2018), the goodness of fit is not high when the industry uses the sales journal in fixed effect regressions. Hashmi, Gulzar, Ghafoor, and Naz (2020) investigated different dimensions of firm size (total assets, total sales, market value, and the number of employees) with data from BRICS. In theory, as the size of the firm grows, its operations grow at the same rate. Therefore, sales are increased by making more production. It provides more income and profit in the company in increasing sales. According to the correlation results of the study, the size of the firm evaluated with total sales has significant interaction with the financial leverage ratios. According to the pooled OLS regression, there is a dominant relationship between total assets and the debt-capital ratio. In addition, there is a significant relationship between total sales and the number of divisions of labor. In addition, there is a non-significant relationship between total sales and ROA and analyzed firm size (Hashmi, Gulzar, Ghafoor, & Naz, 2020).

**Growth Rate**

Authors contributing to finance literature on firm size frequently included the growth rate in their articles. One of the variables discussed in the BV/MV section to analyze stocks in the article of Fama and French (2008) is the growth rate. The classification approach used by Fama and French (2008) in their study shows that the growth rate anomaly was significant with equal returns in micro and small-scale firms. In large-scale companies, there is no growth rate anomaly and its continuity has not been achieved. The growth rate anomaly remained more passive compared to other anomalies (net stock issue, accrual, and momentum anomalies) subject to research (Fama & French, 2008). Fan (2011) included firm size, BV / MV ratio, momentum, growth rate, net stock issue, accrual, return on assets, and the ratio of investments to assets. Among these variables, growth rate, accrual, and net capital export were not found to be a significant relationship in most of the markets in the research sample. Fan (2011) among the countries where research is located in Turkey. The research results show that Turkey, momentum, growth rate, net stock issuance, are meaningless in connection to the assets ratio of accruals and investment (Fan, 2011). Yao et al. (2011) studied the growth rate in the Asia Pacific region.

They used classification and regression analysis. According to the analysis results, it has been determined that there is no positive relationship between stock earnings and growth rate. In addition, when nine markets are analyzed separately, the growth rate did not survive in all markets. While the growth rate in the Taiwanese market is meaningless, the growth rates in China, Malaysia, and Indonesia have little meaning. Legal regulations created by corporate governance for investors did not affect the growth rate (Yao et al. 2011).

Artmann et al. (2012) created a portfolio with other factors (market beta, firm size, BV/MV ratio, P/E ratio, leverage ratios, return on assets, momentum), especially growth rate. They analyzed these variables using Fama-MacBeth cross-section regression analysis. Artmann et al. (2012) concluded that the growth rate in Germany is meaningless. According to the results of the regression analysis, all variables proved that there is an insignificant relationship between stock earnings and growth rate variables (Artmann et al., 2012). Hoffman (2012) evaluated the growth rate and other variables (firm size, BV/MV ratio, momentum, net stock issuance, profitability, accrual) using cross-section regression analysis and classification techniques to examine stock returns in the Johannesburg Stock Exchange. The growth rate anomaly is positive in small and large companies. However, the growth rate anomaly is in a negative way for micro-sized firms (Hoffman, 2012). Sayılgan, et al. (2006) added the growth rate as a variable to the panel data analysis they used in their research at the IMKB. Sayılgan, et al. (2006)'s research results, there is a positive relationship between firm size and growth rate, and leverage ratio. According to Baştürk and Ödül (2008), they evaluated this process with Gibrat Law and Log-Linear model, as every business's desire is to grow. Gibrat's Law refers to the growth rate of a firm not being dependent on similar firms in the market and market characteristics. According to this law, the "continuation of growth" part has been examined in this study. The sales of the firms examined are taken into account as the firm size. Since the beta coefficients are very close to one, it is concluded that the growth rates of the companies and the size of the company when the company is established are independent. The growth criteria of the firms in the period they are in and the growth criteria in the previous period are not related to each other. Changing variance is not in the growth measure of small and large firms (Baştürk & Ödül, 2008). Aslan (2008) examined firm size and firm growth, the difference of which

should be known in finance. ie Gibrat law "Proportional Impact Act" examined in companies in Turkey. Net assets refer to the size of the firm in the study. The information obtained from the questionnaire was evaluated using the Im-Pesaran-Shin (1997) (IPS) test as a panel unit root test. According to the results of Aslan (2008), firm size and firm growth are interdependent. In this case, Gibrat's law is not accepted (Aslan, 2008).

**Cash Flow / Price Ratio**

When researching the size of a firm, we come across the variable of cash flow/price ratio. One of the variables used by Davis (1994) in his article is the cash flow return. If past sales growth, cash flow return, and book-to-market equity ratios are constant, they have explanatory power. In the two-way ranking in cash flow return and historical sales growth, an average return difference has emerged between extreme portfolios. It has been observed that this difference in return exists in half of the firms in the NYSE (Davis, 1994). Chan, Hamao, and Lakonishok (1991) used the return of earnings, firm size, book value/market value ratio, and cash flow rate of return to examine stock returns from their articles. According to the results of the study, the rates that have the most dominant positive effect in explaining stock returns are BV/MV ratio and cash flow return ratio. Lau, Lee, and Mcinish (2002) investigated the relationship between stock returns and beta, size, price/earnings ratio, cash flow/price ratio, book-market equity according to Singapore and Malaysia data in their article. Basu (1983) accepted the existence of a positive relationship between stock returns with variables such as the P/E ratio, CF/P ratio, and BV/MV ratio. Stock portfolios with a low CF/P ratio performed worse than stock portfolios with a high CF/P ratio. Stock portfolios with negative CF/P ratios brought more earnings. Considering the correlation results, CF/P and P/E ratios are high for both Singapore and Malaysia (Lau, Lee, & Mcinish, 2002).

**Dividend Yields and Profitability**

The profitability rates of the companies are very important when investigating the size of the companies in the financial world. Kousenidis, Negakis, and Floropoulos (2000) examined the relation of firm profitability to firm size and

BV/MV ratio based on the work of Fama and French (1995) in their articles. Return on Investment (ROI) was used to measure the profitability of firms. According to the results of the studies of Kousenidis, Negakis, and Floropoulos (2000), firms with a high BV/MV ratio are less profitable than firms with a low BV/MV ratio. In the articles of Charitou and Constantinidis (2004), the profitability ratio was used to express the size of the firm. According to the results of the study, the net profit of small-scale stocks is less than the net profit of large-scale stocks (Charitou & Constantinidis, 2004). In their studies, Fama and French (2008) examined abnormal returns associated with net stock issues, accruals, and momentum with regression analysis. Profitability anomaly is less powerful than others. According to the analysis, it has been determined that profitability and asset growth tend to continue. According to the regression results, it is observed that small stocks that are profitable exhibit a harmonious and positive relationship between profitability. There is no negative relationship between profitability and average return. Also, when only profitable firms are analyzed, the relationship between profitability and average return is not negative (Fama & French, 2008). Fan (2011) handled firm size, return on assets, BV/MV ratio, momentum, growth rate, net share issuance, accrual, and investment to assets ratio according to market data of 43 countries. Firm size, asset profitability, BV/MV ratio, and momentum were used as global anomalies in Fan (2011)'s study. As a result of the study, return on assets and other global anomalies are positively associated with firm risk. Fan (2011) shows that in Turkey results in the study, only in Turkey firm size, profitability, and asset BV/MV are anomalies. Hoffman (2012) examined the variables of firm size, BV/MV ratio, momentum, net stock issuance, profitability, accrual, and growth rate in order to explain the cross-sectional change in stock returns. The Yield-to-book (Y/B) ratio used in the research for profitability is obtained by dividing the earnings per share by the book value per share. According to the Y/B results, the regression coefficients for small and micro stocks were found to be positive. However, the regression coefficients for large stocks were found to be negative. This shows that the profitability of companies of different sizes is also at different rates. In addition, when the stocks of micro firms are not included, the Y/B ratio gives more clear information (Hoffman, 2012).

The aim of Gupta (2012) in his article is to examine dividend distribution and stock movements. The firms subject to the study are divided into two portfolios: firms that

distribute dividends and those that do not distribute dividends. The portfolios of companies that do not distribute dividends have shown lower performance than the portfolios of companies that distribute dividends at all times. Cheung et al. (2015) one of the variables used to calculate the returns in the Chinese A index is the dividend yield. The results regarding the dividend yield obtained by using multiple regression in the 16 portfolios created show that all portfolios of companies with low dividend yield provided low stock returns. In other words, there is a directly proportional relationship between profit share yield and stock return (Cheung et al.2015). Samosir (2018) investigated the effect of the cash conversion cycle, firm size, and firm age on profitability using panel data. Since large companies can reach the capital markets more easily, it is easier for them to provide additional funds while increasing the profitability of the company. According to Samosir (2018), there is no negative effect on the cash conversion cycle, firm size, firm age, and variable return on assets. Growth performance (internal growth) and profitability (EBIT) are the leading indices used in Nagahisarchoghaei, Nagahi, and Soleimani's (2018) research. Other variables used are firm characteristics (capacity utilization), stock performance, imports, foreign exchange borrowings, and the sum of foreign exchange expenditures. The profitability (EBIT) ratio has a significant relationship in imports, foreign exchange borrowings and total foreign exchange expenditures (Nagahisarchoghaei, Nagahi, & Soleimani, 2018). Sayılgan, et al. (2006), first among the variables used to examine the capital structure of companies with panel data analysis, firm size and profitability come first. Other variables are growth rate, fixed assets ratio, and non-debt tax shield. Sayılgan, et al. (2006), according to the analysis results, there is a negative relationship between profitability and borrowing rate. The variables used by Agırman and Yılmaz (2018) in their study are dividend per share (DPS), BV/MV ratio, P/E ratio, and firm size. According to the results of panel data analysis as a regression tool, firm size is more dominant in dividend per share and P/E ratios, respectively, while the relationship between the P/E ratio and stock returns is insignificant (Agırman & Yılmaz, 2018).

**Momentum**

The momentum factor also has an important influence on research. The variables in the studies of Fama and French (2008) referring to the momentum effect

are firm size, BV/MV ratio, momentum, growth rate, accrual, net stock issue, and profitability anomalies. As a result of the classification approach used, it has been understood that momentum anomaly is significant in stocks of all-size companies. One of the variables in the study of Fan (2011), which we mentioned in previous sections, is momentum. Fan (2011) showed that firm size, BV/MV ratio, and momentum anomalies exist in most of the countries studied. As a result, the link between momentum and firm risk is positive. Fan (2011)'s research is needed to assess the Turkey section in the 1989-2009 period, the momentum appeared to be a meaningless anomaly (Fan, 2011). In their article, Artmann et al. (2012) examined the stock returns in the German stock market between 1963-2006, and also discussed the value characteristics and momentum effect. They found that stock returns in the firms subject to the research increased with the effect of momentum. According to the multivariate Fama and MacBeth regressions, it was concluded that there is a positive and explanatory relationship between stock returns and momentum (Artmann et al., 2012). Hoffman (2012) added firm size, BV / MV ratio, momentum, stock issuance, profitability, accrual, and growth rate variables to the cross-section regression and classification method. The effect of momentum anomaly on stocks is dominant. T statistics revealed the positive momentum anomaly (Hoffman, 2012). In his article, Gupta (2012) divided the variables (firm size, beta coefficient, momentums and growth shares) he used when examining the US stock markets into sub-portfolios. When these portfolios are examined, companies that distribute dividends in portfolios based on momentum, firm size, value shares, and growth shares achieved more profit (Gupta, 2012).

Fama and French (2012) basically divided the data in their studies into 2 portfolios. Among these portfolios are 1) Asset pricing tests based on size - B / M Portfolios 2) Asset pricing tests based on size - Momentum Portfolios. The success rate of the analyzes made on the size and momentum portfolios in the local models used was found to be low (Fama & French, 2012). Israel and Moskowitz (2013) investigated the effects of firm size, time, and momentum strategies on firm profitability in their studies. It has been observed that half of the momentum profit occurred in almost all firm sizes in long periods. Also, if we look at the relationship between momentum profits and size, there is no connection between them. Cheung et al. (2015) used the market index and other variables such as momentum (book value market value ratio

(BV / MV), firm size, dividend yield, and volatility) while investigating the firm size in Chinese A-shares. He used multiple regression in the study. The momentum variable can immediately sense the differences in time. In this study, momentum and size effects are positive. But the significance percentages of momentum and size effects are very low. Therefore, momentum, dividend yield, and volatility have not been successful in expressing the returns of China A stocks (Cheung et al., 2015). In this study, in which Cakici, Fabozzi, and Tan (2013) investigated the value and momentum effects of stocks in the market, they determined that the value and momentum effects were dominant in all regions except Eastern Europe. Based on firm size, BV/MV ratio and lagged momentum data are divided into portfolios. The CAPM, three-factor model, and four-factor models were used to explain these portfolio returns, based on local, US, or total developed stock markets (Cakici, Fabozzi, and Tan, 2013).

**Total Assets, Return on Assets**

An evaluation can be made by adding total assets to the model or methods used in determining the size of a firm. According to Moore (2000), this issue used the total assets of the firm to represent firm size as a difference from previous articles in his study. According to the results of Moore (2000), it was not observed that the method used to determine the size of the firm has any effect on the existence of the size premium. In the studies of Zhang et al. (2009), they considered total assets to assess the size of firms in China. Zhang et al. (2009) used regression to test Gibrat's law. Zhang et al. (2009) examined the link between the growth and size of a country in their article. Quantile regression results show that Chinese firms have a growth trend. Gibrat law was rejected in 4 of the 6 sectors during the period under review. In this case, the size process in China is slow (Zhang et al., 2009). Fotopoulos and Giotopoulos (2010) chose total assets as a firm size variable to test the Gibrat Law on Greece's manufacturing firms. Gibrat law was not adopted in the firms in the sample. The business is divided into two according to their age and size. There is an inverse relationship between firm growth and the establishment size of the firm. Gibrat's law has not been adopted for micro, small, and startup firms. But Gibrat's law exists for medium, large and old firms (Fotopoulos & Giotopoulos, 2010). Dang, Li, and Yang (2018) investigated the total assets, total sales, and market values of companies in

their studies. They used OLS regressions and industry constant effect regressions. The different variables used presented different aspects of firm size. Therefore, different results have been achieved. Total assets in the values used have a positive effect (Dang, Li, & Yang, 2018).

According to the articles of Hashmi, Gulzar, Ghafoor, and Naz (2020), variables used for firm size include total assets, total sales, market value, and the number of personnel. Hashmi, Gulzar, Ghafoor, and Naz (2020) identified these variables to investigate the impact of firms on major corporate finance practices (finance policy, dividend policy, investment policy, diversification, firm performance, compensation, incentives, and board structure (corporate governance)). Correlation and regression analysis show that each variable has a relationship with corporate finance applications in different ways. Except for total assets in fixed effective regression, financial leverage is compatible in all connections. Hashmi, Gulzar, Ghafoor, and Naz (2020), in their articles, conclude that debt/equity and firm size are largely compatible with the pooled OLS regression analysis when measuring firm size by total assets. According to the results of other analyses, it was revealed that the total assets and number of operating segments are not important. The relationship between total assets and ROE is important. There is a direct proportion between firm size and total assets of the firm (Hashmi, Gulzar, Ghafoor, & Naz, 2020). Aslan (2008) investigated Turkish businesses using the panel unit root test for firm size and firm growth in his research. In the study, net assets are used to represent the business size. Gibrat's law has not been adopted in the cement, plastic and pipe, textile, pharmaceutical and chemical, steel iron, automobile, and other industries covered in the research. In addition, firm growth and firm size in these seven sectors are not independent of each other. Firms in the fields of food, electrical machinery, electronics, and transportation have adopted the Gibrat law. However, the relationship between firm size and firm growth among these firms is not dependent (Aslan, 2008).

**Economic News**

Firms in a country are very quickly affected by economic events and news. In this case, firm sizes and stocks may react differently to economic news. Taking this

situation into consideration, Chan and Chen (1991) investigated the stocks traded on NYSE and NASDAQ and the different responses of companies of different sizes to the same economic news. Capital Assets Pricing Model has been used. Firm size is added to this model as an explanatory variable. Small firms are firms with very low rates of efficiency, productivity, and a lot of debt. In addition, according to the regression results, firm size has an important power in explaining the differences in stock earnings (Chan & Chen, 1991). Özcan and Yücel (2003) used CAPM while examining the firm size anomaly for the returns in stocks between 1988-2001 in IMKB. According to the results of Özcan and Yücel (2003), when the whole sample period is examined together, there is a firm size anomaly. However, firm size anomaly in sub-periods is either very weak or absent. It was revealed that the anomaly was dominant between 1993-1994 and 2000-2001. The reason is that there are periods in which political and economic crisis in Turkey (Özcan & Yücel, 2003). Chan, Chen, and Hsieh (1985) investigated how changes in macroeconomics affect stock returns. Chan, Chen, and Hsieh (1985) adjusted their research for risk because of macroeconomic changes. To use regression analysis, portfolios are created based on firm size. According to the results of the research, after the adjustment for the risk in stock returns, the firm size anomaly disappeared (Chan, Chen, & Hsieh, 1985).

**Accrual**

The place of Fama and French among the authors who add the accrual variable to the research is important. Fama and French (2008) analyzed accrual and other variables (firm size, BV / MV ratio, momentum, growth rate, net stock issuance, and profitability anomaly) among variables evaluated according to the classification approach and Fama-MacBeth cross-section regression. Accrual, net issuance, and momentum anomalies exist in all-size firms according to the classification approach. However, the effect of the accrual anomaly is negative. Generally speaking, accrual, net stock issuance and momentum anomalies have shown their presence in all stocks from micro to large firms in terms of firm size (Fama & French, 2008). Fan (2011) investigated the accrual and other variables (firm size, BV/MV ratio, momentum, growth rate, net stock issue, return on assets, and the ratio of investments to assets) in the period 1989-2009 in Fama-French three-factor model. Accrual, growth rate, and net capital issuance all produced insignificant

values in almost all markets in the sample. Fan (2011)'s found that the results for Turkey, are a means of transportation research accruing to Turkey. Hoffman (2012), in his study on the Johannesburg Stock Exchange between 1985-2010, classifies firm size, BV/MV ratio, momentum, net stock issue, profitability, accrual and growth rate variables and cross-section to explain the cross-sectional change in stock returns added to the regression analysis. In this study, accruals are defined as the proportional increase of the assets of a business in the last 12 months. Accrual and asset growth may behave differently in firms of different sizes. Large stocks are rewarded. In addition, small stocks can be penalized (Hoffman, 2012).

# CHAPTER 3
# STOCKS, STOCK RETURN AND RELATED LITERATURE

## 3.1. Definition of the Stock

Before using the stock term in the finance literature in Turkey, which is the Arabic term "Esham" word was used. Currently, the word "Esham" is not used. In the Turkish Commercial Code, stock and "share certificate" or "share" have the same meaning. The notion of stock is also included in the finance literature with the word "action" in French. In addition, the term stock is also called a stock for short. However, the notion of stocks is mostly used in today's finance literature (Tuncer, 1985; Apak, 1995).

The first examples of stocks appeared in the 15$^{th}$ century in Italy, France, Spain, Hanseatic Cities, and Leipzig. In the 17$^{th}$ century, innovations such as volume, fluidity, free float, and speculative freedom were introduced in the Amsterdam market. It is based on the systematic buying and selling of the stocks of industrial companies on the streets, starting in London in 1773 and in New York in 1972 (Rosenberg & Birdzell, 1992). The capital market has developed rapidly after the civil war in the United States of America. Thus, stocks, which are the instrument of the developing capital market, have also developed. During the war, federal bonds were marketed to small investors. This situation proved successful in selling the railway stocks. Thus, investors got acquainted with stocks.

The stock represents that the capital of the main companies is divided into equal shares and a part of these equal shares (Ceylan and Korkmaz, 1998.) In addition, when the stock is arranged in accordance with the laws, it has the feature of negotiable documents (Bodie et al., 2001; Karslı, 1989; Konuralp, 2001). A stock certificate is used as an indicator that a person owns a company (Bodie et al., 2001; Keown et al., 2002; Gallagher and Andrew, 1997; Levy, 2002).

Shares can be issued by incorporated companies and commandite companies the capital of which is divided into shares. Stocks represent a certain part of the capital (Bolak, 2001). They can issue shares in limited companies and cooperatives. But the stocks of these companies are only determinative and evidentiary. Therefore, the shares of limited companies and cooperatives are not considered negotiable documents (Bolak, 2001).

Institutions that can issue stocks;
-Incorporated companies,
-Commandite companies the capital of which is divided into shares (in accordance with Article 4 of the CMB, the stocks of commandite companies whose capital is divided into shares cannot be sold through public offering),
-Companies established by a special law (CBRT, banks, state economic enterprises established as incorporated companies, subsidiaries, insurance companies),
-Mass Housing and Public Partnership Administration.

Since the shares representing the capital shares of the shareholders in the incorporated company can be issued, they are classified as negotiable documents (Okka, 2009). Stocks, which are considered valuable documents, are used by investors as an investment tool in developed capital markets (Ünlü, 2016). In other words, it indicates the ownership right of the person holding the stock or the person whose name is written on the stock over the company equal to the value written in the share certificate in the relevant company's capital. In addition, stocks are a financial instrument that is repaid in the liquidation or bankruptcy of the company (Ataman & Kibar, 1999). Stock is a shareholder certificate that provides a single and indivisible right over the partnership. The sum of the nominal values of all the shares owned by the partnership is equal to the basic capital amount of the company (Okka, 2009).

Stock is one of the most frequently traded securities in capital markets. Return is very important in the stock portfolio created by investors. The return that investors expect to obtain as a result of their stock investments is the sum of the profit and the capital return that will emerge from the positive price changes of the stock (Rodoplu,

2001). Stocks do not provide a guaranteed return to investors (Barak, 2008). Stocks provide higher returns in the long run. Because it can provide a stable and regular return in the long run.

A stock is a company's ownership document. Stock is used to represent a small part of the company. If a company is open to the public, the stocks of that company can be traded on the stock exchange. In other words, the stocks of that firm can be bought and sold on the stock exchange. In order to be a shareholder of a company, it is necessary to own the stocks of that company. Owning the stocks of a company means being a partner of that company. In this case, the shareholders of the company have the right to receive as much share from the profit earned by the company (Başak, 2010). In addition, the stock provides the buyer with the stock the right to get a share from the profit. The stock gives the issuer the right to use the funds until the time of liquidation (Canbaş and Doğukanlı, 1997). A partnership arises as a result of stock trading. Therefore, the parties have rights and obligations. The most effective way to meet the fund needs of companies is the issuance, public offering and trading of stocks. These procedures are determined according to the legal structures of each country (Yasaman, 1992).

The stock allows combining the small savings of the broad masses of folk in large firms. In this case, the capital accumulation required for development is created. More balanced income distribution is created by spreading the capital to the base. Stockholders may have little involvement in the company's economic decisions. Stock investments provide additional income to the savings of the public and protect the investment and income of investors against inflation (Akbulak, 2016).

Since the maturity of the shares is infinite, shareholders can only request the principal of the shares from the company when the company ceases to operate. In this respect, stocks are a risky financial tool for investors. But stocks can also be bought or sold among investors. There are active secondary markets for this trading. The existence of these markets reduces stock risk. Because stocks can easily change hands with the secondary market. Thus, the liquidity of stocks increases. This makes stocks attractive to investors (Dağlı, 2009).

Important economic functions of stocks in society;

1) The purchase and sale of stocks by investors in the secondary market enables the financing of companies and the development of the economy,
2) It provides capital accumulation by collecting the small savings of individuals together,
3) Shares allow the ownership of firms and means of production to reach the public. Thus, it spreads prosperity to the wider public base. A balanced income distribution occurs in the society,
4) Reveals the economic aspect of democracy by making people have a say in economic decisions,
5) Protects the value of citizens' assets against inflation,
6) Stocks are not fixed income. So it ensures lower costs. It also directly finances the firm without the need for additional credit institutions. (Okka. 2009)

In addition, in a competitive environment, small companies have merged and developed growth strategies. In order for a new partnership to be established, it is necessary to trade and sell stocks. Therefore, the importance of stocks has increased.

## 3.2. Rights and Obligations of the Shareholder

The document proving the partnership law is called a stock certificate. The owners of this document hold the partnership right and title in the company. Therefore, partners have some rights and obligations. These rights and obligations are as follows; dividend right, priority right, right to receive shares in liquidation, right to participate in the company management and the right to vote, right to information (Emery et al., 1998; Levy, 2002), confidentiality obligations, capital obligations (Korkmaz and Ceylan, 2007).

### 3.2.1. Dividend Right

One of the most important financial rights of shareholders is dividend rights. The

amount remaining after deducting taxes and other deductions from the profit obtained by the companies is shared among the partners. This is called the partner's dividend. Every firm traded on the stock exchange has not to distribute dividends. But the determined first dividend must be distributed on condition that it is not less than half of the profit (Aytaç, 1988).

### 3.2.2. Priority Right

When a company decides to increase the capital, the right to purchase new shares by giving priority to shareholders, provided that they pay the price of the stock, is called the priority right (Yıldız, 2012; Esme, 2008; Okka, 2009). The pre-emptive right protects the wealth of the existing partners and the share of capital in the partnership (Esme, 2008). The firm is able to sell newly issued stocks at a price lower than market value for former shareholders with pre-emptive rights.

### 3.2.3. Right to Receive Shares in Liquidation

After the liquidation of the company and the payment of its debts, the shareholders are paid as much as their shares. This right is called the right to get a share from the liquidation (Sakınç, 2018). The right to participate in the liquidation balance is valid if a residue remains after liquidation. Shareholders in the firm participate in this surplus as much as their shares (TCC, art. 455).

### 3.2.4. The Right to Participate in the Company Management and the Right to Vote

Businesses elect members to establish a management and supervisory board before starting their activities. The votes of the partners are required to elect these boards (Korkmaz & Pekkaya, 2009). In this case, the right to vote for shareholders arises (Havva, 2007). Each shareholder has at least one voting right. The voting right of the shareholders is determined by the articles of association. The voting rights of shareholders cannot be prevented (Karadeniz, Kaplan & Günay, 2016).

In accordance with articles 341, 348, 349, 366, 367 of the TCC, this right is to

choose and be elected the board of directors of the company. Since the management right is provided by the majority, those who hold or hold more than half of the company's capital (51%) will have the management. In case the capital is spread to a wide base, 10% of the vote may be sufficient to take over the management in some companies.

### 3.2.5. Right to Information

According to articles 362 and 363 of the Turkish Commercial Code, the shareholders' right to obtain information cannot be prevented and limited by the decision of the company's general assembly or board of directors. Shareholders have the right to request necessary explanations on the matters they suspect. In addition, after the general assembly meeting, the shareholders have the right to examine the annual profit and loss account, balance sheet, and annual reports.

### 3.2.6. Confidentiality Obligation

The commercial books of the company may be examined only with the permission of the general assembly. Partners can not learn the business secrets of the company, except the secrets learned during the inspection. Every partner in the company is obliged to keep the business secrets learned in any way when they leave the partnership. Despite this obligation, the partner who shares the company secret is liable to the company for any damages that may occur (TCC, Art.363, 404, 527).

### 3.2.7. Capital Obligation

When establishing a new company or increasing capital in an existing company, shareholders pay the capital they have committed. This is called capital obligation (Korkmaz & Ceylan, 2007). The financial liability of a person who makes a portfolio investment without signing any commitment is limited due to the fully paid shares in her/his possession. This person's risk is that if the business goes bankrupt, the business can use some or all of the money invested by the investor in stocks to pay its debts (Büker ve Bayar, 2001).

## 3.3. Types of Stocks

### 3.3.1. Registered and Bearer Stocks

Stocks are divided into two according to the circulation and transfer method. These are registered (name) shares and bearer shares. These two types of stock are more important in transfer transactions (Bolak, 1994). The amounts and owners of the registered and bearer shares are clearly written in the company's articles of association (Karslı, 1989).

Registered stocks are stocks arranged on behalf of a specific person (Konuralp, 2001). The names, surnames, and addresses of the holders of registered shares are written. In addition, registered shares and their owners are recorded in the company's share register (Ceylan & Korkmaz, 2003; Bolak, 1994; Karan, 2004). The shareholders registered in the company's share register acquire the right of partnership. Unless otherwise is decided in the articles of association of the company, all shares are determined as registered shares (Ceylan & Korkmaz, 2003; Turanboy, 1996).

Bearer stocks show that the stock is bearer (Ceylan & Korkmaz, 2003). In other words, the person holding this stock type is the partner of the company (Karan, 2004). The ownership of bearer shares surrenders to the shareholder. All prices of this type of stock must be paid. Therefore, the transfer of these stock types is easier (Ceylan & Korkmaz, 2003).

### 3.3.2. Common and Preferred Stocks

When stocks are examined in terms of the rights they provide to their owners, they are divided into two as privileged (preferred) and common (ordinary) stocks (Bolak, 1994).

The ownership certificate of the partnership is called the common share certificate. With this deed, all financial responsibilities of the partnership are

determined. The most important feature of these stocks is that they provide the right of their owners to participate in the management of the company (Sarıkamış, 2000). Those with common shares have the right to equal shares in the general assembly (Bolak, 1994; Karan, 2004; İpekten, 2006). In addition, the rights of the shareholder thanks to this stock are; voting rights, dividend right, and the right to get shares from liquidation (Bolak, 1994; Karan, 2004; Gitman, 2003).

Preferred stocks, on the other hand, provide their shareholders with special rights, priorities, and privileges on some issues. These privileges are as follows; provided that it is specified in the articles of association of the company, obtaining dividends, liquidation status, being elected to the board of directors and supervisory board, voting, exercising priority right, receiving preparatory period interest, and benefiting from the facilities (Bolak, 1994; Dağlı, 2009).

### 3.3.3. Paid And Non-Paid Up Stocks

Stocks are divided into paid and non-paid up stocks, depending on whether the capital increase is made by using external or internal resources (Karabıyık, 1997).

Stocks can be issued by the company at the time of establishment or afterward, with regulations such as first, second, and sold at a price higher than their nominal value. In this case, if there is a cash inflow to the company, this stock is called a paid stock. These stocks can be sold to company partners or other investors (Okka, 2009; Seyidoğlu, 2001).

Non-paid up stocks, on the other hand, are the shares that are distributed to the shareholders without receiving any compensation issued in return for the amount transferred to the capital from the internal resources of the company while increasing the capital of the company free of charge (Okka, 2009). Non-paid up stocks do not enter any funds other than increasing the capital of the enterprise (Okka, 2009; Seyidoğlu, 2001; Karan, 2004).

### 3.3.4. Premium and Non-Premium Stocks

Stocks are issued at a certain nominal value. In the Turkish legal system, shares without a nominal value cannot be issued (Karabıyık, 1997). Premium stocks emerge when the shares are issued at a price higher than their nominal value (Karan, 2004; Karabıyık, 1997). With the issuance of a stock with a written value above it, non-premium stocks emerge (Karan, 2004; Karabıyık, 1997).

### 3.3.5. Founder and Usufruct Stocks

Founder stocks are stocks issued in writing in the names of the founders of the company in return for the establishment service of the company. These stocks do not represent a specific capital share. Therefore, holders of this share do not have the right to participate in the management of the company. According to the provisions in the articles of association, a certain share is given from the company's profit (Ergül, 2004; Karan, 2004; Gacar, 2009; Başak, 2010).

Usufruct shares are created by the decision of the general assembly of the company to provide different services to some people. Issued after the establishment of the company. This type of stock does not represent a share of the company's capital (Karan, 2004; Başak, 2010; Ataman & Kibar, 1999). Persons with usufruct shares are not considered as shareholders of the company (Gacar, 2009).

## 3.4. Value Definitions of Stocks

### 3.4.1. Nominal Value

The value written on the stock is called the nominal value. Nominal value is also called registered value, break-even value. It has not economically significant value. It has more legal value. The shares are issued to the primary market to determine the amount of total registered capital. It is the value set by the management for this. According to the Turkish Commercial Code, the lowest value that can be in stocks is the nominal value (Özdemir, 1999, Ercan & Ban 2005, Bakkal, M., Bakkal, S., &

Öztürk, Ş. S., 2012).

### 3.4.2. Issue Value

It is the value offered for sale in the primary market by the issuing institution, that is, the value offered to the market (Özdemir, 1999; Korkmaz & Ceylan, 2007; Bakkal, Bakkal, & Öztürk, 2012; Ataman & Kibar 1999). Issue value is also known as extraction value or emission value (Özdemir, 1999; Ataman & Kibar, 1999). The issue value of the stock is calculated by the expert institutions after the future cash flow of the business is estimated (Bakkal, Bakkal, & Öztürk, 2012).

### 3.4.3. Market Value

The value created by stocks according to supply and demand in the capital market is called market value (Özdemir, 1999; Sağcan, 1987; Bakkal, Bakkal, & Öztürk, 2012). This value may be different from the real value of the stock (Sağcan, 1987). In other words, the market value may be higher or lower than the real value (Bakkal, Bakkal, & Öztürk, 2012). If the market value of the stock is below its real value, it "did not find its value in the market". If the market value of the stock is above its real value, it is “sold for more than its value” (Sağcan, 1987).

### 3.4.4. Liquidation Value

Firms prepare balance sheets at the end of a certain activity period (Özdemir, 1999). In this balance sheet, the value obtained by dividing the amount remaining from net assets after all debts and taxes are paid by the number of shares is called the liquidation value (Özdemir, 1999; Gürel, 2005; Ceylan & Korkmaz, 2008; Bakkal, Bakkal & Öztürk, 2012). In the case of liquidation of the company, the liquidation value is the amount of the assets in the balance sheet by selling and the amount remaining after all liabilities are met (Özdemir, 1999).

### 3.4.5. Book Value

Book value is also called accounting value or equity value (Özdemir, 1999). Book value is found by dividing the total equity in a company's balance sheet by the number of shares (Özdemir, 1999; Ataman & Kibar, 1999; Bakkal, Bakkal & Öztürk, 2012). When the business equity is higher than its paid-in capital, the book value will be higher than the nominal value. For this, book value is also called equity value (Ataman & Kibar, 1999).

### 3.4.6. Alternative Income Value

The amount of income per share is called alternative income value by utilizing the capital formed by the business partners in another investment area such as bank interest, treasury bills, or government bonds rather than using it as company capital (Özdemir, 1999; Bakkal, Bakkal & Öztürk, 2012).

### 3.4.7. Functioning Enterprise Value

First of all, debts are subtracted from the sales income obtained in the event that the working business is sold or transferred. Then the remaining amount is divided by the number of shares. This calculated value is called the processing enterprise value (Çımat, 1998; Bakkal, M., Bakkal, S., & Öztürk, 2012; Özdemir, 1999). Liquidation value constitutes the lower limit for market value (Ercan & Ban, 2005; Parasız, 2000). The value of the operating undertaking constitutes the upper limit for the market value (Ercan & Ban, 2005; Bakkal, M., Bakkal, S., & Öztürk, 2012; Özdemir, 1999; Parasız, 2000).

### 3.4.8. Real Value

The value determined by the assets, earnings, dividends, and capital structure of the business owned by stock is called the real value (Bakkal, M., Bakkal, S., & Öztürk, 2012; Bolak, 1994). According to another definition, the real value is the value investors find for the stock in question according to the conditions they have, taking into account the potential of the business to generate a future income and the rate of

earning they expect from this stock (Bolak, 1994).

### 3.5. Public Offering of the Stocks

The reason companies need more funds is because the company grows and develops itself. A company needs financing to grow. For this, the company uses internal financing resources and external financing resources. But a company can only grow up to a certain point by using its internal financing resources. When internal financing resources are insufficient, external financing resources are used. The use of external financing resources occurs through the borrowing of the company (bank loan or bond issue) or public offering. If the company goes into debt, the company will also have to pay interest. If the company chooses a public offering, it causes new partners to enter the company and thus increase the cash capital inflow (Tuncay, 2019; Pamukçu & Öztürk, 2018).

When businesses choose the public offering path, they both provide resources for company growth and enable more people to participate as stakeholders. Thus, capital and property are spread to the base. When the property is spread to the grassroots, the income is spread evenly in the country's economy. It also helps the company to achieve its growth targets more easily (Sayılgan, 2013).

The advantages of the public offering are easy to access to financial resources, easy access to capital markets, liquidity, increased recognition of domestic and foreign company products, reaching new markets, establishing new partnerships, globalization, institutionalization, gaining commercial reputation, reputation, advertising and credibility, and increasing company value ( Tuncay, 2019; Er, Güneysu & Ergün, 2017; Pamukçu & Öztürk 2018).

The disadvantages of the public offering are the obligation to comply with corporate governance principles, the high and long-term cost of going public, high-performance expectations from the company, fear of loss of prestige (Tuncay, 2019).

Stocks are offered to the public in two ways. The first is to sell some of the stocks

owned by existing partners for public offering. Secondly, when the company goes to the capital increase, the participation of existing partners in the capital increase is restricted and the capital increase is made by public offering (Sırma, 2016).

Capital Markets Board is responsible for the regulation of capital markets in Turkey. Borsa İstanbul is the only stock exchange of shares traded in Turkey. The public offering of the stocks is made according to the legislation of Borsa Istanbul, after the CMB approves it. The sale first takes place in the primary market through brokerage firms. Investors who buy stocks in this market must wait for the same stocks to be traded in the secondary market (Küçükkocaoğlu & Alagöz, 2009).

## 3.6. Factors Affecting Stock Returns

All factors that affect the prices of stocks also affect stock returns. It is divided into two main groups with the factor affecting the stocks of companies. These are macroeconomic factors affecting stock return and microeconomic factors affecting stock return. Stock returns may differ depending on micro and macro variables. Macroeconomic factors are related to the country's economy. Therefore, macroeconomic factors have a direct impact on companies. Microeconomic factors are factors that belong to each company.

### 3.6.1. Macroeconomic factors

#### 3.6.1.1. Interest rate

The return obtained by capital from factors of production is called interest. So the usage price of money is called interest. Also, the money earned from the deposited fund is called interest (Gan, Lee, Yong & Zhang, 2006). Stocks become risky when interest rates rise. There is an inverse relationship between the change in interest rates and stock returns. That is, when interest rates rise, stock price decreases (Hürer, 1995; Gan, Lee, Yong & Zhang, 2006). According to Fama (1975-1976), Fama and Gibbons (1982), Nelson and Schwert (1977), they consider changes in interest rates as a result of changes in inflationary expectations.

#### 3.6.1.2. Inflation rate

The continuous and noticeable significant increase in the general level of prices is called inflation (Kumcu & Eğilmez, 2005). Small increases in prices increase the investment willingness of investors and companies. Thus, the sales of companies increase. This increases the nominal earnings. The number of dividends distributed increases as a result of increased earnings. As a result, companies' stock returns also increase. However, this happens when inflation is in equilibrium or shows small increases. However, there is a negative relationship between high inflation and stock returns (Durukan, 1999).

#### 3.6.1.3. Exchange Rate

The expression of foreign currency in terms of the national currency is called the exchange rate (Koçak, Kar & Altıntaş 2006). The comparison rate between the national currency and the foreign currency is called the exchange rate (Barak, 2006). There is a negative relationship between exchange rate and stock return. Foreign currency and stocks are interchangeable investment instruments. When the exchange rate rises, investors sell stocks and buy foreign currency. An increase in the exchange rate means the depreciation of the local currency. In this case, it affects the financial statements and financial structures of companies negatively. Thus, stock returns decrease (Hürer, 1995).

#### 3.6.1.4. Industrial Production Index

The increase in the industrial production index is an indicator that the production of firms has also increased. As production increases, so do the company's sales and nominal earnings. The amount of dividends distributed by the company increases as the earnings increase. As a result, stock returns increase with the increasing amount of dividends. In other words, there is a positive relationship between stock returns and the industrial production index (Diril, 2000).

#### 3.6.1.5. Money Supply

The total amount of money revolving around an economy is called the money supply. The money supply can be measured in two ways as M1 v M2. The sum of cash, demand deposits, and checks in an economy is measured by M1. M2 includes the sum of savings and short-term deposits in addition to M1. If the money supply increases in an economy, interest rates decrease. In this case, stock returns increase. In other words, there is a positive relationship between money supply and stock returns. The increase in the money supply revitalizes the stock market (Chambers, 2003). In addition, it was first suggested by Cooper (1974) and Rozeff (1974) that stock prices affect the money supply in finance literature.

#### 3.6.1.6. Gold Prices

Another investment tool used as a substitute for stocks is precious metals. When precious metals are mentioned, the first metal that comes to mind is gold. Today, although there are various investment tools, gold is seen as the most reliable investment tool, so it maintains its place in the economy. When the finance literature is examined, it has been observed that there is a negative relationship between gold prices and stock prices (Köroğlu, 2009).

#### 3.6.1.7. Oil Prices

Fluctuations in oil prices have an immediate effect on inflation. Oil prices that cause inflation causes a decrease in production in enterprises. With the decrease in production, the growth rates of the business start to decrease. When growth rates decrease, it causes an increase in the current account deficit (Akgün, 2006). When the price of oil increases, it means that production costs will increase for the enterprise. Increasing cost reduces profit rates. Therefore, stock returns are not positively affected by the increase in oil prices.

#### 3.6.1.8. GDP

GDP, one of the macroeconomic indicators, provides information about a country's economy. The total value of all goods and services produced in a certain period in the economy is called GDP. If there is an increase in GDP, it indicates that the goods and services produced in the country have increased. In this case, profit rates also increase. The stock returns of transactions with increasing profit rates also increase (Kanat, 2011; Durukan, 1999).

#### 3.6.1.9. Current Account Balance

The sum of foreign trade, services, investment income, and current transfers in the balance of payments is called the current account balance (Kanat, 2011). In addition, disclosure of the current account balance provides information about the supply and demand of the local currency and the performance of the national economy (Aggarwal & Schrim, 1992). Therefore, when the current account has a deficit, stock returns are negatively affected by this situation. If the current account gives a surplus, stock returns are positively affected. That is, stocks and current accounts move in the same direction (Kanat, 2011). As the current account deficit goes to close, stock prices also increase (Sadeghi, 1992).

#### 3.6.1.10. Foreign Portfolio Investments

Purchasing government bonds of foreign investors, bills, and bonds of private institutions, and stocks are called foreign portfolio investments (Kanat, 2011). For developing countries, the arrival of foreign capital in stock exchanges creates a positive effect (Çetenak, 2006; Korkmaz, 1999). When investors buy foreign portfolios, they increase stock prices. Stock prices decrease in the sale of stocks of foreign investors. Foreign portfolio investors who buy stocks increase liquidity in the market, and in this case, the cost of capital decreases and stock prices increase (Kanat, 2011).

### 3.6.2. Microeconomic Factors

#### 3.6.2.1. Dividend Distribution Policy

Dividend distribution policies affect the movements of investors in the market. When the dividends are not distributed, the investors put their stocks up for sale, and as a result, the market value of the business decreases (Kanat, 2011). The market price of the stocks of companies that make continuous and high dividend payments among companies is also high. Investors sell the stocks of businesses that pay low dividends (Saban & Köse, 2002).

#### 3.6.2.2. Financial Structure

Stock investors refer to the financial statements of the companies in order to learn the risk and return of their investment. The financial structure of the company to be invested is resolved by calculating the financial ratios from the financial statements. The more liabilities a company has, the higher its financial risk. The company must have more resources to meet its financial liabilities. Increasing liabilities increase interest payments. In order for these payments to be made, the number of dividends that will be given to shareholders decreases, and as a result, the company's stock returns decrease (Kanat, 2011).

#### 3.6.2.3. Firm Size

The increase in the sales of the enterprises or the increase in the current production capacity means that there is growth in the enterprise. The quantitative and qualitative change and development process of all kinds of elements that make up the business structure, starting with a certain scale at a certain time, is called growth (Koçel, 1993). Considering the researches, the existence of a relationship between firm size and stock returns has been determined. Size anomaly was found in some studies. The size anomaly is that the stock returns of small firms provide more returns than large firms.

#### 3.6.2.4. Capital Expenditure

In the face of high inflation, enterprises increase capital for new investments in order to strengthen the decreasing capital of enterprises and to meet the funds provided to grow their companies. The capital increase can be made in two ways, paid and non-paid up. Non-paid up capital increase is made with the internal resources of the companies. In addition, shares are distributed without requesting any resources from the partners. The type of capital increase in which companies distribute stocks from their partners or in return for external resources is called capital increase with paid (Kanat, 2011; Karslı, 1994).

#### 3.6.2.5. Financial Values of Business Stocks

The financial values of the stocks of the enterprises are determined with the price/earnings ratio and BV/MV ratios. Investors measure the earnings they expect from stocks by price/earnings ratio. If the P/E ratio is high, the stock price will also be high. Because there is a correct proportion between them. The stock is expensive if the BV/MV is high. There is a direct proportion between stock and BV/MV. But this ratio is desired to be low. The profits of companies that are very profitable are considered instead of book value (Kanat, 2011).

#### 3.6.2.6. Risk of Business Stocks (Beta Coefficient)

The measure of risk used to evaluate the sensitivity of a firm's stock returns to market index returns is called the beta coefficient. Stocks with high sensitivity to the market index are riskier than other stocks (Kırlı, 2006). If the investor likes risk, he/she can earn more income. But if the investor is risk-averse, he/she may earn less income. In other words, the more risk can be covered, the more income can be obtained. If there is a very high risk, the investor is afraid of this situation and does not invest. In this case, stock prices decrease (Kahyaoğlu, 2010).

## 3.7. Types of Return in Stocks

The rate of gain and loss that an investment will provide to its investor in response to the investment made within a certain period is called the return (Karan, 2004; Hayırsever, 2002). Returns can be calculated annually, monthly, weekly, or daily. The returns calculated for the investment are analyzed in two parts: single-term or multi-period calculations. How much the investor's earnings have increased in a period is found with one-period return calculations (Karan, 2004). If the return of the investor is less than the expected return, the investor will remove that stock from his portfolio. Subsequently, the investor directs his funds to investments where they can earn more (Sarıkamış, 2000).

### 3.7.1. Simple Return

The rate of return is calculated with the following formula by denoting R: (Karan, 2001; Sarıkamış, 2000)

R=(End of Period Wealth-Beginning of Period Wealth) / Beginning of Period Wealth

Or

$R= [P_t-P_{t-1}] / P_{t-1}$

$P_t$ = Stock price at the end of the period

$P_{t-1}$ = Stock price at the beginning of the period

### 3.7.2. Compound Return

The return that shows how much the initial value of stocks sold and bought again at the end of each period increases is called compound return. $CR_n$ indicates the composite return at the end of the "n" month, and n indicates the number of periods. It is calculated by the following formula:

$CR_n = ( 1+ R_1)(1+R_2)…(1+R_n)$

### 3.7.3. Expected Return

Stock returns are related to possible future events (Jones, Tuttle & Heaton, 1977). The probability of realization of the rate of return on stocks is calculated for potential investors. In order to calculate the expected return from the risky stock, the returns for a certain period are multiplied with the probability of the return and then added together (Noah, 2002).

The formula for E ($R_i$) is as follows: (Francis, 1993)

$E(R_i) = P_1 * R_1 + P_2 * R_2 + \ldots.. + P_n * R_n$

or

$$E(R_i) = \sum_{i=1}^{n} P_i * R_i$$

$P_1, P_2 \ldots P_n$ = Probability of occurrence of stock i ($P_i$)

$R_1, R_2 \ldots R_n$ = The rate of return on stock i ($R_i$)

### 3.7.4. Abnormal Return

The difference between a company's return and its expected return is called an abnormal return.

### 3.7.5. Capital Gain

A capital gain occurs when an investor sells the stock he/she buys at a price higher than his purchase price. But when an investor sells his/her stock for a price lower than its purchase price, capital is lost. The capital gain or capital loss can be called an increase or decrease in the selling price of the stock. The capital gain or loss of the stock is calculated as follows: (Levy, 2002)

$$\text{Capital Gain of the stock} = \frac{(\text{End of Period Value-Beginning of Period Value})}{\text{Purchase price}}$$

### 3.7.6. Total Return

Profits of companies that make a profit at the end of the year are distributed to shareholders. The return received by the shareholders as a result of the distributed profit is called the profit share return (Kaya, 2014). Calculation of dividend return is as follows: (Levy, 1984; Özer, 2012)

$R_t = [ D_t + (P_t – P_{t-1})] / P_{t-1}$

$R_t$ = Rate of return in period t

$P_t$ = The market price of the stock at the end of period t

$P_{t-1}$ = The market price of the stock at the beginning of t period

$D_t$ = Cash dividend received in period t

## 3.8. Risk Types in Stocks

The probability of undesirable outcomes is called risk (Fabozzi & Drake, 2009; Brigham & Houston, 2001; Hiriyappa, 2008). Uncertainty in the expected return level of financial assets is called risk (Yörük, 2000). Stocks are the riskiest among financial assets. Because it is the type in which the risk varies the most in financial management. There is a possibility of a decrease between the actual yield of the stock owned by the investor and the expected yield. This possibility is called investment risk in terms of investors (Akgüç, 1998; Gitman, 2003; Okka, 2009). Risk is divided into systematic risk and non-systematic risk depending on whether the investor can control the risk (Bodie, Kane & Marcus, 2001; Corrado & Jordon, 2002). In systematic risk, stock investors cannot interfere with the risk. Systematic risk sources are interest rate risk, inflation (purchasing power) risk, market risk, exchange rate risk, political risk, and country risk. Unsystematic risk, on the other hand, is a risk that the investor can control and does not restrict their activities. Non-systematic risk sources are financial risk, management risk, operational risk, sector risk.

### 3.8.1. Systematic Sources of Risk

#### 3.8.1.1. Interest Rate Risk

If changes in interest rates negatively affect the market value of investment instruments, this is called interest rate risk (Fischer & Jordan, 1995). If the market interest rate is the highest, the interest rate risk will be more moderate. But if the interest rate is low, if it is expected to rise, this risk increases (Bekçioğlu, 1983). When interest rates rise, investors prefer bonds and bills. In this case, the demand for stocks falls. The prices of stocks in low demand decline. In other words, there is an opposite relationship between interest rate and stock prices. Academic studies in this direction are Lynge & Zumwalt 1980; Flannery & James 1984; Cook & Hahn 1988; Gjerde & Sættem 1999; Bae 1990; Prasad & Rajan 1995; Dinenis & Staikouras 1998; Achasani & Strohe 2002; Reilly et al. 2007; Hahm 2004 and Czaja et al. 2009 and 2010 studies.

#### 3.8.1.2. Purchasing Power (Inflation) Risk

The loss of purchasing power with inflation of the money reserved for investment is called purchasing power risk. (Sarıkamış, 2000; Frisch, 1983; Fabozzi, 1999) If the purchasing power decreases, the yield of the fixed currency and the stock also decrease. If the maturity of the investments to be made increases, the inflation risk rate also increases (Sarıkamış, 2000). Inflation risk arises due to the loss of return of securities against inflation (Aşıkoğlu, 1983).

#### 3.8.1.3. Market Risk

The decreases in the market prices of financial assets in the capital market cause investors to encounter negative yields. This is called market risk (Üstünel, 2000; Garp, 2009). The market risk of securities such as stocks caused by changes in prices (Cuthbertson & Nitzsche, 2001) is difficult to predict and makes all securities equally risky (Maheu & McCurdy, 2007). Price movements in the market may be due to economic stagnation, wars, political uncertainties, changes in the economic structure,

and differences in consumer choice (Dağlı, 2009). The negative price fluctuations experienced are more important for risk. For example, with the news of President Kennedy's death on November 22, 1963, stock prices started to decline.

#### 3.8.1.4. Exchange Rate Risk

The probability of loss that may arise as a result of the depreciation of the value of the country's currency against other foreign currencies or the changes in the values of foreign currencies in the foreign currency reserves of banks is called exchange rate risk (Atan, 2002; Fabozzi & Drake, 2009; Türko, 2002; Babuşcu 2005). Investment risk rises in fluctuating exchange rates (Fabozzi & Drake, 2009; Türko, 2002). In order to avoid currency risk, investors should divide their portfolios into securities of different countries (Korkmaz & Ceylan, 2007; Tapiero, 2004).

#### 3.8.1.5. Political Risk

Extraordinary measures are taken by the state in the country where the stock is traded, political and economic crises, protection attempts, quotas, exchange rate fluctuations, war, revolution, civil war, or uprising create political risk. If the investor encounters such situations, the return and value of the investment will be negatively affected (Clark & Tunaru, 2001). According to the studies of Perotti & Oijen (2001), it was concluded that changes in political risk in emerging markets have a strong effect on stock returns.

#### 3.8.1.6. Country Risk

The risk that occurs when a country cannot or does not want to pay its foreign debts is called country risk. From a financial point of view, the country's risk is related to the foreign currency holding status necessary for the country to meet its current and future debts (Kosmidou & Zopounidis, 2004). According to some researchers, low country risk means that the country's economy is good. According to some researchers, high country risk is accepted as an indicator of the financial crisis in the country (Andrade & Teles, 2006).

### 3.8.2. Unsystematic Sources of Risk

#### 3.8.2.1. Financial Risk

Financial risk arises with the decrease in the company's ability to pay the debt. This risk occurs when the liquidity level of the borrowed companies and the company earnings, interest, and dividend payments remain below the income level with a special or general economic change (Sarıkamış, 2000). It is a risk that the stock investor may face due to the company's activities (Brigham & Houston, 2009). Firms with a high debt-equity ratio carry higher financial risk, and even firms may go bankrupt in this case. This risk can be eliminated with the diversification method.
Factors affecting financial risk; increase in operating debt, fluctuations in sales, the possibility of an increase in raw material prices, the possibility of discontinuing production, increasing competition, lack of working capital, management errors, strikes, the emergence of new technologies, low firm performance, changes in government policies (Hiriyappa, 2008).

#### 3.8.2.2. Management Risk

The risk that occurs due to the management mistakes and inadequacy of the company selected for investment, as well as the lack of knowledge and experience of the managers is called the management risk (Kuğu, 2004; Hiriyappa, 2008; Akgüç, 1998). For stock investors, the managers of the firm they will invest in must be of high quality. Management risk can be eliminated with a diversified portfolio (Ceylan & Korkmaz, 1993; Kepekçi, 1983). Due to management mistakes, the sales and profits of businesses decrease. In this case, the demand for the stock decreases (Ceylan & Korkmaz, 2000).

#### 3.8.2.3. Operational Risk

The risk associated with the formation of companies' assets is called operational risk. If the share of fixed assets in total assets is large, fixed expenses will be high. As a result, operating expenses also increase (Sarıkamış, 1998; Sarıkamış, 2000). When

production decreases, sales decrease. Sales fluctuate as fixed expenses must always be covered. As a result, net profit fluctuates. Operational risk, which is not positively affected by sales, also reduces the return of the financial asset. As a result, there is a risk on stock returns (Yörük, 2000; Sarıkamış, 2000).

#### 3.8.2.4. Sector (Business and Industry) Risk

Changes in the profits of businesses operating in one or more business lines cause fluctuations in the stock prices of that firm. An investor who invests in such a company also experiences a loss of income (Pike & Neale, 2006). In order to minimize the losses that may arise due to business risk, the investor should first investigate the competitiveness of the company he invested in and analyze the future income expectations of the company (Konuralp, 2001). The investor tries to protect himself from business risk by deciding to buy or sell stocks according to risk and return rates.

## 3.9. Stock Valuation Methods

Valuation methods are used to determine the real value of stocks. Investors buy stocks if the present value of the stock is less than their real value. If the present value of the stock is higher than its real value, the investor sells the stock. Stock valuation methods are; Discount Model, Price/Earnings Ratio Model, Book Value/Market Value Model, Valuation Through Profit Capitalization (Dividend Model).

### 3.9.1. Discount Model

This model was developed by Gordon. For the stock investor, the real value of the stock, the amount of cash that will be received each year, that is, the current value of the dividend earnings, is the basis of the discount model (Samuels, Wilkes & Brayshaw, 1999; Zhang, 2014). According to the discount model, the stock value is calculated with the following formula:

$$P_t = \frac{D_{t+1}}{(1+k)^{t+1}} + \frac{D_{t+2}}{(1+k)^{t+2}} + \ldots + \frac{D_n}{(1+k)^n} = \sum_{t=1}^{n} D_t / (1+k)^t$$

The variables used in this formula;

$D_t$ = dividend distributed at time t,

k = discount rate for stock investments

Since the dividend distribution policy of each company is different, three different assumptions have emerged in evaluating the stocks. These assumptions; no-growth model, constant growth model, and multi-stage model (Damodaran, 1994).

#### 3.9.1.1. Non-Growth Model

If the profit distributed by the companies does not grow over the years, that is, if it remained in a fixed amount, the stocks of those companies are evaluated with the non-growth model. Stable companies in their maturity period prefer to use this model more (Karan, 2004; Okka, 2009). The formula for the non-growth model;

Stock value = $P_o = D / k$

#### 3.9.1.2. Constant Growth Model

The fixed growth model is used in the stock evaluation of firms in countries exposed to high inflation. The formula for this model is: (Okka, 2009)

$$P_0 = \frac{\sum_{t=1}^{\infty} D_0 (1+g)^t}{(1+k)^t}$$

The variables of the formula are;

$P_o$= Stock value,

$D_o$= Dividend amount,

g= Constant growth coefficient,

k= Discount rate.

If we consider that growth will continue indefinitely, it is concluded that the discount rate k will always be greater than the dividend growth rate g. According to this situation, the formula becomes simpler: (Okka, 2009)

$$P_0=\frac{D_1}{k-g}$$

#### 3.9.1.3. The Multi-Stage Growth Model

As companies buy new technologies and enter new markets, their sales, profits, and dividends may rise suddenly. This situation becomes normal after a while. If a business grows in two stages, it is evaluated with the following formula in stocks.

$$P_0=\sum_{t=1}^{m} D_0 \frac{(1+g)^t}{(1+k)^{n-1}}+\frac{1}{(1+k)^n} * \frac{D_{n+1}}{(k-g_2)}$$

The variables of the formula are;

$g_1$= Dividend growth rate in the first period,

$g_2$= Dividend growth rate in the second period,

k= The rate of return the investor expects,

m= Beginning of the second term

### 3.9.2. The Price/Earnings Ratio Approach

The simplest model to use, the most used model is the price/earnings ratio approach. It is easier because there is no future prediction in the price/earnings ratio (Jones, 1998). The P/E ratio indicates how much TL the investor is willing to pay in return for the firm's net profit per 1 TL of stock (Ceylan & Korkmaz, 2000; Horasan, 2009). The basis for calculating this ratio is the ready-to-distribute profits (Haugen, 2001). The formula is as follows: (Ceylan & Korkmaz, 2000; Horasan, 2009)

P/E = Stock Market Price / Net Profit Per Share

### 3.9.3. Book Value/Market Value Ratio Approach

This ratio is frequently used among financial companies for company evaluation, mergers, and acquisitions (Jones, 1998). The formula for this approach is as follows:
BV/MV ratio = Stock Book Value/Stock Market Value
This ratio is very important in explaining stock returns. For this reason, the relationship between the two variables Rosenberg et al. 1981; Fama & French 1992 and 1993; Ajili 2002; Gaunt 2004; Gupta & Kumar 2009; Gökgöz 2008 and Coşkun & Çınar 2014 have examined them.

### 3.9.4. Valuation Through Profit Capitalization (Dividend Model)

Firms may not distribute all of their earned profits as dividends. The equity of the company is increased by keeping the undistributed profits within the company. If a valuation is made with profit per share, the result will be more realistic. According to this information, the formula is;

$$PV= \sum \frac{d\ (1+b)^n k_0}{r}$$

The variables of the formula are as follows;
PV= present value,
n= time,
$k_o$= company net profit at the beginning of the period,
b=expected increase in firm net profit,
d= dividend payout rate,
r= market discount interest rate.

## 3.10. Methods Used to Estimate Stocks Returns

Over the years, many methods have been developed for investors to create an appropriate position between risk and return. In this section, methods commonly used in financial literature to estimate stock returns will be explained. The most used of these methods are Markowitz Portfolio Theory, CAPM, Arbitrage Pricing Theory,

Fama-French 3-Factor Model, Fama-French 4-Factor Model, and Fama-French 5-Factor Model.

### 3.10.1. Markowitz (Modern) Portfolio Theory

The traditional portfolio theory, created by researchers like Williams (1938), is a theory that tries to maximize expected returns. Williams (1938) argued in his research that all risk would be eliminated through diversification, and therefore he did not include risk much in his work. Markowitz (1952) argued that risk should be measured in his study. According to Markowitz (1952), another deficiency in Williams (1938)'s traditional portfolio theory is that the securities are evaluated together with other securities in the portfolio (Rubinstein, 2002). Harry Markowitz (1952) created the work 'Portfolio Selection' in order to eliminate the shortcomings of traditional portfolio theory and to lay the foundations of modern portfolio theory.

In modern portfolio theory, attention is drawn to the link between the risk and return of a portfolio containing a large number of securities. The two principles of this theory are minimizing the risk at a given expected return or maximizing the expected return on a particular risk (Elton & Gruber, 1997).

The assumptions of the Markowitz theory (Hiriyappa, 2008);

• At no cost, investors have complete and available knowledge between risk and return.

• Capital markets are efficient. They report information promptly and completely.

• Every investor wants to avoid risk. Investors try to increase returns while reducing their risk. In addition, if investors are torn between two different investment options with the same risk level, they choose the one with the higher expected return or choose the one with the lowest risk among two different investment options with the same expected return.

• Investors make investment decisions based on expected return and risk criteria.

• According to a certain level of risk, investors do not prefer low returns. Rather, they choose high returns.

Diversification forms the basis of the Markowitz theory (Seyidoğlu, 2003).

In order to solve the selection problem in efficient portfolios, Markowitz considered expected returns as a random variable. He defined this variable as mean and variance. The expected return of the portfolio and the expected variance of the portfolio return were calculated by Markowitz as follows (Markowitz, 1952; Bailey, 2005). Accordingly, investors can maximize the benefit according to two factors, "mean and variance".

1. To calculate the expected return of the portfolio

$$\mu_p = \sum_{i=1}^{n} x_i \mu_i$$

$\mu_p$ = expected return of the portfolio,

$x_i$= Percentage of funds to be invested in security i,

$\mu_i$ = the expected rate of return on security i,

n= the number of securities in the portfolio.

2. The expected variance of portfolio return

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} \sigma_{ij} x_i x_j$$

$\sigma_p^2$ = variance of portfolio,

$x_i$= Percentage of funds to be invested in security i,

$x_j$ = Percentage of funds to be invested in securities j

$\sigma_{ij}$ = Covariance between returns on security i and returns on security j

n= the number of securities in the portfolio

### 3.10.2. Capital Asset Pricing Model (CAPM)

CAPM is aimed at pricing all risky assets as a result of the development of Markowitz's modern portfolio theory. CAPM was first discovered by William Sharpe (1964). It was later expanded in different directions by Lintner (1965) and Mossin (1966) (Zaretzky, 2004, p. 18).

CAPM examines the relationship between systematic risk (beta) and expected return in the capital market. According to CAPM, the return of a security depends on the

sum of systematic and unsystematic risks. Unsystematic risk is eliminated. Systematic risk maintains its place in the diversified portfolio (Sharpe, Alexander & Bailey, 1999).

Sharpe (1964), the pioneer of the CAPM, expanded the Markowitz model in two dimensions. First, Sharpe (1964) included risk-free investment instruments and the possibility of borrowing at the risk-free interest rate. The second is to reduce Markowitz's tedious data collection process and convert it to an easier model (Harrington, 1987).

The assumptions of the CAPM model are as follows: (Merton, 1973; Fabozzi & Markowitz, 2002; Gürbüz & Ergincan, 2004; Dağlı, 2004; Karan, 2004; Ünvan, 1989; Yörük, 2000).

• While making investment decisions, investors are taken as the basis of expected returns and variance of returns.
• Investors are rational. Also, investors avoid risk.
• The financial asset purchased or sold has no transaction costs.
• Investors alone cannot affect the price. Because the securities market is big.
• The relationship between risk and expected return is systematic.
• Unlimited borrowing and lending can be done at risk-free rates. Investors can borrow or lend any amount that is equivalent to the interest rate of risk-free securities.
• Investors try to adapt to Markowitz's portfolio diversification.
• The same risk-free interest rate applies to all investors.
• Access to information is free and information is instantly available to all investors.

- **Beta**

It is an important point that investors who want to invest using this model want to know how much risk they will face. An investor who knows the risk he may face reduces his mistakes at that rate while creating a portfolio. This is where the importance of beta has emerged. Beta coefficient is used to show the relationship between the changes in the rate of return of the market portfolio in capital markets and the changes in stock returns due to these changes alone (Ceylan and Korkmaz,

1998).

$$\beta_a = [\ Cov\ (r_a\ ,\ r_m\ ) / \sigma^2\ m]$$

$r_a$= a the return on financial assets,

$r_m$= return on market portfolio,

$\sigma^2_m$ = market portfolio variance,

Cov ($r_a$, $r_m$) = covariance between the return on the market portfolio and the return on financial asset a

If the beta coefficient is equal to 1, it indicates that security or portfolio moves in parallel with the market portfolio. If the beta coefficient is greater than 1, it is understood that the risk of a security or portfolio is higher than the risk of the market portfolio. If the beta coefficient is less than 1, it should be understood that the risk of a security or portfolio is less than the risk of the market portfolio (Fabozzi & Markowitz, 2002; Chambers & Lacey, 1994; Canbaş & Doğukanlı, 2001).

After the beta formula, the formula of CAPM is now as follows: (Konuralp, 2005; Fabozzi & Markowitz, 2002)

$$E(r_a) = r_f + \beta_a\ [\ E(r_m) - r_f]$$

E( $r_a$ )= expected return on financial asset a,

$r_f$ = risk-free interest rate,

$\beta_a$ = beta of a financial asset,

E($r_m$) = the expected return of the market portfolio

### 3.10.3. Arbitrage Pricing Theory (APT)

In the studies examining the CAPM, it has been revealed that it cannot explain all of the earnings differences between securities. In this case, it has been determined that there is a need for a multi-factor asset pricing model by adding one or more factors to the model. For this purpose, Stephen A. Ross (1976) developed "The Arbitrage Pricing Theory" for the first time. This model, argues that more than one risk is effective on the rate of return of a particular security (Campbell et al., 1997; Ross, 1976; Nededog, 1999).

When the arbitrage opportunity arises, those who will arbitrage will act quickly to take advantage of this situation. As a result, the prices of money and risk in the market will occur as one price. That is, with the "Law of One Price ", the same goods cannot be sold at two different prices. Also, according to APT, market balance is easily established. Because; when the arbitrage opportunity arises, the volume of transactions that arbitrage players will make becomes large. Therefore, the market stabilizes again in a short time (Cihangir & Kandemir, 2010).

The two main differences that distinguish Arbitrage Pricing Theory from CAPM are:

• APT is based on a single price law,

• Shows the effect of multiple factors on the return on assets.

APT consists of three basic assumptions. These assumptions (Ross, 1976; Altay, 2001);

• There is perfect competition in the Capital Markets.

• Investors always choose more returns for fewer returns.

• The stochastic process that reveals how the expected returns of financial assets are produced can be demonstrated with a factor model.

APT has a beta series consisting of every factor (Kavurmacı, 2009). Based on the above assumptions, the APT model is as follows:

$$R_i=E(R_i)+\beta_{i1}\delta_1+\beta_{i2}\delta_2+\ldots+\beta_{ik}\delta_k+e_i$$

$R_i$ =The rate of return on financial asset i for a given period,

$E(R_i)$ = expected return on asset i

$\beta_{ik}$ = the sensitivity of returns on asset i to changes in factor j,

$\delta_k$ = common factor affecting the returns of all financial assets,

$e_i$ = error term

### 3.10.4. Fama-French 3-Factor Model (FF3F)

Eugene Fama and Kenneth French developed the 3-Factor Model in 1993 because the CAPM was insufficient to explain the expected returns (Gökgöz, 2008). Fama and French (1993) created five risk factors for stock and bond returns in their study. Three of these risk factors belong to stock markets and the other two to bond

markets. The 3 risk factors used for stock markets are; market factor, firm size, and BV/MV ratio. They created maturity and non-repayment risks for the bond markets.

In order to understand the 3-Factor Model of Fama and French (1993), it is necessary to examine the portfolio formation in the stock market. First, all stocks to be included in the sample are sorted by firm size in June of each year in the sample. It is then divided into two groups, small and large. Later, stocks in the same sample are ranked ascending according to BV/MV ratio. Then the low group of 30% is placed at the bottom. 30% of the piece is in the top group by including the high group. The 40% piece is the middle group and takes place in the middle group.

The intersections of portfolios created according to firm size and BV/MV ratio are taken. Six portfolios occur from these intersections. Among these intersecting groups, Fama and French (1993) expressed the difference between portfolio returns of small stocks and portfolio returns of large stocks with 'SMB'. On the other hand, they defined the difference between the portfolio return of stocks with high BV/MV ratios and the portfolio return of stocks with low BV/MV ratios as 'HML'. Thus, basically, two portfolios were created.

Fama and French showed in their study in 1993 that the change in average stock returns can be explained by BV/MV ratio and firm size. As a result of the study, a value effect has been observed since stocks with a high BV/MV ratio yield higher returns than stocks with a lower BV/MV ratio. In addition, the firm size effect was observed as small stocks created according to firm size earn more income than large stocks.

Stock Expected Returns in 3-Factor Model; (Gökgöz, 2008)

- The market's excess return on the risk-free interest rate,
- The difference (SMB) between the return of the portfolio of small stocks and the portfolio of big stocks according to the size of the firm,
- The difference (HML) between the return on a portfolio of stocks with a high BV/MV ratio and a portfolio of stocks with a low BV/MV ratio.

According to the 3-Factor Model, the expected return of an asset is calculated as

follows;

$$E(R_i) - R_f = \beta_{im} [E(R_m) R_f] + \beta_{is} E(SMB) + \beta_{ih} E(HML)$$

$E(R_i) – Rf$ = the expected return on the risk-free interest rate of the portfolio under review,

$E(R_m) - Rf$ = the expected return of the market portfolio on the risk-free interest rate,

SMB = The difference between the returns of small and large stocks (firm size factor)

HML= The difference between the returns of stocks with high and low BV/MV ratio, (BV/MV ratio factor)

$\beta_{im}$ = Sensitivity of portfolio excess returns to excess market returns (factor coefficient)

$\beta_{is}$ = Sensitivity of portfolio excess returns to SMB returns, (factor coefficient)

$\beta_{ih}$ = Sensitivity of portfolio excess returns to HML returns (factor coefficient)

### 3.10.5. Fama-French 4-Factor Model (FF4F)

Carhart (1997), based on the assumptions of Jegadeesh and Titman (1993), analyzed the permanence of mutual fund performance between 1962 and 1993. Carhart (1997) added a one-year momentum factor to the 3-factor model of Fama and French. Thus, he developed the 4-factor momentum model to analyze mutual fund returns. With this model, Carhart (1997) analyzed the difference between portfolio returns for the highest 30% and the lowest 30% momentum stocks. By comparing the model he found with the CAPM and Fama-French 3-models, Carhart proved that the momentum 4-factor model provides additional explanatory power for up to one year after portfolio creation.

Carhart (1997) developed this 4-factor model to see the momentum returns (Fama & French, 2012):

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p}(R_{mt} - R_{ft}) + \beta_{2p} SMB_t + \beta_{3p} HML_t + \beta_{4p} WML_t + \varepsilon_{pt}$$

The variables of the formula are:

$R_{pt}$ = the return of portfolio p in month t,

$R_{ft}$ = Risk-free interest rate in month t,

$R_{mt}$ = Return of market portfolio m in month t,

$SMB_t$ = the difference between the return in t month of portfolios created by firms

with small market value and the return in t month of portfolios created by firms with large market value,

$HML_t$ = The difference between the returns of the portfolios formed by firms with a high BV/MV ratio and those formed by firms with a low BV/MV ratio,

$WML_t$ = the momentum factor at month t,

$\varepsilon_{pt}$ = random error term,

$\beta_{1p}$, $\beta_{2p}$, $\beta_{3p}$, $\beta_{4p}$ = regression coefficients of risk factors,

$\alpha_p$ = constant value of regression.

### 3.10.6. Fama-French 5-Factor Model (FF5F)

Fama & French (2015) created the Fama-French 5-Factor Model by adding profitability and investment factors to their previous 3-factor model. The formula of this model is as follows (Fama & French, 2015; Acaravcı & Karaömer, 2017; Fama & French, 2017; Zeren, Yılmaz, Belke, 2018 Fama & French, 2016; Güler, İlhan, Zavalsız & Keskin, 2018):

$$R_{it}-R_{ft}= a_i+ b_i(R_{mt}- R_{ft})+ s_iSMB_t+ h_iHML_t+ r_iRMW_t+ c_iCMA_t+ e_{it}$$

The variables of the formula (Fama & French, 2015; Acaravcı & Karaömer, 2017; Fama & French, 2017; Fama & French, 2016; Güler, İlhan, Zavalsız & Keskin, 2018);

$R_{it}$= is the return on security or portfolio i for period t,

$R_{mt}$ = is the return on the value-weight (VW) market portfolio for period t,

$R_{ft}$ = is the risk-free return for period t,

$SMB_t$ = is the return on diversified portfolios of small stocks minus the return on a diversified portfolios of big stocks for period t,

$HML_t$ = is the difference between the returns on diversified portfolios of high and low B/M stocks for period t,

$RMW_t$ = is the difference between the returns on diversified portfolios of stocks with robust and weak profitability for period t,

$CMA_t$ = is the difference between the returns on diversified portfolios of stocks low and high investment firms, which we call conservative and aggressive for period t,

$e_{it}$ = is a zero-mean residual for period t.

The " $\beta_i$, $s_i$, $h_i$, $r_i$, $c_i$ " (beta coefficients) mentioned in the equation represent sensitivity coefficients that Express the slope of the multiple regressions that are

made between $R_i - R_f$, $R_m - R_f$,, SMB, HML, RMW, and CMA.

The profitability factor that Fama-French (2015) added to their studies was expected to be positive with the return of the company. On the other hand, the new investment factor added to the model is expected to have a negative relationship with the company's return. Companies with high profitability are expected to have high firm returns. It can be thought that companies with high investment levels have lower returns (Zeren, Yılmaz, Belke, 2018).

## 3.11. Literature Review on Factor Affecting Stock Returns

### Macroeconomic Factors

There are foreign researchers studying macroeconomic factors and stock returns. The work of these researchers is as follows.

Apergis and Eleftheriou (2002) researched the Greek stock markets in their article. They investigated the connection between stock prices in these exchanges with interest rates and inflation. According to the results of the research, it was found that there is a negative relationship between two variables and stock prices. In other words, if there is a decrease in inflation and interest rates, there is an increase in stock prices. Diacogniannis et al. (2001) conducted a study of the Athens stock market. The subject of his studies is to examine the relationship between stock returns in Athens and macroeconomic factors. Diacogniannis et al. (2001) have proved that there is an interaction between the variables such as inflation, production cost, foreign trade balance, and unemployment, which are used as macroeconomic factors, and stock returns. Patra and Poshakwale (2006), like Diacogniannis et al. (2001), studied the Athens stock markets. As a result, a balance relationship between stock prices and inflation, money supply, and trade volume variables in Athens in both the short and long term has been found. However, Patra and Poshakwale (2006) could not find any relationship between exchange rate and stock returns as a result of their research. Due to the policies implemented by the Greek government to join the European Monetary Union, there is no relationship between exchange rates and stock returns.

Maysami and Koh (2000) conducted their studies in the Singapore stock market. In the research, the cointegration relationship between the stock market and industrial production was examined. According to the results of the research, a cointegration relationship with industrial production was not found. However, an integration relationship between the interest rate and the exchange rate has been found in both the short and long term. They carried out their work in Chiang and Kee (2009) in Singapore. But the work was carried out in the hospitality industry. Stock returns and macroeconomic factors were examined in detail in the research. The results show that the relationship between stock return, industrial production, and money supply is positive. On the other hand, the relationship between stock returns and exchange rate, interest rate, and inflation was found to be negative.

When we look at the researches about the stock market, the USA is one of the leading developed countries. Fama (1981) examined stock prices and macroeconomic variables in the US market. Fama (1981) used regression and correlation analysis for this topic in his research. As a result, macroeconomic factors positively associated with stock prices are interest rate, industrial production, and money supply. The macroeconomic factor negatively associated with stock prices is inflation. After Fama (1981), he researched the same issue in Geske and Roll (1983). The results of Geske and Roll (1983) are; macroeconomic factors negatively associated with stock prices are inflation and interest rate. Inflation is thought to indicate a greater rate of currency expansion. Huang and Kracaw (1984) examined in their article the relationship between stock returns and real GNP, employment, and the Standard and Poors 500 index in the USA. According to the results of Huang and Kracaw (1984), changes in GNP and employment in the USA are the Granger reasons for stock returns. Pearce and Roley (1985) investigated the relationship between stock returns and macroeconomic variables in the USA in their studies. Consequently, the macroeconomic factor negatively associated with stock prices is monetary policy. In addition, they could not find a relationship between inflation, and CPI, unemployment rate, industrial production and interest rate, which are other macroeconomic factors. Chen et al. (1986) conducted research on the same subject in the USA. The results of the research show that the macroeconomic factors that strongly explain the stock return in the USA are industrial production and interest

rates. The macroeconomic factor that weakly explains stock returns in the USA is inflation. In addition, macroeconomic factors that are insignificant in explaining stock return in this study are real production per capita and oil price.

Mukherjee and Naka (1995) investigated stock returns and macroeconomic factors in Japan. Mukherjee and Naka (1995) found exchange rate, money supply, government bond interest rate, and industrial production as macroeconomic factors positively associated with stock returns. On the other hand, macroeconomic factors negatively associated with stock returns are loan interest rate and inflation. Najand and Noronha (1998) also carried out their work on the same subject in Japan. The results show that inflation negatively affects stock returns. They found that inflation can be used to estimate the interest rate and industrial production.

The periods that Pesaran and Timmerman (1995) deal with in their studies are between January 1954 and December 1992. Monthly closing prices of the S&P 500 index were used as stock returns. The macroeconomic factor used is the dividend ratio, P/E, short-term and long-term interest rates (1 and 12-month government bonds), industrial production index and monetary expansion rates. According to the analysis results of Pesaran and Timmerman (1995), with macroeconomic data, an above-average return was obtained in the US stock markets. The money supply and industrial production index emerged meaningfully after the mid-1960s. In the models used in the early 1970s, the profit share efficiency ratio was also included as a regressor. After the economic shocks, inflation and long-term government bonds showed themselves. Especially after the oil crisis in 1974, inflation started to take place in models. With the FED's 1979 and 1982 target interest rate policies, long-term interest rates have been used in models. According to the analysis, with the economic shocks experienced, more factors began to be needed to evaluate stock returns. When the models used in the 1960s, when the economy was stagnant, were changed, an above-average return could not be created. However, the model change strategy applied again in the 1970s and 1980s did the job and yielded above-average returns.

Al-Shubiri (2010) examined the variables included in the study together with the stocks of 14 commercial banks in the Amman stock exchange between 2005-2008.

Stock prices are considered dependent variables in the study. Net asset values per share, percentage of dividends, earnings per share, GDP are also used as independent variables. Al-Shubiri (2010) used simple and multiple regression analyzes in his article. According to the findings of the study, those in a positive and significant relationship with stocks are the variables of net asset value per share, percentage of dividends, earnings per share, and gross domestic product. But there is a negative and significant relationship between interest and inflation and stocks.

Singh et al. (2011) investigated the relationship between stock returns and macroeconomic factors using a linear regression model. As macroeconomic variables, GDP, employment rate, exchange rate, inflation, money supply, and the returns of companies in the Taiwan 50 Index are used. Stocks are evaluated as a portfolio. Macroeconomic factors are considered independent variables. Portfolio returns are included in the study as a dependent variable. According to the study findings, the factors that are negatively associated with stock returns are inflation and money supply. Factors that are positively associated with stock returns are GDP and exchange rate.

Forson and Janrattanagul (2014) examined stocks in the Thai stock exchange (SETI) between January 1990 and December 2009 in their research. The subject of the research is to measure the explanatory power of macroeconomic factors on the monthly returns of stocks. Money supply (M1), interest rate, consumer price index, and industrial production index are macroeconomic factors considered as independent variables. According to the tests, macroeconomic variables were significant on the stock market index in the long run. As a result of other tests (unit root tests, vector error correction models, and Granger causality tests), the factor that positively affects stock returns in the long run is money supply (M1). The factors that negatively affect stock returns are the industrial production index and the consumer price index.

There are also domestic researchers who examine macroeconomic factors and stock returns. The work of these researchers is as follows.

Açıkalın et al. (2008) examined the returns of the IMKB100 Index as dependent

variables and gross domestic product (GDP), nominal interest rates, USD/TL parity and current account balance factors as independent variables between 1991-2006. In order to prove the explanatory power of these variables, cointegration tests, vector error corrections model, and causality tests were used. The results of the study show that the factors that have a significantly negative relationship with the past returns of the IMKB100 Index are GDP, USD/TL parity, and current account balance. In addition, the effect of the nominal interest rate on IMKB100 Index returns was not found. In Dizdarlar and Derindere's (2008) research, different models were obtained by comparing the data of the IMKB100 index for the years 2002-2007 with 14 macroeconomic variables. In addition, the periods are divided into 4 sub-periods. According to the results of different periods and models tried in the study, only the yields of the exchange rate and IMKB100 index among the factors were found to be significant. Looking at the 2005-2007 sub-period, it was found that the exchange rate could explain 55% of the changes in the IMKB100 index according to the results of the regression analysis. Özer et al. (2011) investigated the interaction between the IMKB100 Index as the dependent variable and the macroeconomic variables (interest rate, money supply, foreign trade balance, industrial production index, gold prices, exchange rate, and consumer price index) as independent variables. The data used in the study are monthly data for the period January 1996 - December 2009. The methods used in the study are the least-squares estimation method, Johansen-Juselius cointegration test, Granger causality test, and VEC models. According to the results, a relationship has been determined between different degrees of stock returns and price index, interest rate, money supply, foreign trade balance, and industrial production index variables. Büyükşalvarcı and Abdioğlu (2010) examined the link between the monthly data of the IMKB100 Index between March 2001 and June 2010 and macroeconomic factors (gold prices, industrial production index, exchange rate, inflation, and money supply). First, they did the stationary test, namely ADF (Augmented Dickey and Fuller) test. According to this test, after the first step, all factors were found to be related to each other. According to the causality test, the significance rate of stock returns and industrial production index is 5%. The meaningful ratio of stock returns and gold prices, money supply, and the inflation rate was 10%. According to the results of the study, estimates of past stock returns and current gold prices, inflation rate, money supply, industrial production index, and exchange rate can be made.

Durukan (1999) used inflation, economic activity, exchange rate, interest rate, and money supply as macroeconomic variables in his research. Durukan (1999) compared these macroeconomic variables with stock prices. The research results show that the relationship between the interest rate and stock prices is negative. No relationship has been found between money supply and inflation rate and stock prices. The exchange rate does not have a meaningful explanation.

Atan et al. (2005) investigated the relationships between the stocks traded on the IMKB and macroeconomic variables. Arbitrage Pricing Model was used for the data used in the study. The sensitivity of stock returns to the money supply is shown with β coefficients. In addition, these coefficients have significance levels. According to the analysis, the β coefficient was found to be significant in 11 out of 29 stocks. Stock returns are directly proportional to the money supply.

Kalmanbetov (2010) using monthly data were examined macroeconomic variables and stock prices in Turkey. She used the Least-Squares method in her work. According to the results of Kalmanbetova (2010), the significance level between stock prices and exchange rate, consumer price index, interest rate variables is 1%. A meaningful relationship could not be found between money supply and stock in analyzes. The relationship between stock prices in Turkey with the exchange rate and interest rates was negative. But the relationship between stock and inflation is positive.

In his research, Kanat (2011) examined the percentage of return on a stock and foreign exchange price, inflation rate, foreign portfolio investment, treasury domestic borrowing interest rate, liquidity ratio, capacity ratio, asset size value, the beta value of the stock and P/E ratios. A significant relationship has been obtained between these variables. The variables that are positively associated with stock returns are liquidity ratio, foreign currency price, foreign portfolio investment, asset size value, capacity utilization ratio, and P/E ratio. The variables that have a negative relationship with the stock are the inflation rate, the treasury domestic borrowing interest rate, and the beta value of the stock.

**Microeconomic Factors**

There are foreign researchers studying microeconomic factors and stock returns. The work of these researchers is as follows.

Basu (1977) investigated the effect of price/earnings ratio on stock return in his study. In the research, stock returns and price/earnings ratio information of 753 firms between September 1956 and August 1971 in NYSE was used. Companies are divided into 5 portfolios according to their P/E ratio. The P/E ratio of companies in the first portfolio is the lowest. The fifth portfolio includes companies with the highest P/E ratio. Basu (1977) used beta coefficients, Treynor Ratios, Sharpe Ratios, Jensen alpha, and explanatory statistics in its calculations. According to the conclusion after these statistics, portfolios with low P/E ratios have yielded more returns than portfolios with high P/E ratios. In addition, the beta coefficients of these portfolios were also investigated. According to the results of the research for beta, it is understood that portfolios with low P/E ratios generate more returns than portfolios with high P/E ratios even when systematic risks are constant.

Fama and French (1992) examined the returns of stocks traded in NYSE, NASDAQ, and AMEX exchanges between 1963-1990 in CAPM. They added firm size, beta coefficient, P/E, ratio and BV/MV ratio as explanatory variables to CAPM. Firstly, the study was divided into 10 portfolios according to company size. Then, 10 more portfolios were made for each portfolio of the companies ranked according to the beta coefficient, that is, 100 portfolios in total. They showed that in 10 portfolios of firm size, beta and firm size can explain the stock returns. In addition, the portfolios of small firms in the same portfolio earned more than the portfolios of large firms. When 100 portfolios were analyzed, beta coefficients could not explain stock returns. A regression is established with all explanatory variables together. According to the results of the research, it was revealed that the explanatory power of firm size and BV/MV ratio is stronger than the explanatory power of financial indebtedness ratio and price/earnings ratio.

Mukherji et al. (1997) investigated the monthly stock returns and microeconomic factors of the South Korean stock market between 1982-1993. These microeconomic

factors are book value/market value ratio (B/M), sales per share (S/P), debt/equity ratio (D/E), stock market the value (MVE), earnings per share (E/P) and beta factors. In the first part of the research, they formed small, medium, and large portfolios by first ordering these factors from small to large. According to the portfolio returns analyzed, the relationship between B/M, S/P, and D/E portfolios with stock returns is positive. However, the return of beta and E/P portfolios have not been found to be a linear relationship with stock return. The result is that value shares (stocks with high S/P and B/M ratios) brought more returns than growth stocks (stocks with low S/P and B/M ratios). In the second part of the research, small, medium, and large portfolios were created by considering the B/M, S/P, and E/P ratios one by one. In addition, it is divided into sub-portfolios according to MVE, BETA, and D/E ratios as a small, medium, and large. According to the result obtained in the department, the lowest stock return was in the portfolio with low B/M and low D/E ratios.

Downs and Ingram (2000) evaluated stock returns with beta coefficient, firm size, and total risk in their article. Fama and French's (1992) model and Fama Macbeth's (1973) model are used in this article. First, 10 portfolios were made according to company size. Then, by creating 10 portfolios according to beta coefficients for each of these portfolios, a total of 100 portfolios were obtained. In cross-section analysis, firm size was deemed insufficient to explain stock returns. For this, it has been seen that it is more meaningful in explaining the CAPM beta coefficients and the returns of the total risk. As a result, the relationship between the beta coefficient and stock returns is positive. But the relationship between total risk and stock returns is negative. Also, there is no relationship between stock returns and firm size.

The factors used by Dehuan and Jin (2008) to analyze the returns of the Shanghai stock exchange's top-performing stocks are as follows; total asset turnover rate (sales/total assets), changes in earnings per share, profit margin ratio (net profit/sales), return on equity ratio (net profit/equity) ratio of return on assets (net profit/total assets) and changes in sales. They analyzed these variables using the simple and multiple regression method. According to the results of the study, company performance factors and stock returns in 1996-1998 are explained at a certain level. These factors are not sufficient to explain stock returns between 1998-2000.

Alexakis et al. (2010) investigated the stock returns of 47 companies in the Athena stock exchange using accounting data. Some of the accounting data used are as follows; profitability ratios, asset utilization ratios (asset turnover rate), indebtedness ratios, investment ratios (price earning ratio and book value/market value ratios), liquidity ratios. According to panel data analysis, stock returns and accounting data that are meaningless are the ratios of NPM (Net Profit/Total Sales), ROA (Net Profit/Total Asset), and DA (Total Debt/Total Asset). In the second part of the study, company returns for the years 2004, 2005 and 2006 are listed. Thus, 5 portfolios were created. The portfolios of the companies that earned the most and those of the companies that earned the least were compared. In this analysis, accounting data could not fully explain stock returns.

Banz (1981) has investigated the link between total market value and stock returns. Using CAPM, Banz (1981), examining the total market value and stock returns, found that stocks with small market value earn higher returns than stocks with higher market value.

Bhandari (1988) investigated stock returns and leverage ratio in his research. The leverage ratio in the study is defined as the ratio of the difference between the book value of total assets and the book value of equity to the market value of the firm. Regression analysis was used in the study. According to the analysis results, the relationship between leverage ratio and stock return was found to be positive.

Wong (1989) examined stock returns and firm size in the Singapore stock market. Research results show that there is a negative relationship between stock returns and firm size. As it can be understood from here, the stock returns of small firms are higher than the stock returns of large firms.

There are also domestic researchers who examine microeconomic factors and stock returns. The work of these researchers is as follows.

Demir (2001) conducted his research between 1991-2000 with 16 companies from the financial sector organizations in the IMKB. Monthly returns of stocks in the

financial sector are considered dependent variables. As independent variables, leverage ratio, return on equity ratio, return on assets ratio, price/earnings (P/E) ratio, market value book value ratio (BV/MV), trading ratio, profit per share ratio, net profit growth rate, and equity increase rate has been used. According to the multiple regression results, the accounting data required to explain the stock earnings of the companies subject to the study are book value/market value ratio, net profit growth rate, transaction rate, and dividend ratio. Among these factors, the strongest explanation for stock earnings is book value/market value (BV/MV). The next factors are earnings per share, price/earnings ratio, and return on equity. In addition, dividend distribution has a positive effect on stock returns.

Horasan (2008) researched the company size and stock returns of 118 companies in the IMKB. Firms are divided into small, medium, and large according to company size. In the first part of the study, Horasan (2008) used the Dickey and Fuller test to measure the stationarity of the company series. In addition, these series are stationary since the significance level is 1%. According to the result of the estimation analysis made in the second part of the research, a significant effect was found between small, medium, and large companies and the return on firm size. In large firms, the return on firm size was found to be meaningless.

Korkmaz and Karaca (2013) discussed the closing prices of stocks as a performance criterion for companies in their article and this study was conducted to determine the factors affecting stock returns. The 1998-2010 data of 16 companies in the IMKB30 index were used in two models. In the first model, year-end closing prices of stocks are taken as the dependent variable. Dividend payment rate, profit per share ratio, asset profitability ratio, net profit growth rate, book value/market value ratio (BV/MV), and market value increase rate are considered as independent variables. In the second model, the dependent variable is a stock return. Independent variables are the rate of profit per share, the rate of increase in market value, and the rate of return on assets. These models were examined by the regression method. According to the results of the first model, the rate of change in the closing price of the stock, the dividend payment ratio and the rate of profit per share has increased. But it reduced the change in return on assets. The increase in BV/MV ratio and market value did not affect the closing price of the stock. In the Second Model, the rate of return on share

has increased the market value and profit per share factors. However, there was no effect on return on assets.

Karan (1996) examined the price/earnings ratio and stock investments in his research. As a result of the research, the price/earnings ratio was found to be statistically significant.

Canbaş, Düzakın, and Kılıç (1997) investigated the relationship between financial ratios and stock returns in their research. As a result of the research, financial ratios and stock returns were found to be meaningful. Those who will invest should examine the liquidity ratio, financial structure, and profitability ratios while making an investment decision.

Çıtak (2004) investigated the relationship between price/earnings ratio, one of the stock market performance ratios, and stock return. He examined the relationships between the P/E ratios at the beginning of the period and the returns for 3 months, 6 months, 1 year, 2 years, 3 years, 4 years, and 5 years of holding period. He used regression analysis for this. Significant relationships have occurred for the holding periods other than the 3-month holding period of the P/E ratio.

Erişmiş (2007) researched by comparing firm size and BV/MV ratio with the return portfolios of stocks. For this, 4 models were used in the research. The first model is CAPM, which is a single factor model. The second model is the two-factor model that includes the market factor and the firm size factor. The third model is also a two-factor model, but its variables are the market factor and the BV/MV ratio. The fourth model is the 3 factor model of Fama and French (1993), which includes all three factors. When the size of the firm is investigated as a basis, the portfolios of small-sized firms yielded more returns than the portfolios of large-sized firms. Results according to the BV/MV ratio, on the other hand, as the BV/MV ratio increases, the portfolio return increases. So there is a correct proportion between them. According to all results, portfolios with high BV/MV ratios yielded high returns in all portfolios.

**Beta**

There are foreign researchers studying beta and stock returns. The work of these researchers is as follows.

Lintner (1965) and Black (1972) found a positive relationship between beta coefficient and stock return in their studies. This kind of work has also formed the basis of CAPM. Fama and French (1992) found that betas are not sufficient in explaining stock returns. Fama and French (1992) argued that firm size and BV/MV ratio better explain stock returns. Fama and French put forward these claims in a meaningful way with their study in 1996. Pettengill et al. (1995) found the methodology used by Fama and French (1992) incorrect in their research. Because in their research, they found the effect of betas on stock returns.

Blume (1971) and Levy (1971) examined single-entity and single-period beta coefficients in their research. The betas in the next period could not be predicted over a single asset and with the predictions of single period beta coefficients. Additionally, the estimates made more reasonable if the number of assets included in the portfolio is increased.

Black et al. (1972), Miller, Scholes (1972) conducted their studies in America in 1931-1965. The subject of his studies is to investigate the predictive power of stocks with high and low beta coefficients. The model used for this is CAPM. CAPM has been the most important predictor for low beta stocks. The predictive power of high beta stocks was found to be weak. Black et al. (1972), Miller, Scholes (1972) made research in Sharpe & Cooper (1972), who examined this issue with CAPM. Sharpe, Cooper (1972) evaluated all companies in the New York Stock Exchange between 1931-1967 in terms of stock returns and beta. In the CAPM model used, data were taken monthly. According to the results of the research, more than 95% of the returns can be explained with betas. They found a similar result of this study in Fama and Macbeth (1973).

Sheu et al. (1998) made their research in the Taiwan market. In their research, they examined the relationship between returns with the beta, sales/price ratio, and

transaction volume variables. According to the results of the study, the relationship between beta and return is positive in rising market periods. But the relationship between beta and return is negative in times of the falling market. Lam (2001) examined the relationship between stock returns and beta coefficient in the Hong Kong stock market. According to the research results, stock returns and beta coefficients were found to be positive in rising market periods. There is a negative relationship between stock returns and beta coefficients in periods of decline.

Heston, Rouwenhorst, and Wessels (1999) examined beta and firm size in the stock markets of 12 European countries (Germany, Austria, Belgium, United Kingdom, Denmark, France, Netherlands, Spain, Sweden, Switzerland, Italy, and Norway). In the study, the explanatory power of the changes in the average returns of stocks between 1978-1995 was tested. Company size has been added to the CAPM used in the study. This result is contrary to the studies conducted in the USA. Heston, Rouwenhorst, and Wessels (1999) concluded that firm size and beta have significant explanatory power on average stock returns. When all countries are evaluated, the firm size risk premium turned out to be clearly negative.

Pettengill et al. (1995) conducted their research between January 1926 and December 1990. Their research topics are to see if the relationship between stock returns and beta value is conditional. Additionally, they wanted to see if the relationship between beta values and stock returns in the long run was negative or positive. Research periods are divided into portfolios and regression analysis has been performed on these portfolios. As a result, a systematic relationship was found between beta values and actual returns, according to all analyses. A positive relationship was found between beta coefficients and returns.

There are also domestic researchers who examine beta and stock returns. The work of these researchers is as follows.

Ünvan (1989) investigated the relationship between the average returns of stocks in IMKB and systematic risk. According to the results of the research, it was found that the relationship between returns and systematic risk is positive. Stocks with systematic risks greater than 1 have higher risk premiums than other stocks.

Akdeniz et al. (2000) examined the relationship between the stocks traded on the IMKB and their returns. For this, it used CAPM as a model. They took the data from January 1992 to December 1998 on a monthly basis. The results of the research show that the factor in a positive relationship with stock returns is BV/MV. However, a relationship has not been found between stock returns and beta.

Yalçıner (2006) used weekly data of all stocks in the IMKB in his research. The research years are between 2000-2004. The aim of the research is to learn the relationship between the returns of stocks and their beta values. According to the results of the study, Yalçıner (2006) found a positive relationship between stock return and beta coefficient.

Gürsoy and Rejepova (2007), Pettengill et al. (1995) used the method included in their article. Turkey has also been analyzed in terms of the CAPM. According to the results of the study, they found that portfolios that include companies with high beta coefficients achieve higher returns in bull markets. They found that portfolios containing companies with low beta coefficients earn higher returns in bear markets.

İskenderoğlu (2012) investigated the relationship of the beta coefficient between stock return and market return in his study. He found the beta coefficient to analyze the systematic risks of stocks. He made a forecast for future value. The data of 73 companies traded on the IMKB were included in the research. The date range of the data in the study is 2003-2011. Panel data analysis was used in the research. As a result, the beta coefficient is not random.

Dalgıç (2011) used daily data of 14 firms in the IMKB30 index between 2006-2011. The model used in Dalgıç's (2011) study is CAPM. The data are divided into systematic and unsystematic risks. Thus, the risk distribution of companies has been investigated. According to the analysis results, the beta coefficients of the companies were found to be positive. In addition, the sector with the highest systematic risk is banking.

In Usta and Demirel's (2010) research, a portfolio was created with companies in the IMKB. In the research, the relationship between stock returns and risk is examined. The model used is CAPM. First, the market risk was removed from stock risks. Thus, stocks have reached a systematic risk level. The systematic risks of companies in the same sector are also the same. However, unsystematic risks were different.

Derindere and Dizdarlar (2008) investigated the link between beta coefficient and stock return in their article. In their studies, the data of 64 companies in the IMKB100 were used for the period of 2002-2006. The models and tests used in the research are as follows; Capital Asset Pricing Model, T-Test, and ANOVA. When the return range is short, the calculated betas show a decrease.

**Fama-French 3-Factor Model (FF3F)**

There are foreign researchers studying Fama-French 3-Factor Model and stock returns. The work of these researchers is as follows.

Fama and French (1993) analyzed five common risk factors in stock and bond returns in their research. The three factors in the stock market are factors associated with the overall market factor, firm size and BV/MV ratio. Two factors in the bond market are maturity and default risks. Stock market factors affect stock returns and bond returns jointly. Five factors discussed according to the results of the analysis explained average stock returns and bond average returns (Fama and French, 1993).

In the studies of Brennan and Subrahmanyam in 1996, a study was conducted to measure illiquidity with monthly stock returns and intraday data. Several techniques have been used for the fixed and variable components of the average adjusted expected rates of return and transaction cost. In order to obtain these techniques, Fama and French 3-factor asset pricing models are used as a model with the synthesis of the latest pricing techniques and new techniques of market microstructure. According to the Fama and French 3-factor model results, the relationship between expected return rates and illiquidity was found to be significant (Brennan & Subrahmanyam, 1996). In another study investigating the liquidity in the FF3F model, it came from Chan and Faff (2005). Chan and Faff (2005) used the

three-factor model of Fama and French (1993) to test the asset-pricing aspect of liquidity in their research. The analysis covers the monthly data of Australia. The research period is between 1990-1998. The aim of the study is to test whether liquidity provides a return effect in the stock market. According to the results, the Fama-French model adjusted for liquidity relationship was found suitable. The liquidity factor has been found to be successful in this model (Chan & Faff, 2005). In addition to these researches, Chen and Sherif (2016) conducted research. Chen and Sherif (2016) investigated the liquidity risk in the UK's stock returns. According to the analysis results in the study, the asset in the study should have special components in order to prevent illiquidity. In addition, in order to investigate whether the liquidity risk can be priced in the UK, the application has been made with parametric and non-parametric methods. The addition of illiquidity to the model and its cross-sectional change in stock returns are explained more easily with the Fama-French 3-factor model. According to the result, equity portfolios are more effective than other portfolios in managing liquidity risk (Chen & Sherif, 2016).

Achola and Muriu (2008) discussed the three-factor model in their research. In the research, daily stock prices in Nairobi Securities Exchange (NSE) between 2004 and 2014 were divided into 6 portfolios according to size and BV/MV ratio. Fama and French 3-factor model (1993) was investigated in the study. According to the results of the research, the Fama and French 3-factor model (1993) was found to be effective in stocks in NSE.

In the study of Kapadia in 2011, Fama-French investigated the 3-factor model and the total lien risk. In this study, Kapadia presents the premium of Fama-French size (SMB) and value (HML) factors as the main reason for encountering total lien risk. A database containing collective business failures of private and public firms between 1926 and 1997 was established. Portfolios have been made to monitor future failures. These portfolios optimally avoided the total lien risk. In addition, approximately 4% CAPM alpha was obtained per year. HML and SMB were able to predict the future error rate change. Small stocks yielded fewer returns than large stocks (Kapadia, 2011).

Faff et al. (2014) redesigned the Fama-French model to match the macroeconomic variables used to generate the GDP factor. The purpose of the research is to examine the power of the model that includes GDP to explain stock returns and the effect of macroeconomic variables on future GDP news. The Fama-French model modified with GDP and the conditional Fama French model were compared with some techniques. As a result, it was found that the modified Fama-French model has lower performance than the conditional Fama-French model.

Wu et al. (2016) examined the effects of investor stock indicators on the three risk premiums of the Fama-French 3-factor model. The factors under investigation are the volatility index and the credit default swap. The research period is the interval between the first and fourth quarters of 2003. Study data are from 58 firms listed on the Taiwan Stock Exchange. Research results show that the direction of stocks is not linear. There are three risk premiums that differ over time in the stocks of different investors in different systems. Market premiums have declined due to the excessive behavior of investors (optimistic or pessimistic). In general, the size premium was significant and started to decline with the increase in the volatility index. Another study using the volatility variable in their study is Chen et al. (2017). Chen et al. (2017) investigated the relation of multi-factor stochastic fluctuation of stock returns with economic fluctuation. They also investigated whether asset prices were affected by this fluctuation. Fama-French 3-factor volatility model was used in the study. They found that conditional volatility of magnitude and value factors is significantly associated with economic uncertainty. In addition, this volatility was found to be significant in pricing factors. According to the non-sample estimation analysis, the results were able to predict the conditional volatility stock returns. In addition, the economic gain was obtained through portfolio distribution. As it can be understood from here, there is a connection between economic principles and the stock market.

There are also domestic researchers who examine the FF3F model and stock returns. The work of these researchers is as follows.

Aksu and Önder (2003) have used the FF3F model for the first time in Turkey. Aksu and Önder (2003) examined the exchange of stocks of companies other than finance in the IMKB with the CAPM and FF3F model in their research. According to the

research results, there is a firm size anomaly and BV/MV anomaly in IMKB. Also, the FF3F model was able to explain the changes in stock returns. They worked with Aksu and Önder (2003) on the same subject in Karan and Gönenç (2003). As a result of examining the stocks in the IMKB with the FF3F model, the BV/MV factor could not explain the differences in stock returns in the IMKB. He conducted research on the same subject in Doğanay in 2006. Doğanay (2006) conducted his research between July 1995 and June 2005. Doğanay (2006) took stocks with positive equity in his study. Analysis conducted shows that investors who accept common risk factors (market risk (market factor), market value, and book value/market value) in stock returns yielded higher returns. In addition, the FF3F model is valid in IMKB. Gökgöz (2008) researched the IMKB-Industrial, Services, Real Estate, Securities and Technology indices with the FF3F model. According to the results of the research, the indexes were found meaningful in the model. Coşkun and Çınar (2014) investigated the relationship between portfolio return and market return in Fama-French 3-Factor Asset Pricing Model. In this model, besides portfolio return and market return, size and BV/MV ratio were also affected. In the panel data analysis used, three different regression models were developed. According to the results of the research, in all models, both scale and BV/MV variables have significant and negative relationships with stock returns. Genç and Çömlekçi (2018) analyzed the same model for Borsa Istanbul Corporate Governance Index. According to the results of the study, unlike the Fama and French (1993) studies, value premium and firm size effect were not found. In addition, Fama and French 3-factor model is invalid in SL, SH, and BM portfolios created according to Fama and French risk factors.

**Fama-French 4-Factor Model (FF4F)**

There are foreign researchers studying Fama-French 4-Factor Model and stock returns. The work of these researchers is as follows.

Carhart (1997) examined stock returns, and investment expenditures in his study. It showed that the common factors of these two variables explain the mutual fund average and risk-adjusted returns. The expense ratio, portfolio volume and sales expenses were found to be negatively related to performance. According to the findings of the study, it has shown that it is consistent with market efficiency, size,

BV/MV ratio, and momentum factors.

Tai (2003) examined the price anomalies of companies that meet the extra market risk. The Conditional Intertemporal Capital Asset Pricing Model (ICAPM) and GARCH are used for this. In these analyzes, size, book value/market value ratio, and momentum anomalies are examined. According to the analysis results; CAPM could not determine the extra market risk of high average return. Risk premiums in ICAPM, which vary over time, are divided into 4 and these are market, size, book value/market value ratio, and momentum. The most dominant of these factor is the market risk premium. They used the factors used in this study in their research in Ammann and Steiner (2008). Ammann and Steiner (2008) investigated the market, size, book value/market value ratio, and momentum factors with the Swiss Stock Exchange data between January 1990 and December 2005, considering only the characteristics of the Swiss stock market. Findings in the study; negative magnitude effect - 0.67%; the positive value effect was 2.35%. The momentum effect is the most accurate data. This is due to the fact that momentum is 10.33%. When the research results are compared with the data in the USA, the results are valid. Additionally, the explanatory value of the factors was found to be high. Lai and Lau (2010) conducted another study on the same subject. Lai and Lau (2010) investigated the performance of 311 mutual funds between 1990 and 2005 in their article. The models and analyzes they use for this are as follows; compound portfolio performance measures, single market model, Fama and French 3-factor model, and Carhart 4-factor model. Mutual fund performances resulted in higher returns with lower systematic risk. According to the results of models (Single-factor model, Fama-French 3-factor model, and Carhart 4-factor model), factors that are significant in explaining stock returns are beta, size, book value/market value ratio, and momentum factors. In addition, the model that is thought to be better among the three models used in this study is the Carhart 4-factor model. Beta has the highest coefficient among these four factors, and beta has the highest meaningful aspect.

Huang (2009) investigated the relationship between cash flow volatility and stock returns. The cross-sectional relationship between cash flow volatility in previous years and future returns has been found to be negative. The negative relationship is economically significant and permanent for up to 5 years. The 4-factor model of

Fama-French was used in the study. The performance of the 10 least volatile portfolios created by the standard deviation of the cash flow is 13% better than the 10 most volatile portfolios according to the model. Pricing of cash flow volatility has presented an anomaly versus traditional asset pricing. Pricing of cash flow uncertainty in the past guides the potential underlying risks of the HML and SMB factors of the Fama-French 4-factor model.

Lam et al. (2010) investigated Hong Kong stock returns in their study. The 4-factor model used in the article was created by adding the momentum factor to the Fama-French 3-factor model. In addition, the 4-factor model used in the research was able to find the stock return variability in the Hong Kong market. All 4-factors were found to be significant in the model. But the intersection points of these four factors are meaningless.

Fama and French (2012) studied four regions, namely North America, Europe, Japan, and the Asia Pacific. They wanted to test whether asset pricing models could analyze the value and momentum factors in international average returns. Additionally, the validity of asset pricing models in these four regions was also tested. In the North America, Europe, and Asia Pacific regions there were value premiums that decreased with size in average stock returns. In addition, momentum returns have been obtained in these regions. Momentum returns spread from large stocks to smaller stocks.

Ivanov (2012) conducted research on the Fama-French 4-factor asset pricing model by adding and removing companies in the S&P 500 Index. Since the method of adding and subtracting firms is used, sensitivity has been noticed in SMB and momentum factors. These information and robustness tests have had a great impact on the method of adding and removing companies. Rath and Durand (2015) used SMB, HML, and UMD factors of Fama-French and Carhart models in their study. They chose these factors as observable firm characteristics. In addition, these factors refer to systematically priced features. Thanks to these factors, the characteristics of the investors in the analysis are understood. While the SMB factor in the portfolio is found by the total debt, the HML factor is expressed by the market leverage. UMD sensitivity is related to both market leverage and total debt. According to the results

of the research, the relationship between leverage and returns has been found to be complex.

Boamah (2015) examined the application phase of the Fama-French and Carhart models in the South African Stock Exchange and the growth potential of the South African economy. The effects of size, book value/market value, and momentum have been investigated in this stock market. For this, 848 data from the South African Stock Exchange were included in the study. The size, book value/market value ratio and momentum factors investigated in the models for the South African Stock Exchange were effective. The Carhart model was able to show a little momentum effect. But the Fama-French model could not adequately explain the momentum. So the momentum is better explained by the Carhart model in the South African Stock Exchange. In Lemeshko and Rejnuš's (2015) studies, they analyzed the performance of mutual funds in the economies of Central and Eastern Europe, Southeast Asia, The Middle East, and North Africa by adhering to absolute and relative risk. The models used in the study are the conditional and unconditional single-factor model, multi-factor CAPM time series regression, Fama-French and Carhart models. The data in the research are taken from Bloomberg, World Development Indicators, and International Financial Statistics. According to the results of the research, it was found that mutual fund performances in a certain segment in developing economies have important regional characteristics.

Butt (2015) investigated the liquidity effect with Finnish market returns in her study. The unexpected decreases and increases in the monthly average zero return are expressed in the study as the illiquidity in the market. The illiquidity effect has been found to be the most important systematic risk for all dimensions. Fama and French, a factor associated with illiquidity, have similar pricing capacity with the three-factor model and the Carhart 4-factor model. Ze-To (2016) conducted a study on liquidity. Ze-To (2016) investigated how many stock returns could predict firms' liquidity. For this, portfolios have been created. The relationship between portfolios at the highest and lowest levels of asset liquidity and the annual rate of return is positive and meaningful. The models used in the research are the Fama-French 3-factor model and the Carhart 4-factor model. In addition, asset liquidity anomaly brought meaningful and positive alphas in these models. The relationship between asset

liquidity and forward returns is positive.

Garyn-Tal and Lauterbach (2015) used the Fama-French-Carhart 4-factor asset pricing model to analyze the Israeli economy and the stocks traded on the NYSE and NASDAQ stock exchanges. A hybrid model was established by adding some global variables to the regional 4-factor model. As a result, the hybrid model has been analyzed better than the regional model.

There are also domestic researchers who examine the FF4F model and stock returns. The work of these researchers is as follows.

Ünlü (2012) examined the Carhart 4-factor model in Borsa Istanbul between July 1992 and June 2008. Carhart's 4-factor model has been found to be valid in Borsa Istanbul according to the results of the research. According to the research, the momentum premium was 3.48% on average monthly. Rouwenhorst (1999) also addressed the same issue in his research. According to the study found that premiums momentum for Turkey found the rate 0.48%. According to these studies, this model is valid in Borsa Istanbul and has a momentum effect. Ünlü (2013) and Pastor and Stambaugh (2003) examined Borsa Istanbul in their research. Ünlü (2013) used the FF3F model and C4 model in his research. Pastor and Stambaugh (2003) added the liquidity factor (LMH) to the four-factor model in their study. The coefficients of the factors that are significant in all three models are as follows; RM - RF, SMB, HML, WML, and LMH. The models used by both researchers were valid for Borsa İstanbul.

**Fama-French 5-Factor Model (FF5F)**

There are foreign researchers studying Fama-French 5-Factor Model and stock returns. The work of these researchers is as follows.

Nguyen et al. (2015) stated in their study that the FF5F model explains anomalies better than the traditional CAPM and 3-factor models. Chiah et al. (2016) found that the FF5F model is more explanatory than the FF3F model in their studies for Australian markets.

Chen et al. (2017) tested the FF5F model in the Chinese market in their article. The FF5F model captures fluctuations in the stock more precisely than the FF3F model. In another study examining Chinese markets, it came from Guo et al. (2017). According to the results of their research, the investment factor was found to be meaningless between July 1995 and June 2015 and between July 1997 and December 2013.

Racicot and Rentz (2017) analyzed the FF5F model using GMM in their research. They handled the FF5F model in 12 different sectors. Each variable proved to be highly important. Yang et al. (2017) examined five factors in the FF5F model in Global, North American, and USA examples. The FF5F model is also valid when using the EGARCH model.

Fama and French (2015) researched the FF5F model in public companies in the USA. Later, Fama and French (2017) conducted a detailed study of the FF5F model in 23 developed country markets in North America, Asia Pacific, and Europe. In both studies conducted by Fama and French, they proved that the FF5F model works better than the FF3F model in different markets in different countries.

In Martinsa and Eid (2015) research for the Brazilian market, Chiah, Chai, Zhong, and Li (2016) for the Australian Stock Exchange, and Guo, Zhang, Zhang and Zhang (2017), Lin (2017), and Shao (2017) for the Chinese Stock Exchange The FF5F model has been more successful than other models. In addition, Sundqvist (2017) found that the FF5F model is more explanatory than the CAPM and FF3F models in the Scandinavian country markets.

Foye (2018) included 18 developing countries in its study. When examining the stock returns of these countries, he found that the FF5F model was more developed and successful in terms of explanatory power than the FF3F model. Also, the FF5F model that also includes Turkey, Eastern Europe, and Latin American countries was more successful. But in Asian countries, the FF3F model has been found to be more suitable.

According to the analysis of Racicot and Rentz (2016), using the standard OLS method, the FF5F model is more successful in explaining the returns of portfolios created from 12 Fama-French sectors. However, when the generalized method of moments (GMM) is used, the explanatory power of the FF5F model decreases significantly. A similar study to this study came from Kubota and Takehara (2018). Kubota and Takehara (2018) also analyzed the Japanese Stock Exchange using the GMM test. Since the investment and profitability factors in the FF5F model are insignificant for the Japanese market, it has not been a good benchmark model choice.

There are also domestic researchers who examine the FF5F model and stock returns. The work of these researchers is as follows.

Acaravcı and Karaömer (2017) analyzed the validity of the FF5F model in Borsa Istanbul between 2005-2016. For the model, 14 different portfolios were created regarding size, market value/book value ratio, profitability, and investment factors. Erdinç (2017) conducted a study similar to this one. Erdinç (2017) obtained 48 different portfolios with different factors between 2000-2017 in his article. Both Acaravcı and Karaömer (2017) work on both Erdinc (2017) FF5F model in the study was successful in explaining the return on average equity market portfolio in Turkey. In the study conducted by Çakıcı in 2015, he compared the results of the FF5F model researched for North America, Europe, and other global markets with the results of the same model for the US stock markets. The results are similar. In addition, the two factors added to the FF3F model were observed to lose their explanatory power in the Japan and Asia Pacific portfolios (Çakıcı, 2015). Mustafa and Ali (2016) stated in their research that they could measure the volatility with the FF5F model better and more precisely than other models in their research in Norwegian markets.

# CHAPTER 4
# DATA AND METHODOLOGY

## 4.1. Purpose and Significance of the Research

The main purpose of this research is to investigate the returns of the stocks of 331 companies listed in Borsa Istanbul and the presence of firm size anomaly in these stock returns. Index prices and 10-year bond yield data of Turkey were used as macro indicators for stock returns. Market Value (MarketCap), Market Value/Book Value (MV/BV), Free-float, and Earnings Per Share (EPS) are used as size indicators.

In the research, the companies in ISEALL index that are in Borsa Istanbul and direct the Turkish economy by using daily data between 01/03/2011 - 30/09/2020, the relationship between stock returns and firm size anomaly was analyzed with fixed effect panel data analysis. Within this framework, a total of 514406 observations were created in all analyzes between 01/03/2011 - 30/09/2020, and analyzes were carried out.

## 4.2. Research Universe and Sample

The universe of this thesis study consists of companies that are traded in the ISEALL index of Borsa Istanbul (BIST) and have complete data. The sample data set contains data for 331 companies for the time period between 01/03/2011 - 30/09/2020.

## 4.3. Research Methodology

### 4.3.1. Definition of Panel Data Analysis

There are three types of data that are commonly used in econometrics. These are as

follows (Sevüktekin & Nargeleçekenler, 2010);

1. Time Series Data (T),
2. Horizontal Cross Section Data (N),
3. Panel Data.

Time series data allow a unit (people, companies, cities, countries, etc.) to obtain observations about the relevant variable according to different periods (day, month, season, year, etc.) (Sevüktekin & Nargeleçekenler, 2010). Cross-section data, on the other hand, gives information about the various characteristics of the units about only one period of many units (Güriş, Çağlayan, & Güriş, 2011).

According to Gujarati (2004), "time series is the set of observations on the values of a variable at different times". Cross-sectional data are "data on one or more variables that are collected at the same point in time and characterized by separate units" (Gujarati, 2004).

Panel data analysis, which is one of the financial econometric methods, is used in this study. The word panel comes from Dutch and means rectangular cabinet. But the meaning of the word panel used in econometrics is data sets with a time dimension and a non-temporal dimension.

The data set created by continuously monitoring a cross-section over a certain period is called panel data (Tatoğlu, 2013). Panel data analysis, on the other hand, is the analysis method of a specific object that is observed periodically within a certain time frame. In short, panel data analysis consists of a combination of time series analysis and cross-section analysis (Pazarlıoğlu & Gürler, 2007).

### 4.3.2. Advantages and Disadvantages of Panel Data

Panel data has several advantages compared to cross-sectional data and time-series data. The advantages of the panel data method are listed as follows (Baltagi, 2005a; Hsiao, 2002; Frees, 2004; Wooldridge, 2002; Cameron & Trivedi, 2005 and Hsiao, 2014):

1-Since the panel data method combines cross-section and time-series observations (N × T), the number of observations is higher.

2- The panel data provides the researcher with a greater number of observations, allowing the regression model to be created to have a high degree of freedom. It reduces the degree of linear linkage between the explanatory variables. Thus, it increases the efficiency of econometric estimates.

3-Panel data analysis shows more variability than time-series and cross-section data analysis, so the problem of multicollinearity is less in these data.

4-Panel data analysis enables econometric analysis in cases where there is a short time series or insufficient cross-section observation.

5- Units used in the econometric analysis are generally heterogeneous. Unit variability and unobservable heterogeneity in panel data sets can be included in the model. Thus, the estimation bias is reduced. Due to the variables that are excluded in econometric models, the error term and independent (explanatory) variables are correlated and parameter estimates may have deviated. By using panel data, the effects of these variables can be kept under control, thus reducing the estimation bias.

Unlike the various advantages of panel data, there are also some disadvantages. These are as follows (Tatoğlu, 2016):

1- The most important problem in panel data usage is collecting data and organizing data. For these reasons, it is very difficult to obtain the exact data.

2- The error term is very important in creating panel data because error term in panel data models; The time series carries the deviation specific to the cross-sectional data and panel data model. Therefore, the error term should always deviate in panel data models.

3-In panel data analysis, the problem of selection bias occurs when the sample is not randomly selected from the population to which it belongs or when the whole population does not show interest in the selection.

4- While the unit size is mostly in panel data, the time dimension is short.

### 4.3.3. Assumptions and Features of Panel Data Analysis

Some assumptions need to be realized for panel data analysis to be applied. These assumptions are as follows; The absence of cross-sectional dependence, the series being stationary, the absence of heteroskedasticity**,** multicollinearity, and the absence of correlation problems representing the relationship between the same errors for different observations.

According to Baltagi (2005b), panel data analysis provides much more accurate results than applying cross-sectional analysis alone or time series analysis alone, for the following reasons: Panel data more descriptive information, more variability, less collinearity between variables, it provides a higher degree of independence and efficiency.

I. It controls individual heterogeneity due to latent factors.
ii. The ability to work with correction (adaptation) dynamics is higher.
iii. It is more capable of identifying effects that cannot be easily determined by cross-sectional only or only time series analysis.
iv. It allows researchers to build and test more complex behavioral models in cross-section or time-series data.
v. With the increase in the number of data, the problem of multi-linearity will decrease and thus the reliability of economic forecasts increases (Balgati, 2005b; Hassan, 2015; Onatça, 2017).

Panel data structures are handled in two ways as "balanced and unbalanced panel data". A balanced panel is called this type of panel data set if there is no missing observation in the time series for each unit in the panel data set. Panel data sets in which observations of some panel units are missing are called unbalanced panels (Jeffrey, 2009).

Reasons for encountering unbalanced data set: (Woolridge, 2010)
• The most important reason we sometimes have to work with unbalanced panel data is that there may be gaps in the data. This is often due to missing data. For example, data may not be observed or some observations may not be made public.

• For some reason, some of the data belonging to several units may not be available. For example, if the unbalanced data unit is a firm, some of the data for a particular period may not be observed for a newly established firm, usually the time interval before the establishment of the company. If the company goes bankrupt, some other firms may not have the data after a certain period. Alternatively, data for some firms may be lost due to layoffs or mergers with other companies.

Panel data contains two-way content. Firstly, it consists of N units, and secondly, T number of observations corresponding to each unit (Tatoğlu, 2016). If the observations of the T number of circuits are the same for all units (i) in the cross-section, N, this data is defined as balanced panel data. If the number of observations belonging to at least one unit in the panel data is different, this data is unbalanced panel data (Güriş, 2015).

### 4.3.4. Panel Data Regression Models

In the variables of the panel data regression model, unlike the cross-section or time series models, there are double subscripts. The basic representation of the panel data regression model is as follows (Baltagi, 2005b):

$$Y_{it} = \alpha + \beta_{1it}X_{1it} + \ldots + \beta_{kit}X_{kit} + \varepsilon_{it}$$

$i = 1,2, \ldots N \quad t = 1,2,\ldots T$

The subscript i = unit of cross-section expressing variables such as firm, household, individual, country.

The subscript t = time, i.e. time-series size

$Y_{it}$ = dependent variable,
$X_{it}$ = independent variables,
$\alpha$ = intercept coefficient, (constant term)
$\beta$ = slope coefficient
$\varepsilon_{it}$ = error term

When estimating panel regression models, 5 different models can be created depending on the fixed term, slope coefficients, and error term of the model (Özer & Biçerli, 2003). These models are described below:

1. Both the constant and slope coefficients do not vary with both units and time, and the error term can represent the differences that occur concerning time and units.
2. While the slope coefficients are constant, the fixed term varies according to units but may remain constant over time.
3. While the slope coefficients are constant, the constant term changes according to units and time.
4. Both constant and slope coefficients may vary according to units.
5. All coefficients may vary according to both time and units.

Fundamentally, two models are used in panel data analysis. These are Fixed Effects Model (FEM) and Random Effects Model (REM).

#### 4.3.4.1. Fixed Effects Model

In studies using panel data, one way to include the change arising from differences between individuals or differences between individuals and overtime is to assume that this change leads to change in some or all of the coefficients of the regression model. Models in which the coefficients are assumed to vary according to units and time are called fixed effects models.

In the fixed-effects model, the differences in the behavior of the units are tried to be revealed by the differences in the fixed term. However, the slope coefficients are assumed to be constant. In this model, the constant term is called a group-specific constant term. The constant characterization here states that the coefficient can vary according to units, but is constant over time. Individual effects that cannot be observed in the fixed effects model are considered to be related to the explanatory variables in the model. Therefore, the differences between units are modeled as parametric changes in the regression function.

The fixed-effects model is as follows;

$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$ $i = 1,\ldots N$ ve $t = 1,... T$

Where,
Y = the dependent variable,
X = the independent variable,
α = the fixed parameter,
β = the slope parameter (coefficient),
ε = the error term.

i = the $i^{th}$ cross-sectional unit (the cross-section identifier)
t = the $t^{th}$ time period (the time identifier)

In this equation, Y is the explanatory variable; $X_{it}$ is observable but $\alpha_i$ unobservable time-invariant regressors.

The fixed-effects model sets up the model by perceiving the individual effects of firms as $\alpha_i$ is a constant term. One way of incorporating change in the model due to differences in it using panel data; It is assumed that the current change leads to change in some or all of the coefficients of the regression model. Models in which the coefficients are assumed to vary with units or units and time are called fixed effects models (Pazarlıoğlu & Gürler, 2007).

#### 4.3.4.2. Random Effects Model

The fixed-effects model is suitable where differences between units are viewed as parametric changes in the regression function. The Random Effects Model is valid when the cross-sectional observations are wide enough to cover the whole sample examined. For example, the fixed effects model is more suitable, since the existence of a random effect cannot be mentioned in studies examining the member countries of a certain organization, all companies working in a certain industry, or the economic indicators of two countries. Conversely, if the cross-sectional data studied were collected by random methods from a larger population, then it can be assumed

that unit-specific effects are randomly distributed throughout the cross-sectional observations since this sample is not large enough to cover the entire population.

The random-effects model is as follows;

$Y_{it} = (\alpha_i + \mu_i) + \beta X_{it} + \varepsilon_{it}$ $\quad i = 1,\ldots N$ ve $t = 1,\ldots T$

In the random-effects model, the individual effects of the firms are random. Unlike the fixed effects model, in addition to the constant variable $\alpha_i$, the model has unobservable random errors $\mu_i$ that take into account individual differences in firm data and variation between firms according to a fixed time. The $\mu_i$ are independent from each other and from the $\varepsilon_{it}$s' (Pazarlıoğlu & Gürler, 2007).

## 4.4. Collection of Research Data

In the research, daily closing price, market value, market value/book value, floating market value, and earnings per share data of the stocks of 331 companies in ISEALL index, the values of ISE30, ISE50, and ISE100 indices and 10-year bond yield data for Turkey are used between 01 March 2011 - 30 September 2020. In this study, the number of total panel (unbalanced) observations is 514406.

Market value, market value/book value, floating market value, earnings per share data were obtained from Finnet. Stock codes for the constituents of ISE30, ISE50, ISE100, and ISE ALL indices are obtained from the Public Disclosure Platform (PDP). As a result of this classification, dummy variables for ISE30, ISE50, and ISE100 indices, are created.
The daily closing price data of the stocks of these 340 companies between the dates 01/01/2008 -02/04/2021 were obtained from the investing.com website. In addition, ISE30, ISE50, ISE100, and ISE ALL index price data between 01/01/2008 - 02/04/2021 and 10-year bond yield data of Turkey were obtained from investing.com.

In this research, data analysis is performed by using daily data. However, some variables are based on the financial statements of companies and therefore available

quarterly. All quarterly variables are matched to each daily observation in that particular quarter. These variables are earnings per share data, market capitalization, market value/book value, and floating market value data were then converted into quarterly data.

ARCLK and AVGYO stocks have been excluded from the research analysis due to errors in data. Also to check for unadjusted prices returns greater than 25% and less than -25% are filtered out.

Descriptive statistics of the returns are included in Appendix-1.

All stock and index returns are calculated using the following equation:

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

The daily risk-free rate for a given day is obtained by dividing the 10-year Turkey government bond yield by 365 for that day.

In addition, the FFRATIO variable created as below:
FFRATIO = Free Float (total public market value) / Market Capitalization (total market capitalization)

Preparation of data for analysis and data analysis is undertaken by using Microsoft Excel, SAS University Edition and E-Views software.

## 4.5. Research Model

The following regression models have been developed by considering the dependent and independent variables and based on the studies in the literature. The dependent variable in this study is RET-RF, and the independent variables are $(R\_ISE100\text{-}RF)_t$, log $(MARKETCAP)_{it}$, log $(FREEFLOAT)_{it}$, $FFRATIO_{it}$, $EPS_{it}$, $TR10Y_t$, and $MVBV_{it}$.

**Model 1:** $(RET\text{-}RF)_{it} = \alpha + \mu_i + \beta X_{it} + \varepsilon_{it}$

where $X_{it}$ is the set of variables below:

$(R\_ISE100\text{-}RF)_t$ = Market excess return at time t

$log(MARKETCAP)_{it}$= Natural logarithm of the market capitalization of stock i at time t

$log(FREEFLOAT)_{it}$ = Natural logarithm of the free-float of stock i at time t

$FFRATIO_{it}$ =Free float ratio of stock i at time t

$EPS_{it}$= Earnings per share of stock i at time t

$TR10Y_t$ = Turkey's 10-year bond yield at time t

$MVBV_{it}$ = Market value of the stock (Market Value / Book Value) of stock i at time t

Other variables;

$(RET\text{-}RF)_{it}$ = Excess return of stock i at time t

$\alpha$ = constant term, $\varepsilon$ = error term, $\mu$= fixed effects, $\beta$= the slope parameters.

Model 1 is the base model in this study. It is estimated using the fixed effect panel data regression approach. Note that, the logarithms of MARKETCAP and FREEFLOAT are included in the model, to minimize possible heteroscedasticity issues.

To investigate possible differences in behavior in stocks which are constituents of different indices, Model 1 is extended as below:

**Model 2:** $(RET\text{-}RF)_{it} = \alpha + \mu_i + \beta_1 X_{it} + D\_ISE30*\beta_2 X_{it} + D\_ISE50* \beta_3 X_{it} + D\_ISE100*\beta_4 X_{it} + \varepsilon_{it}$

D_X = Dummy variable which takes the value of 1 in a particular stock as a constituent of index X, 0 otherwise.

Other variables in Model 2 are used in the same sense as variables in Model 1.

To obtain the second model, the dummy variables of the independent variables in the ISE30, ISE50, and ISE100 indices in Borsa Istanbul were taken as well as the variables in the first model. Thus, the first model has been expanded with dummy

variables. In the second model obtained, it was examined whether the parameters change from index to index with the help of a dummy variable.

**Model 3:**

After removing insignificant variables from the regression in Model 2, Model 3 is estimated. Next, regression results of these models are discussed.

## 4.6. Data Analysis

The results of the fixed effect panel data regression analysis in Model 1 are provided in Table 1 below.

**Table 4.1.** Regression Result for Model 1

Dependent Variable: RET-RF
Method: Panel Least Squares
Cross-sections included: 331
Total panel (unbalanced) observations: 514406

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.057881 | 0.001481 | -3.908114 | 0.0000** |
| R_ISE100-RF | 0.799708 | 0.002799 | 2.857125 | 0.0000** |
| LOG(MARKETCAP) | 0.003591 | 0.000300 | 1.197335 | 0.0000** |
| LOG(FREEFLOAT) | -0.000608 | 0.000300 | -2.028638 | 0.0425** |
| FFRATIO | 0.003039 | 0.000961 | 3.162655 | 0.0016** |
| EPS | -2.96E-05 | 1.41E-05 | -2.102806 | 0.0355** |
| TR10Y | -0.000154 | 1.41E-05 | -1.091944 | 0.0000** |
| MVBV | 1.51E-05 | 4.48E-06 | 3.376588 | 0.0007** |
| | Effects Specification | | | |
| Cross-section fixed (dummy variables) | | | | |
| R-squared | 0.141502 | | | |
| F-statistic | 2.514.273 | | | |
| Prob(F-statistic) | 0.000000 | | | |

** Statistically significant at the 10% significance level

Table 1 above contains the dependent variable expressed by RET-RF and fixed effects regression results for 7 independent variables between 1/03/2011-30/09/2020. The findings obtained in Table 1, according to the fixed effects method, all variables were found to be significant at a significance level of at least 0.05.

Significant variables with positive coefficients are R_ISE100-RF, LOG (MARKETCAP), FFRATIO, and MVBV. Significant variables with negative coefficients are LOG (FREEFLOAT), EPS, and TR10Y.

There is a positive and significant relationship between one of the independent variables, R_ISE100-RF, and the dependent variable, RET-RF. In other words, as the independent variable R_ISE100-RF increases by 1%, the stock return as the dependent variable increases approximately 80%.

There is a positive and significant relationship between the market capitalization LOG (MARKETCAP), which is considered as firm size in independent variables, and the dependent variable RET-RF. In other words, as the size of firms increases, stock returns also increase. FFRATIO and MVBV also positively affect excess returns.

It is also observed that LOG (FREEFLOAT), EPS, and TR10Y variables have negatively significant effects on the dependent variable.

**Table 4.2.** Regression Result for Model 2

Dependent Variable: RET-RF
Method: Panel Least Squares
Cross-sections included: 331
Total panel (unbalanced) observations: 514406

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.053907 | 0.001812 | -2.975469 | 0.0000** |
| R_ISE100-RF | 0.757115 | 0.003475 | 2.178482 | 0.0000** |
| LOG(MARKETCAP) | 0.003735 | 0.000321 | 1.165091 | 0.0000** |

**Table 4.2. (cont'd).** Regression Result for Model 2

| | | | | |
|---|---|---|---|---|
| LOG(FREEFLOAT) | -0.000310 | 0.000321 | -0.965619 | 0.3342 |
| FFRATIO | 0.003057 | 0.001005 | 3.042841 | 0.0023** |
| EPS | 5.41E-05 | 4.13E-05 | 1.312075 | 0.1895 |
| TR10Y | -0.000167 | 1.73E-05 | -9.628172 | 0.0000** |
| MVBV | 1.32E-05 | 4.81E-06 | 2.733850 | 0.0063** |
| D_ISE30*(R_ISE100-RF) | 0.126553 | 0.013284 | 9.526647 | 0.0000** |
| D_ISE30*LOG(MARKETCAP) | -0.002515 | 0.004054 | -0.620517 | 0.5349 |
| D_ISE30*LOG(FREEFLOAT) | 0.002224 | 0.004056 | 0.548244 | 0.5835 |
| D_ISE30*FFRATIO | -0.009081 | 0.013341 | -0.680728 | 0.4960 |
| D_ISE30*EPS | -2.18E-05 | 9.71E-05 | -0.224274 | 0.8225 |
| D_ISE30*TR10Y | 0.000205 | 7.17E-05 | 2.851664 | 0.0043** |
| D_ISE30*MVBV | 3.45E-05 | 3.12E-05 | 1.105231 | 0.2691 |
| D_ISE50*(R_ISE100-RF) | 0.061724 | 0.012357 | 4.995005 | 0.0000** |
| D_ISE50*LOG(MARKETCAP) | 0.003548 | 0.002174 | 1.632490 | 0.1026 |
| D_ISE50*LOG(FREEFLOAT) | -0.003972 | 0.002181 | -1.821007 | 0.0686** |
| D_ISE50*FFRATIO | 0.018725 | 0.008132 | 2.302667 | 0.0213** |
| D_ISE50*EPS | -5.59E-05 | 3.68E-05 | -1.519912 | 0.1285 |
| D_ISE50*TR10Y | -0.000133 | 6.54E-05 | -2.029368 | 0.0424** |
| D_ISE50*MVBV | -2.40E-06 | 2.91E-05 | -0.082352 | 0.9344 |
| D_ISE100*(R_ISE100-RF) | 0.049036 | 0.007665 | 6.397391 | 0.0000** |
| D_ISE100*LOG(MARKETCAP) | -0.002706 | 0.001179 | -2.294294 | 0.0218** |
| D_ISE100*LOG(FREEFLOAT) | 0.001441 | 0.001175 | 1.226188 | 0.2201 |
| D_ISE100*FFRATIO | -0.013229 | 0.004498 | -2.941076 | 0.0033** |
| D_ISE100*EPS | -1.85E-05 | 5.23E-05 | -0.354144 | 0.7232 |
| D_ISE100*TR10Y | 5.42E-05 | 3.83E-05 | 1.416828 | 0.1565 |
| D_ISE100*MVBV | -7.66E-06 | 2.19E-05 | -0.349124 | 0.7270 |

| | Effects Specification |
|---|---|
| Cross-section fixed (dummy variables) | |
| R-squared | 0.142959 |
| F-statistic | 2.395.131 |
| Prob(F-statistic) | 0.000000 |

** Statistically significant at the 10% significance level

After removing insignificant variables from the estimated regression model above (Model 2), the results of the reduced regression model (Model 3) is provided in Table 3 below:

**Table 4.3.** Regression Result for Model 3

Dependent Variable: RET-RF

Method: Panel Least Squares

Cross-sections included: 331

Total panel (unbalanced) observations: 514406

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.053507 | 0.001426 | -3.753057 | 0.0000** |
| R_ISE100-RF | 0.757215 | 0.003475 | 2.179138 | 0.0000** |
| LOG(MARKETCAP) | 0.003437 | 8.32E-05 | 4.129139 | 0.0000** |
| FFRATIO | 0.002110 | 0.000536 | 3.936210 | 0.0001** |
| TR10Y | -0.000151 | 1.53E-05 | -9.879545 | 0.0000** |
| MVBV | 1.28E-05 | 4.48E-06 | 2.866832 | 0.0041** |
| D_ISE30*(R_ISE100-RF) | 0.126478 | 0.013277 | 9.526378 | 0.0000** |
| D_ISE30*TR10Y | 0.000196 | 6.41E-05 | 3.061719 | 0.0022** |
| D_ISE50*(R_ISE100-RF) | 0.061536 | 0.012350 | 4.982745 | 0.0000** |
| D_ISE50*TR10Y | -0.000110 | 5.30E-05 | -2.064491 | 0.0390** |
| D_ISE100*(R_ISE100-RF) | 0.048867 | 0.007659 | 6.380569 | 0.0000** |
| D_ISE100*LOG(MARKETCAP) | -0.001590 | 0.000160 | -9.955172 | 0.0000** |
| D_ISE100*FFRATIO | -0.005190 | 0.001502 | -3.456084 | 0.0005** |

| | Effects Specification |
|---|---|
| Cross-section fixed (dummy variables) | |
| R-squared | 0.142926 |
| F-statistic | 2.506.579 |
| Prob(F-statistic) | 0.000000 |

** Statistically significant at the 10% significance level

The independent variables positively associated with the dependent variable (RET-RF) are R_ISE100-RF, LOG (MARKETCAP), FFRATIO, MVBV, D_ISE30 * (R_ISE100-RF), D_ISE30 * TR10Y, D_ISE50 * (R_ISE100-RF), and D_ISE100 * (R_ISE100-RF).

The independent variables that are negatively associated with the dependent variable (RET-RF) are TR10Y, D_ISE50 * TR10Y, D_ISE100 * LOG (MARKETCAP), and D_ISE100 * FFRATIO.

In this study, the market value (market capitalization) variable is considered as a measure of firm size. When looking at Marketcap in general, it observed that as Marketcap increases, the return increases. But a special effect is seen for ISE100 in Table 3. The coefficient of the D_ISE100*LOG(MARKETCAP) variable is negative. This suggests that, for ISE100 companies, the size effect is smaller than other companies in the ISEALL index. However, a comparison of coefficients suggests that the total size effect is still positive for ISE100 stocks, even though it is lower.

# CHAPTER 5
# CONCLUSIONS AND FUTURE RESEARCH

## 5.1. Conclusions

In this study, the effect of firm size on the returns of stocks in Borsa Istanbul's (BIST) ISE ALL index. Data of 331 firms traded in Borsa Istanbul (BIST) between 01/03/2011 - 30/09/2020 were used in the research.

Excess returns (RET-RF) of stocks are used as the dependent variable in the study. The variables used as independent variables to investigate the effect of firm size anomaly on excess returns of stocks are R_ISE100-RF, MARKETCAP, FREEFLOAT, FFRATIO, EPS, TR10Y, and MVBV. Fixed effect panel data regression analysis is used in the study.

In the first model estimated in the study, statistical values between the dependent variable excess return and all independent variables (R_ISE100-RF, MARKETCAP, FREEFLOAT, FFRATIO, EPS, TR10Y, and MVBV) yielded significant results. Significant variables with positive coefficients are the excess return of the market ( market portfolio of ISE100), the natural logarithm of the market capitalization of stock, free-float ratio, and market value of the stock. Significant variables with negative coefficients are the natural logarithm of the free float of stock, earnings per share, and Turkey's 10-year bond yield. There are two very important independent variables in this model. These; the excess return of the market and natural logarithm of the market capitalization of stock. These two independent variables are in a positive and significant relationship with the dependent variable. As the excess return of the market increases in Table 1, it greatly increases in the dependent variable. According to the natural logarithm of the market capitalization of the stock variable, which represents the size of the firm, the stock returns increase as the size of the firm increases. This situation in Table 1 contradicts Fama & French (1993). Because;

Small firms have higher stock returns, according to Fama & French (1993).

The third model used in the study was obtained by subtracting the variables that were meaningless in the second model. The independent variables in Table 3 that were positively correlated with the dependent variable were the excess return of the market, the natural logarithm of the market capitalization of stock, free-float ratio, market value of the stock, the dummy variables to the market excess return of the ISE30, ISE50 and ISE 100 indexes and dummy variable of Turkey's 10-year bond yield of the ISE 100 index. The independent variables that have a negative relationship with the dependent variable are Turkey's 10-year bond yield, dummy variable of Turkey's 10-year bond yield of the ISE 50 index, dummy variable of the natural logarithm of the market value of the stock of the ISE 100 index and dummy variable of the free float ratio of the stock of the ISE 100 index. In this model, which determines the main purpose of this study, the most important independent variable is market capitalization. Because the size of the firm is measured in this study with the market value variable. When the market value variable is examined in general, it is understood that it is directly proportional to the stock return. In other words, the higher the market capitalization, the higher the stock return. However, Table 3 shows a special effect for ISE100. The coefficient of the variable dummy variable of the natural logarithm of the market value of the stock of the ISE 100 index is negative. The size effect for firms in the ISE100 is smaller than for firms in other stock indexes. However, looking at the coefficients, it is seen that the overall size effect is positive for ISE100 stocks, although it is lower.

As a result, a positive firm size anomaly was found in this study conducted with real stock market data between 01/03/2011 - 30/09/2020. In other words, according to the results of this study, as the size of the firm increases, the stock returns also increase. Looking at the Firm Size Anomaly literature, studies that are consistent with the result of this study are Brown, Kleidon, and Marsh (1983), Chan, Chen, and Hsieh (1985), Kothari, Handa, and Wasley (1989), Jegadeesh (1992), Berk (1995), Allen and Cleary (1998), Moore (2000), Connor and Sehgal (2001), Charitou and Constantinidis (2004), Yao et al. (2011), Wu (2011), Artmann et al. (2012), Civelekoglu (1993), Akdeniz, Altay and Aydoğan (2000), Taner and Kayalıdere (2002), Ünal and Akbey (2016), and Agirman and Yılmaz (2018).

In the finance literature, there are studies that have inconsistent results with the result obtained in this study. In other words, researchers who found that small firms have higher stock returns are Banz (1981), Reinganum (1981), Roll (1981) and Keim (1993), Basu (1983) and Cook and Rozeff (1984), Keim, Jaffe, et al. Westerfield (1989) and Davis (1994), Chan and Chen (1991), Chan, Hamao and Lakonishok (1991), Fama and French (1992), Fama and French (1995), Herrera and Lockwood (1994), Chui and Wei (1998), Rouwenhorst (1999), Heston, Rouwenhorst and Wessels (1999), Kousenidis, Negakis, and Floropoulos (2000); Bauman, Conover and Miller (2001), Lam (2002), Drew and Veeraraghaven (2002), Fama and French (2008), Fan (2011), Hoffman (2012), Sukor (2012), Jenner and Powel (2014), Cheung et al. (2015), Samosir (2018), Özcan and Yücel (2003), and Yıldırım (2005).

## 5.2. Future Research

In this study, the data that is thought to be influenced by the firm size anomaly (daily closing price data of the firm's stocks, market value data, market value/book value data, public market value, earnings per share data, prices of ISE30, ISE50 and ISE100 indices and data on Turkey's 10-year bond yield) on stock returns in ISE30, ISE50, ISE100 and ISEALL indices in Borsa Istanbul. In future studies, this issue can be included in the scope of analysis on a sectoral basis and financial studies can be examined with different financial ratios and models.

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## APPENDIX 1 – Descriptive Statistics

| | | N | MIN | MAX | MEAN | STD |
|---|---|---|---|---|---|---|
| 1 | ACSEL | 1582 | -0.14906 | 0.197674 | 0.001657 | 0.030627 |
| 2 | ADEL | 2505 | -0.14341 | 0.213413 | 0.000993 | 0.024524 |
| 3 | ADESE | 2287 | -0.2 | 0.200276 | 0.001285 | 0.039461 |
| 4 | AEFES | 2506 | -0.14111 | 0.103093 | 0.000323 | 0.021411 |
| 5 | AFYON | 2467 | -0.19408 | 0.213307 | 0.000685 | 0.035079 |
| 6 | AGHOL | 1575 | -0.10602 | 0.109285 | 0.00041 | 0.023245 |
| 7 | AGYO | 1615 | -0.18519 | 0.193548 | 0.001096 | 0.027348 |
| 8 | AKBNK | 2506 | -0.17321 | 0.09894 | 5.58E-05 | 0.022546 |
| 9 | AKCNS | 1620 | -0.16766 | 0.199442 | 0.000615 | 0.021981 |
| 10 | AKENR | 2505 | -0.19277 | 0.2 | 0.000286 | 0.025463 |
| 11 | AKFGY | 1462 | -0.1978 | 0.2 | 0.001069 | 0.027815 |
| 12 | AKGRT | 1427 | -0.21957 | 0.15122 | 0.001123 | 0.020106 |
| 13 | AKMGY | 1793 | -0.10952 | 0.154824 | 0.00106 | 0.022909 |
| 14 | AKSA | 2506 | -0.13995 | 0.159341 | 0.00128 | 0.022021 |
| 15 | AKSEN | 1817 | -0.19802 | 0.111111 | 0.001107 | 0.024399 |
| 16 | AKSGY | 1480 | -0.2246 | 0.198486 | 0.000259 | 0.024158 |
| 17 | AKSUE | 1618 | -0.17523 | 0.243478 | 0.001159 | 0.027906 |
| 18 | AKYHO | 1534 | -0.19943 | 0.199533 | 0.000603 | 0.032737 |
| 19 | ALARK | 1865 | -0.13842 | 0.111175 | 0.000972 | 0.022536 |
| 20 | ALBRK | 1462 | -0.19811 | 0.2 | 0.000549 | 0.026203 |
| 21 | ALCAR | 2506 | -0.13699 | 0.164996 | 0.001762 | 0.028833 |
| 22 | ALCTL | 1930 | -0.19988 | 0.199759 | 0.001644 | 0.034187 |
| 23 | ALGYO | 2505 | -0.14438 | 0.199729 | 0.001195 | 0.024088 |
| 24 | ALKA | 1569 | -0.16653 | 0.198582 | 0.002057 | 0.029092 |
| 25 | ALKIM | 2286 | -0.19383 | 0.133043 | 0.001391 | 0.023156 |
| 26 | ANELE | 2390 | -0.12281 | 0.197465 | 0.001093 | 0.02457 |
| 27 | ANHYT | 2011 | -0.14286 | 0.116147 | 0.000509 | 0.018357 |
| 28 | ANSGR | 2031 | -0.1105 | 0.074406 | 0.000946 | 0.012393 |
| 29 | ARENA | 2276 | -0.1529 | 0.198533 | 0.001556 | 0.027087 |
| 30 | ARMDA | 2504 | -0.15 | 0.199438 | 0.001928 | 0.031344 |
| 31 | ARSAN | 1431 | -0.18971 | 0.2 | 0.00179 | 0.028635 |
| 32 | ASELS | 1691 | -0.19348 | 0.130788 | 0.001508 | 0.021793 |
| 33 | ASUZU | 1470 | -0.1557 | 0.201493 | 0.00133 | 0.031396 |
| 34 | ATAGY | 1463 | -0.14906 | 0.149675 | 0.000821 | 0.019073 |
| 35 | ATEKS | 1907 | -0.1502 | 0.214118 | 0.001761 | 0.030382 |
| 36 | AVISA | 1571 | -0.1 | 0.11717 | 0.000684 | 0.018637 |
| 37 | AVOD | 1550 | -0.2 | 0.2 | 0.002156 | 0.039289 |
| 38 | AVTUR | 1666 | -0.2 | 0.198966 | 0.000925 | 0.03642 |
| 39 | AYCES | 1457 | -0.20194 | 0.199405 | 0.002533 | 0.036296 |
| 40 | AYEN | 2410 | -0.23834 | 0.199047 | 0.001044 | 0.030213 |
| 41 | AYGAZ | 1906 | -0.17369 | 0.099864 | 0.000435 | 0.019385 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 42 | BAGFS | 2322 | -0.11111 | 0.119231 | 0.000436 | 0.022999 |
| 43 | BAKAB | 1490 | -0.15909 | 0.110613 | 0.002053 | 0.02621 |
| 44 | BANVT | 2504 | -0.2 | 0.2 | 0.001409 | 0.028874 |
| 45 | BAYRK | 210 | -0.09938 | 0.099849 | 0.005544 | 0.040903 |
| 46 | BERA | 1436 | -0.2 | 0.2 | 0.003073 | 0.037321 |
| 47 | BEYAZ | 1725 | -0.2186 | 0.201613 | 0.002839 | 0.049501 |
| 48 | BFREN | 1860 | -0.1521 | 0.199892 | 0.001368 | 0.027578 |
| 49 | BIMAS | 2503 | -0.1 | 0.099115 | 0.000918 | 0.017315 |
| 50 | BIZIM | 1431 | -0.15991 | 0.190355 | 0.000685 | 0.025482 |
| 51 | BJKAS | 2319 | -0.2 | 0.19877 | 0.000802 | 0.032735 |
| 52 | BLCYT | 1493 | -0.10345 | 0.196262 | 0.002481 | 0.025817 |
| 53 | BNTAS | 1448 | -0.20007 | 0.200117 | 0.001477 | 0.035861 |
| 54 | BOSSA | 2058 | -0.24386 | 0.225326 | 0.002122 | 0.034579 |
| 55 | BRISA | 2504 | -0.13622 | 0.213763 | 0.001067 | 0.024439 |
| 56 | BRKSN | 1797 | -0.19837 | 0.214367 | 0.002337 | 0.039179 |
| 57 | BRSAN | 2093 | -0.16718 | 0.202652 | 0.001143 | 0.026355 |
| 58 | BRYAT | 1737 | -0.13981 | 0.2 | 0.002574 | 0.030816 |
| 59 | BSOKE | 1428 | -0.17708 | 0.199829 | 0.001075 | 0.026476 |
| 60 | BTCIM | 1443 | -0.1451 | 0.198795 | 0.001575 | 0.026764 |
| 61 | BUCIM | 2504 | -0.09972 | 0.121212 | 0.000665 | 0.018788 |
| 62 | BURCE | 1983 | -0.17045 | 0.181818 | 0.001391 | 0.03332 |
| 63 | BURVA | 1606 | -0.20351 | 0.198718 | 0.002395 | 0.037737 |
| 64 | CCOLA | 1515 | -0.0964 | 0.125077 | 0.000328 | 0.021912 |
| 65 | CELHA | 1446 | -0.18094 | 0.2 | 0.001942 | 0.031818 |
| 66 | CEMAS | 2201 | -0.20737 | 0.2 | 0.000883 | 0.039879 |
| 67 | CEMTS | 2506 | -0.152 | 0.195411 | 0.001311 | 0.023426 |
| 68 | CEOEM | 459 | -0.14937 | 0.100917 | 0.002825 | 0.036941 |
| 69 | CIMSA | 1729 | -0.16221 | 0.099556 | 0.000491 | 0.019627 |
| 70 | CLEBI | 1704 | -0.16171 | 0.199593 | 0.00226 | 0.029624 |
| 71 | CMBTN | 1679 | -0.12075 | 0.21045 | 0.001625 | 0.030839 |
| 72 | CRDFA | 1499 | -0.14879 | 0.131737 | 0.001465 | 0.025277 |
| 73 | CRFSA | 734 | -0.17435 | 0.199622 | 0.001727 | 0.042305 |
| 74 | CUSAN | 1266 | -0.12971 | 0.2 | 0.001425 | 0.029005 |
| 75 | DAGHL | 1448 | -0.2 | 0.2 | 0.002401 | 0.040469 |
| 76 | DAGI | 2396 | -0.17588 | 0.185629 | 0.000782 | 0.030248 |
| 77 | DARDL | 1438 | -0.2 | 0.2 | 0.002871 | 0.037404 |
| 78 | DERAS | 438 | -0.2 | 0.198795 | 0.003961 | 0.044821 |
| 79 | DERIM | 1550 | -0.19888 | 0.201807 | 0.001779 | 0.031736 |
| 80 | DESA | 1578 | -0.19886 | 0.19869 | 0.00223 | 0.032594 |
| 81 | DESPC | 1830 | -0.19841 | 0.199203 | 0.00172 | 0.028201 |
| 82 | DEVA | 2504 | -0.11905 | 0.199035 | 0.001251 | 0.02538 |
| 83 | DGATE | 2093 | -0.19577 | 0.183594 | 0.002203 | 0.032621 |
| 84 | DGGYO | 1596 | -0.19934 | 0.199319 | 0.001501 | 0.031607 |
| 85 | DGKLB | 1430 | -0.19718 | 0.20155 | 0.001049 | 0.034553 |
| 86 | DITAS | 2054 | -0.19927 | 0.200053 | 0.002142 | 0.033194 |

| 87 | DMSAS | 1444 | -0.15357 | 0.198658 | 0.001992 | 0.032205 |
|---|---|---|---|---|---|---|
| 88 | DNISI | 148 | -0.1 | 0.1 | 0.009648 | 0.047741 |
| 89 | DOAS | 2506 | -0.18734 | 0.199158 | 0.001039 | 0.028927 |
| 90 | DOBUR | 1931 | -0.17442 | 0.2 | 0.001843 | 0.038618 |
| 91 | DOCO | 1890 | -0.12162 | 0.145975 | 0.001234 | 0.023257 |
| 92 | DOGUB | 1650 | -0.19981 | 0.2 | 0.002009 | 0.037466 |
| 93 | DOHOL | 2506 | -0.15068 | 0.195402 | 0.000734 | 0.026813 |
| 94 | DOKTA | 1823 | -0.17809 | 0.2 | 0.002013 | 0.035452 |
| 95 | DURDO | 1467 | -0.19964 | 0.2 | 0.002021 | 0.032262 |
| 96 | DYOBY | 1432 | -0.19905 | 0.199346 | 0.001936 | 0.035237 |
| 97 | DZGYO | 2186 | -0.17127 | 0.2 | 0.001594 | 0.032041 |
| 98 | ECILC | 2505 | -0.12478 | 0.199468 | 0.000922 | 0.022672 |
| 99 | ECZYT | 2028 | -0.14248 | 0.199129 | 0.001949 | 0.025012 |
| 100 | EDIP | 1650 | -0.16374 | 0.2 | 0.001369 | 0.031598 |
| 101 | EGEEN | 2506 | -0.15673 | 0.175104 | 0.002146 | 0.030045 |
| 102 | EGGUB | 1891 | -0.11081 | 0.132725 | 0.001559 | 0.023602 |
| 103 | EGPRO | 2007 | -0.2 | 0.199134 | 0.001462 | 0.027797 |
| 104 | EGSER | 2506 | -0.14925 | 0.169686 | 0.000918 | 0.024009 |
| 105 | EKGYO | 2215 | -0.12581 | 0.120147 | 0.000506 | 0.02173 |
| 106 | EMKEL | 1442 | -0.14743 | 0.194781 | 0.001581 | 0.031641 |
| 107 | ENJSA | 786 | -0.09983 | 0.075064 | 0.000996 | 0.019849 |
| 108 | ENKAI | 1922 | -0.18715 | 0.105402 | 0.000502 | 0.01962 |
| 109 | ERBOS | 1863 | -0.11527 | 0.199342 | 0.001871 | 0.025852 |
| 110 | EREGL | 2224 | -0.22342 | 0.099755 | 0.000723 | 0.021663 |
| 111 | ERSU | 1882 | -0.14865 | 0.193548 | 0.001524 | 0.029813 |
| 112 | ESCOM | 1750 | -0.14938 | 0.2 | 0.001689 | 0.035466 |
| 113 | ESEN | 122 | -0.1 | 0.1 | 0.012108 | 0.049415 |
| 114 | EUHOL | 1767 | -0.20952 | 0.2 | 0.001279 | 0.04025 |
| 115 | FADE | 168 | -0.09967 | 0.1 | 0.012003 | 0.046153 |
| 116 | FENER | 2505 | -0.19298 | 0.2 | 0.000541 | 0.031715 |
| 117 | FLAP | 2125 | -0.2 | 0.2 | 0.000663 | 0.04498 |
| 118 | FMIZP | 1721 | -0.1999 | 0.2 | 0.002244 | 0.03042 |
| 119 | FONET | 970 | -0.2 | 0.201299 | 0.003035 | 0.03835 |
| 120 | FORMT | 716 | -0.20259 | 0.201183 | 0.002083 | 0.0496 |
| 121 | FRIGO | 1396 | -0.2 | 0.2 | 0.004044 | 0.045913 |
| 122 | FROTO | 2506 | -0.14386 | 0.1 | 0.001374 | 0.022839 |
| 123 | GARAN | 2506 | -0.13257 | 0.132075 | 0.000279 | 0.023064 |
| 124 | GEDIK | 1387 | -0.12597 | 0.200097 | 0.00255 | 0.028838 |
| 125 | GEDZA | 1619 | -0.12466 | 0.177632 | 0.001887 | 0.026468 |
| 126 | GENTS | 1510 | -0.1814 | 0.196527 | 0.001312 | 0.024495 |
| 127 | GEREL | 2062 | -0.2 | 0.2 | 0.001478 | 0.033275 |
| 128 | GLBMD | 1426 | -0.18367 | 0.2 | 0.002885 | 0.038795 |
| 129 | GLRYH | 1670 | -0.2 | 0.196226 | 0.002614 | 0.038671 |
| 130 | GLYHO | 1445 | -0.17867 | 0.198953 | 0.001335 | 0.02788 |
| 131 | GOLTS | 2131 | -0.1548 | 0.199499 | 0.001187 | 0.02759 |

| 132 | GOODY | 1494 | -0.12766 | 0.200608 | 0.00098 | 0.024315 |
|---|---|---|---|---|---|---|
| 133 | GOZDE | 1953 | -0.2 | 0.2 | 0.001336 | 0.031474 |
| 134 | GSDDE | 2506 | -0.19414 | 0.22093 | 0.000878 | 0.03163 |
| 135 | GSDHO | 1491 | -0.13103 | 0.2 | 0.001101 | 0.025968 |
| 136 | GSRAY | 1689 | -0.2 | 0.202128 | 0.001201 | 0.037303 |
| 137 | GUBRF | 1926 | -0.13784 | 0.181951 | 0.001389 | 0.028163 |
| 138 | HALKB | 2244 | -0.14238 | 0.146503 | 2.91E-05 | 0.023492 |
| 139 | HATEK | 1677 | -0.19892 | 0.2 | 0.001898 | 0.033232 |
| 140 | HDFGS | 1518 | -0.19995 | 0.200124 | 0.002245 | 0.039502 |
| 141 | HEKTS | 2505 | -0.14669 | 0.198668 | 0.001905 | 0.02178 |
| 142 | HLGYO | 1763 | -0.1839 | 0.200335 | 0.000996 | 0.024639 |
| 143 | HUBVC | 1436 | -0.20002 | 0.2 | 0.002731 | 0.036762 |
| 144 | HURGZ | 1757 | -0.19872 | 0.198113 | 0.00084 | 0.032785 |
| 145 | ICBCT | 1522 | -0.1997 | 0.2 | 0.00175 | 0.03649 |
| 146 | IDEAS | 1401 | -0.19988 | 0.200031 | 0.003778 | 0.048194 |
| 147 | IDGYO | 1451 | -0.19912 | 0.2 | 0.00255 | 0.04074 |
| 148 | IEYHO | 1487 | -0.19672 | 0.195652 | 0.001847 | 0.039729 |
| 149 | IHEVA | 2506 | -0.19811 | 0.241379 | 0.000679 | 0.035311 |
| 150 | IHGZT | 2162 | -0.19797 | 0.200546 | 0.001251 | 0.039083 |
| 151 | IHLAS | 2504 | -0.20034 | 0.25 | 0.00031 | 0.033296 |
| 152 | IHLGM | 1589 | -0.19667 | 0.200344 | 0.000959 | 0.038241 |
| 153 | IHYAY | 2506 | -0.19789 | 0.198516 | 0.000252 | 0.036406 |
| 154 | INDES | 1864 | -0.12529 | 0.1 | 0.001249 | 0.024111 |
| 155 | INFO | 2244 | -0.19065 | 0.200201 | 0.002022 | 0.034897 |
| 156 | INTEM | 1833 | -0.10406 | 0.2007 | 0.002248 | 0.034828 |
| 157 | INVEO | 1334 | -0.15 | 0.2 | 0.004217 | 0.03921 |
| 158 | IPEKE | 2149 | -0.2 | 0.2 | 0.000889 | 0.037384 |
| 159 | ISCTR | 2298 | -0.13216 | 0.098706 | 0.000363 | 0.021221 |
| 160 | ISDMR | 1238 | -0.19936 | 0.2 | 0.001453 | 0.028673 |
| 161 | ISFIN | 2215 | -0.21763 | 0.199929 | 0.001031 | 0.029904 |
| 162 | ISGSY | 1797 | -0.14658 | 0.199507 | 0.001856 | 0.031596 |
| 163 | ISGYO | 2498 | -0.17472 | 0.132353 | 0.000448 | 0.020459 |
| 164 | ISMEN | 1593 | -0.18042 | 0.132231 | 0.002015 | 0.018473 |
| 165 | ITTFH | 2355 | -0.20052 | 0.200429 | 0.000992 | 0.032072 |
| 166 | IZFAS | 1460 | -0.2 | 0.2 | 0.001827 | 0.040523 |
| 167 | IZMDC | 2501 | -0.15103 | 0.2 | 0.001086 | 0.029028 |
| 168 | IZTAR | 1462 | -0.19975 | 0.2 | 0.002524 | 0.050959 |
| 169 | JANTS | 2091 | -0.16481 | 0.123188 | 0.002366 | 0.029386 |
| 170 | KAPLM | 1575 | -0.2 | 0.219178 | 0.002457 | 0.039245 |
| 171 | KAREL | 2087 | -0.15817 | 0.2 | 0.001818 | 0.02931 |
| 172 | KARSN | 2250 | -0.19575 | 0.195424 | 0.001015 | 0.029272 |
| 173 | KARTN | 2505 | -0.15279 | 0.181787 | 0.001201 | 0.027876 |
| 174 | KATMR | 1890 | -0.2 | 0.202439 | 0.001684 | 0.033748 |
| 175 | KCHOL | 1713 | -0.09939 | 0.090406 | 0.000517 | 0.018862 |
| 176 | KERVT | 1832 | -0.14672 | 0.216667 | 0.000995 | 0.032551 |

| 177 | KFEIN | 720 | -0.2 | 0.2 | 0.002951 | 0.035931 |
|---|---|---|---|---|---|---|
| 178 | KLGYO | 2295 | -0.19865 | 0.200194 | 0.001081 | 0.034262 |
| 179 | KLMSN | 2505 | -0.19848 | 0.2 | 0.001248 | 0.02986 |
| 180 | KNFRT | 871 | -0.17568 | 0.194444 | 0.002879 | 0.033522 |
| 181 | KONTR | 116 | -0.1 | 0.1 | 0.021507 | 0.060496 |
| 182 | KONYA | 2506 | -0.13912 | 0.2 | 0.000986 | 0.028577 |
| 183 | KORDS | 1706 | -0.09984 | 0.187135 | 0.001445 | 0.023143 |
| 184 | KOZAA | 2506 | -0.2 | 0.2 | 0.000989 | 0.033999 |
| 185 | KOZAL | 1496 | -0.19955 | 0.2 | 0.001337 | 0.03225 |
| 186 | KRDMD | 2502 | -0.15748 | 0.136925 | 0.001283 | 0.026104 |
| 187 | KRGYO | 1574 | -0.14881 | 0.198925 | 0.001977 | 0.033126 |
| 188 | KRONT | 2331 | -0.19958 | 0.221239 | 0.002271 | 0.033292 |
| 189 | KRSTL | 2506 | -0.18116 | 0.199441 | 0.000732 | 0.029945 |
| 190 | KRTEK | 1446 | -0.14815 | 0.2 | 0.003279 | 0.035384 |
| 191 | KUTPO | 2506 | -0.14286 | 0.21164 | 0.001576 | 0.027 |
| 192 | KUYAS | 2070 | -0.19955 | 0.219388 | 0.00103 | 0.037667 |
| 193 | LIDFA | 1657 | -0.15758 | 0.2 | 0.001405 | 0.030754 |
| 194 | LINK | 1791 | -0.20027 | 0.210106 | 0.002939 | 0.040365 |
| 195 | LKMNH | 2438 | -0.15633 | 0.196283 | 0.00127 | 0.028768 |
| 196 | LOGO | 2506 | -0.12855 | 0.202765 | 0.002147 | 0.026284 |
| 197 | LUKSK | 1454 | -0.15 | 0.2 | 0.002798 | 0.034469 |
| 198 | MAALT | 1557 | -0.13026 | 0.2 | 0.00241 | 0.032843 |
| 199 | MAKTK | 2504 | -0.1993 | 0.213592 | 0.000691 | 0.035075 |
| 200 | MARKA | 1445 | -0.2 | 0.2 | 0.003276 | 0.047934 |
| 201 | MARTI | 1454 | -0.1791 | 0.197531 | 0.001335 | 0.035016 |
| 202 | MAVI | 943 | -0.125 | 0.086798 | 0.000443 | 0.025328 |
| 203 | MEGAP | 1571 | -0.20011 | 0.198276 | 0.002822 | 0.04357 |
| 204 | MEPET | 2357 | -0.24537 | 0.216216 | 0.000354 | 0.038957 |
| 205 | MERKO | 1625 | -0.19732 | 0.200407 | 0.00222 | 0.038754 |
| 206 | METRO | 2504 | -0.2 | 0.221053 | 0.000885 | 0.034115 |
| 207 | METUR | 2330 | -0.17411 | 0.223404 | 0.002089 | 0.03381 |
| 208 | MGROS | 2253 | -0.15796 | 0.128684 | 0.000772 | 0.022059 |
| 209 | MIPAZ | 2245 | -0.16327 | 0.200474 | 0.001263 | 0.037093 |
| 210 | MNDRS | 2317 | -0.2 | 0.2 | 0.001059 | 0.031926 |
| 211 | MPARK | 783 | -0.18975 | 0.141058 | 0.000715 | 0.031745 |
| 212 | MRGYO | 1465 | -0.2 | 0.225 | 0.002035 | 0.040972 |
| 213 | MRSHL | 1583 | -0.19881 | 0.2 | 0.001663 | 0.03169 |
| 214 | MSGYO | 1040 | -0.11765 | 0.203125 | 0.001689 | 0.036783 |
| 215 | NATEN | 414 | -0.19961 | 0.2 | 0.005799 | 0.046997 |
| 216 | NETAS | 2503 | -0.19981 | 0.20868 | 0.00106 | 0.032132 |
| 217 | NIBAS | 2031 | -0.2 | 0.2 | 0.002388 | 0.045145 |
| 218 | NTHOL | 2504 | -0.14601 | 0.102273 | 0.00061 | 0.020981 |
| 219 | NUGYO | 2104 | -0.18213 | 0.235294 | 0.001056 | 0.031215 |
| 220 | NUHCM | 1597 | -0.10368 | 0.132463 | 0.001471 | 0.020376 |
| 221 | ODAS | 1913 | -0.18012 | 0.2 | 0.001276 | 0.030664 |

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|---|---|---|---|---|---|---|
| 222 | OLMIP | 1532 | -0.12251 | 0.197183 | 0.001705 | 0.029308 |
| 223 | ORGE | 2156 | -0.19855 | 0.202735 | 0.001508 | 0.035189 |
| 224 | OSMEN | 1142 | -0.2 | 0.218009 | 0.004072 | 0.046739 |
| 225 | OSTIM | 1601 | -0.2 | 0.198026 | 0.001081 | 0.032597 |
| 226 | OTKAR | 2506 | -0.13172 | 0.172535 | 0.001469 | 0.023976 |
| 227 | OYAKC | 1446 | -0.12555 | 0.199346 | 0.000929 | 0.02275 |
| 228 | OYLUM | 1845 | -0.17901 | 0.232877 | 0.001686 | 0.037085 |
| 229 | OZBAL | 1444 | -0.17318 | 0.220779 | 0.002312 | 0.039733 |
| 230 | OZGYO | 1489 | -0.20082 | 0.200988 | 0.001919 | 0.048986 |
| 231 | OZKGY | 1737 | -0.10526 | 0.190287 | 0.001369 | 0.024335 |
| 232 | OZRDN | 1508 | -0.19787 | 0.172296 | 0.001893 | 0.035176 |
| 233 | PAGYO | 1445 | -0.21127 | 0.199005 | 0.000572 | 0.019978 |
| 234 | PAPIL | 333 | -0.1671 | 0.199052 | 0.004255 | 0.040442 |
| 235 | PARSN | 2506 | -0.19986 | 0.183496 | 0.001565 | 0.026135 |
| 236 | PEGYO | 1677 | -0.1954 | 0.198276 | 0.001744 | 0.034789 |
| 237 | PEKGY | 777 | -0.20168 | 0.201681 | 0.002262 | 0.041335 |
| 238 | PENGD | 2065 | -0.19977 | 0.202703 | 0.001352 | 0.033369 |
| 239 | PETKM | 2505 | -0.22017 | 0.179702 | 0.000807 | 0.021455 |
| 240 | PETUN | 1896 | -0.19231 | 0.1 | 0.000911 | 0.020369 |
| 241 | PGSUS | 1934 | -0.13043 | 0.148365 | 0.001065 | 0.029152 |
| 242 | PINSU | 1482 | -0.19708 | 0.2 | 0.001418 | 0.029242 |
| 243 | PKART | 1685 | -0.15897 | 0.2 | 0.00169 | 0.029459 |
| 244 | PKENT | 1413 | -0.15735 | 0.20339 | 0.00353 | 0.041735 |
| 245 | PNSUT | 1846 | -0.10584 | 0.138732 | 0.000568 | 0.02288 |
| 246 | POLHO | 1630 | -0.19969 | 0.121849 | 0.001088 | 0.025814 |
| 247 | POLTK | 1437 | -0.13262 | 0.200335 | 0.002797 | 0.032821 |
| 248 | PRKAB | 1778 | -0.23284 | 0.224575 | 0.001873 | 0.028899 |
| 249 | PRKME | 2505 | -0.19846 | 0.195876 | 0.000612 | 0.026515 |
| 250 | PRZMA | 1443 | -0.19728 | 0.2 | 0.001676 | 0.029241 |
| 251 | PSDTC | 1442 | -0.1996 | 0.14557 | 0.0023 | 0.033302 |
| 252 | RALYH | 1682 | -0.18523 | 0.199852 | 0.00276 | 0.042677 |
| 253 | RAYSG | 2500 | -0.19858 | 0.203704 | 0.001534 | 0.033472 |
| 254 | RHEAG | 2506 | -0.2 | 0.192982 | 0.000397 | 0.032627 |
| 255 | RODRG | 1863 | -0.2 | 0.20202 | 0.001886 | 0.041416 |
| 256 | RTALB | 1675 | -0.2 | 0.209402 | 0.002109 | 0.037671 |
| 257 | RYGYO | 1561 | -0.1997 | 0.2 | 0.001895 | 0.035588 |
| 258 | RYSAS | 1951 | -0.19983 | 0.2 | 0.00187 | 0.033216 |
| 259 | SAFKR | 803 | -0.09988 | 0.142222 | 0.002452 | 0.036894 |
| 260 | SAHOL | 2506 | -0.12083 | 0.110039 | 0.000308 | 0.020079 |
| 261 | SAMAT | 2378 | -0.19364 | 0.196721 | 0.000878 | 0.030233 |
| 262 | SANEL | 1440 | -0.19937 | 0.200952 | 0.001306 | 0.030751 |
| 263 | SANFM | 1913 | -0.18886 | 0.198864 | 0.001597 | 0.034118 |
| 264 | SANKO | 1827 | -0.19003 | 0.19171 | 0.001564 | 0.027429 |
| 265 | SARKY | 1477 | -0.1053 | 0.148545 | 0.001984 | 0.021726 |
| 266 | SASA | 2505 | -0.24941 | 0.199869 | 0.002076 | 0.031386 |

| 267 | SAYAS | 1441 | -0.15029 | 0.2 | 0.002184 | 0.034654 |
|---|---|---|---|---|---|---|
| 268 | SEKFK | 1497 | -0.11385 | 0.200173 | 0.002168 | 0.028957 |
| 269 | SEKUR | 1555 | -0.2 | 0.199301 | 0.002697 | 0.036125 |
| 270 | SELEC | 1797 | -0.11924 | 0.2 | 0.001144 | 0.023633 |
| 271 | SEYKM | 1396 | -0.2 | 0.198457 | 0.002787 | 0.029799 |
| 272 | SILVR | 1554 | -0.23714 | 0.199248 | 0.001922 | 0.033193 |
| 273 | SISE | 2498 | -0.16374 | 0.120968 | 0.000695 | 0.021886 |
| 274 | SKBNK | 1631 | -0.15051 | 0.2 | 1.88E-05 | 0.024832 |
| 275 | SKTAS | 1438 | -0.19787 | 0.2 | 0.001391 | 0.031618 |
| 276 | SMART | 470 | -0.19983 | 0.199789 | 0.003047 | 0.047163 |
| 277 | SNGYO | 1438 | -0.12766 | 0.196721 | 0.001744 | 0.0292 |
| 278 | SNPAM | 1516 | -0.19492 | 0.2 | 0.002504 | 0.037674 |
| 279 | SOKM | 719 | -0.12723 | 0.110285 | 0.000656 | 0.026478 |
| 280 | SONME | 1429 | -0.2 | 0.2 | 0.002846 | 0.036514 |
| 281 | SRVGY | 1593 | -0.15698 | 0.2 | 0.002968 | 0.032869 |
| 282 | TATGD | 2506 | -0.11787 | 0.137641 | 0.000585 | 0.023027 |
| 283 | TAVHL | 2506 | -0.17361 | 0.1 | 0.000566 | 0.023173 |
| 284 | TCELL | 2504 | -0.14324 | 0.109181 | 0.000277 | 0.018554 |
| 285 | TDGYO | 776 | -0.14839 | 0.19708 | 0.002663 | 0.039182 |
| 286 | TEKTU | 1999 | -0.19576 | 0.199686 | 0.000829 | 0.031809 |
| 287 | TGSAS | 2142 | -0.19343 | 0.173333 | 0.001529 | 0.034836 |
| 288 | THYAO | 2502 | -0.14943 | 0.108974 | 0.000587 | 0.023719 |
| 289 | TIRE | 1670 | -0.2 | 0.198381 | 0.001396 | 0.031333 |
| 290 | TKFEN | 2155 | -0.13774 | 0.165625 | 0.000719 | 0.022533 |
| 291 | TKNSA | 2158 | -0.2 | 0.2 | 0.000748 | 0.031279 |
| 292 | TKURU | 1305 | -0.10061 | 0.199749 | 0.003335 | 0.040894 |
| 293 | TLMAN | 797 | -0.1226 | 0.199488 | 0.001507 | 0.033118 |
| 294 | TMPOL | 1576 | -0.19986 | 0.202864 | 0.001491 | 0.035697 |
| 295 | TMSN | 2027 | -0.16731 | 0.200924 | 0.001266 | 0.028062 |
| 296 | TOASO | 1665 | -0.17794 | 0.101993 | 0.000677 | 0.023743 |
| 297 | TRCAS | 1435 | -0.19737 | 0.197044 | 0.001056 | 0.027825 |
| 298 | TRGYO | 2158 | -0.16964 | 0.159884 | 0.000858 | 0.023743 |
| 299 | TSGYO | 1846 | -0.14453 | 0.198598 | 0.0018 | 0.030143 |
| 300 | TSKB | 2161 | -0.17014 | 0.107901 | 0.00048 | 0.02227 |
| 301 | TSPOR | 2502 | -0.20008 | 0.218045 | 0.000515 | 0.036175 |
| 302 | TTKOM | 1892 | -0.11048 | 0.101652 | 0.000353 | 0.021297 |
| 303 | TTRAK | 1763 | -0.14525 | 0.179114 | 0.001207 | 0.021766 |
| 304 | TUCLK | 1666 | -0.19964 | 0.2 | 0.00138 | 0.039985 |
| 305 | TUKAS | 2443 | -0.21399 | 0.220779 | 0.001056 | 0.031684 |
| 306 | TUPRS | 2506 | -0.13955 | 0.10105 | 0.000532 | 0.020449 |
| 307 | TURGG | 1433 | -0.1087 | 0.199856 | 0.001298 | 0.027572 |
| 308 | TURSG | 1934 | -0.17874 | 0.200738 | 0.001044 | 0.02823 |
| 309 | ULAS | 1837 | -0.19799 | 0.2 | 0.002095 | 0.040163 |
| 310 | ULKER | 2506 | -0.12892 | 0.140762 | 0.000809 | 0.021329 |
| 311 | ULUSE | 1431 | -0.09922 | 0.199396 | 0.002107 | 0.021461 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 312 | ULUUN | 1432 | -0.19902 | 0.146479 | 0.001806 | 0.03006 |
| 313 | USAK | 1843 | -0.19554 | 0.19596 | 0.000685 | 0.031478 |
| 314 | UTPYA | 2088 | -0.2 | 0.199377 | 0.002074 | 0.035646 |
| 315 | VAKBN | 2506 | -0.1083 | 0.117762 | 0.000305 | 0.023557 |
| 316 | VAKFN | 2500 | -0.23861 | 0.200537 | 0.00181 | 0.036057 |
| 317 | VAKKO | 1430 | -0.1758 | 0.19883 | 0.002281 | 0.034137 |
| 318 | VANGD | 1775 | -0.2 | 0.218978 | 0.00168 | 0.042201 |
| 319 | VERTU | 1325 | -0.19959 | 0.159314 | 0.002195 | 0.032414 |
| 320 | VERUS | 1430 | -0.19952 | 0.2 | 0.001679 | 0.026567 |
| 321 | VESBE | 2272 | -0.2366 | 0.195241 | 0.001632 | 0.027859 |
| 322 | VESTL | 2506 | -0.16974 | 0.208502 | 0.001355 | 0.028806 |
| 323 | VKGYO | 2492 | -0.19906 | 0.199033 | 0.000862 | 0.027756 |
| 324 | VKING | 1749 | -0.19868 | 0.226776 | 0.001267 | 0.033505 |
| 325 | YAPRK | 1437 | -0.17557 | 0.198675 | 0.003557 | 0.039353 |
| 326 | YATAS | 1440 | -0.12803 | 0.2 | 0.002531 | 0.028276 |
| 327 | YAYLA | 1597 | -0.19094 | 0.201117 | 0.000823 | 0.037018 |
| 328 | YESIL | 1423 | -0.2 | 0.2 | 0.004918 | 0.05345 |
| 329 | YGGYO | 1755 | -0.12107 | 0.14969 | 0.000675 | 0.015235 |
| 330 | YGYO | 2292 | -0.2 | 0.2 | 0.000569 | 0.035868 |
| 331 | YKBNK | 2505 | -0.13021 | 0.115739 | 0.000128 | 0.022322 |
| 332 | YKGYO | 1721 | -0.1982 | 0.203593 | 0.001859 | 0.036439 |
| 333 | YKSLN | 348 | -0.15569 | 0.2 | 0.003469 | 0.037191 |
| 334 | YUNSA | 2182 | -0.19822 | 0.200034 | 0.001266 | 0.03053 |
| 335 | YYAPI | 1884 | -0.2 | 0.242424 | 0.000948 | 0.039645 |
| 336 | ZOREN | 2506 | -0.1975 | 0.17988 | 0.000321 | 0.026976 |