

Behavioural analysis of stock prices during financial crises: The case of Borsa İstanbul¹

Finansal kriz dönemlerinde hisse senetleri fiyatlarının davranışsal analizi: Borsa İstanbul örneği

¹ This study was prepared by making use of the Master's Thesis titled "Behavioural Analysis of Stock Prices During Financial Crises: The Case of Borsa İstanbul" in Turkey.

Meltem Budak¹ 

Sedat Ayyıldız² 

¹ Graduated-Master Student, AYBU, Ankara, Turkey, meltembudak@outlook.com.tr

ORCID: 0009-0008-4913-0056

² Asst. Prof., Former Bank Manager, Yıldırım Beyazıt University, Ankara, Turkey, sedatayyildiz@aybu.edu.tr

ORCID: 0000-0003-0317-5247

Corresponding Author:

Sedat Ayyıldız,

Asst. Prof., Former Bank Manager, Yıldırım Beyazıt University, Ankara, Turkey

sedatayyildiz@aybu.edu.tr

Submitted: 7/03/2025

Revised: 6/08/2025

Accepted: 26/08/2025

Online Published: 25/09/2025

Abstract

This study examines the effects of financial crises on stock prices and analyses how investor behaviour is shaped during these crises. It was found that during crisis periods, investors' behaviours deviate from rationality due to emotional factors and cognitive biases, leading to excessive market volatility and irrational decision-making processes, significantly affecting stock prices. The method used was the Exponential Generalised Autoregressive Conditional Heteroskedasticity (EGARCH) (1,1) model to analyse the volatilities of stock prices. The analysis showed that price volatilities increase during crises and persist for a long time. Notably, adverse shocks were found to create more volatility than positive shocks. This finding demonstrates the lasting impact of financial crises on market fluctuations caused by investor behaviour. From a behavioural finance perspective, it was identified that investors exhibit tendencies such as overconfidence, herd behaviour, and avoidance of regret, leading to excessive price movements in the markets during crisis periods. This situation highlights that uncertainty and irrational behaviours in financial markets increase further during crises, and understanding investor psychology and behaviour plays a critical role in mitigating the effects of crises and ensuring market stability.

Keywords: Financial Crisis Periods, Behavioural Finance, BIST, Exponential GARCH Analysis Method

JEL Codes: E44, G01, G15

Öz

Bu çalışmada, finansal krizlerin hisse senedi fiyatları üzerindeki etkileri incelenmiş ve yatırımcı davranışlarının finansal kriz süreçlerinde nasıl şekillendiği analiz edilmiştir. Kriz dönemlerinde yatırımcıların davranışlarının, duygusal faktörler ve bilişsel önyargılar nedeniyle rasyonellikten uzaklaştığı, bu durumun piyasada aşırı dalgalanmalara ve irrasyonel karar alma süreçlerine yol açarak, hisse senedi fiyatlarında önemli değişikliklere sebep olduğu tespit edilmiştir. Yöntem olarak; Üssel Genelleştirilmiş Otoregresif Koşullu Değişen Varyans (EGARCH) (1,1) modeli kullanılmış ve hisse senedi fiyatlarının oynaklıkları analiz edilmiştir. Analiz sonucunda; kriz dönemlerinde fiyat oynaklıklarının arttığı, bu oynaklıkların uzun süre devam ettiği gözlemlenmiştir. Özellikle negatif şokların, pozitif şoklara göre daha fazla oynaklık yarattığı tespit edilmiştir. Bu bulgu, finansal krizlerin yatırımcı davranışlarından kaynaklı piyasa dalgalanmaları üzerindeki kalıcı etkisini göstermektedir. Davranışsal finans perspektifinden ele alındığında, kriz dönemlerinde yatırımcıların aşırı güven, sürü davranışı ve pişmanlıktan kaçınma gibi eğilimler sergilediği ve bu davranışların piyasalarda aşırı fiyat hareketliliklerine yol açtığı belirlenmiştir. Bu durum, finansal piyasalardaki belirsizliğin ve irrasyonel davranışların kriz dönemlerinde daha da arttığını, yatırımcı psikolojisi ve davranışlarının anlaşılmasının, krizlerin etkilerinin azaltılmasında ve piyasalarda istikrarın sağlanmasında kritik bir rol oynadığını ortaya koymaktadır.

Anahtar Kelimeler: Finansal Kriz Dönemleri, Davranışsal Finans, BIST, Exponential GARCH Analiz Metodu

JEL Kodları: E44, G01, G15

Citation: Budak, M., & Ayyıldız, S., Behavioural analysis of stock prices during financial crises: The case of Borsa İstanbul, bmij (2025) 13 (3): 1307-1326, doi: <https://doi.org/10.15295/bmij.v13i3.2532>

Introduction

The financial crises that Turkey has experienced in the past have been discussed, and the effects of these crises on stock prices have been examined. In addition, the basic principles of behavioural finance and the common tendencies exhibited by investors during crisis periods have been discussed. Analysing the effects of financial crises on investor behaviour allows for the development of more accurate and effective strategies when faced with similar situations in the future.

Therefore, this study aims to contribute to a better understanding of financial markets by conducting a behavioural analysis of stocks during crisis periods. Behavioural finance theory suggests that investors may act based on emotional and cognitive biases rather than making rational decisions. In our study, it has been revealed that stock investors increase the volatility in the stock market due to emotional decisions during crisis periods.

The study examined the relationship between investor behaviour and stock prices within the framework of Behavioural Finance. It found that price volatility, asymmetric reactions to price movements, and emotional investor behaviours can have a lasting impact during crises, as well as potential implications for future volatility. The present study quantitatively analyses the contribution of irrational investor behaviour to the volatility of stock prices during financial crises. The findings demonstrate that behavioural finance plays a significant role in causing fluctuations in the stock market as a result of the impact of economic downturns.

Conceptual framework

General Concepts and Financial Crisis: In this study, in addition to concepts such as stock, index, brokerage firm, stock analysis (fundamental analysis and technical analysis), as well as concepts such as general price level (inflation), differences in public expenditures, changes in gross national product, changes in exchange rates, gold prices, interest rates, international portfolio investments, changes in money supply (emission), privatisation practices, an analysis was developed on the concept of financial crisis.

Conceptually, Financial Crisis refers to sudden and severe changes in prices and/or quantities in services, goods, production factors or financial markets exceeding acceptable limits (Turgut, 2007). The term economic crisis refers to situations where normal relations are seriously shaken as a result of a social, financial or psychological development. Such crises may occur when unexpected events occur and existing solutions become inadequate. Economic crises, on the other hand, are macroeconomic imbalances that arise as a result of sudden events that seriously affect a country's economy or companies (Delice, 2003). Economic crises are generally divided into two categories: real sector crises and financial sector crises. While real crises manifest themselves through significant contractions in production and employment, financial crises are characterised by financial market collapses that affect the real sector of the economy (Delice, 2003).

As for Financial Crisis Models, the number of theoretical models developed to explain real and financial crises is relatively high. However, each of these models may not be explanatory for all types of crises. Although there are common points between crises, none of them is an exact copy of the other. It is possible to gather these models, each of which focuses on different crisis points, under five main headings (Delice, 2003).

1. Traditional Theories: These models suggest that financial crises usually occur as a result of speculative attacks. The leading causes of crises are usually sudden changes in exchange rates and capital outflows (Delice, 2003).
2. Innovative Approaches: Second-generation models address the complexity and structural changes in financial markets. These models focus on associating crises with the internal dynamics of the economic system and the behaviour of market participants (Delice, 2003).
3. Spread and Contagion Models: These models examine the process of spreading financial crises from one country to another. They try to explain how crises are transmitted through global economic integration and market connections (Delice, 2003).
4. Models Focusing on External Factors: These models emphasise that crises are affected by external factors. It is argued that international trade relations, global economic imbalances, and other countries' policies play a significant role in the emergence of crises (Delice, 2003).

5. Various Approaches: Other models address the interaction of multiple factors and take into account the complexity of inequality. These models typically offer various perspectives and attempt to understand the different dimensions of crises that contribute to inequality (Stiglitz, 2012)

First-generation models, first proposed by Krugman (1979) and subsequently developed by Flood and Garber (1984), emphasise the seriousness of macroeconomic factors that trigger financial crises and attribute these crises to the structural incompatibility of macroeconomic policies. In these models, the incompatibility between fundamental imbalances in economic policies and exchange rate fixing policies is seen as the source of crises (Delice, 2003).

The unsustainable fixed exchange rate model envisioned by Krugman is a crucial step in understanding financial crises, particularly those involving currencies. This model was later developed in different directions and has been subject to criticism. In particular, those referred to as "second generation crisis models" focus on macroeconomic policy problems. In these models, which emerged after the 1992-93 European Currency Crisis, it is widely accepted that the fundamental phenomenon triggering currency crises is sudden changes in expectations of sustainability in macroeconomic policies (Delice, 2003).

The difficulties experienced in explaining the crises in 1994/95 and 1997 led to the development of Spillover/Contagion Effect Models, known as "third generation models". In these models, it is argued that the global integration of financial markets can lead to instability or crisis in any country, which in turn can trigger a crisis elsewhere that cannot be explained by traditional macroeconomic principles. Government policies that create moral hazard are considered the fundamental cause of crises (Delice, 2003).

In models that address external factors, it is generally accepted that these factors are decisive, especially during crises in developing countries. Economic developments in industrialised countries are thought to trigger crises in developing countries. Especially after the 1997-98 crisis in Asia, many models were developed in which microeconomic disorders in the banking and financial sector were the leading cause of the crises (Delice, 2003)

This study numerically analyses the impact of behavioural finance in general, and investor behaviour on BIST stock prices in particular. It also contributes to the literature as one of the few studies that applies the EGARCH method—a more effective tool for future forecasts—to the social-psychological field.

Financial crises in Turkey

Turkey has been affected by both the global and financial crises, which originated from its internal dynamics. The impact of economic problems occurring abroad, especially in 2000 and 2001, was quite significant. Within this framework, Turkey's financial crises have periodically followed a continuous course over 6-10 years. Although Turkey's financial crises have transformed, their economic and social effects have not diminished in significance. It is possible to summarise Turkey's financial crises as follows;

1994 Crisis: Financial liberalisation policies implemented in Turkey since the 1980s have provided a significant increase in foreign capital inflows. During this period, restrictive and guiding regulations affecting financial markets were gradually removed. Legal restrictions on foreign exchange deposits were terminated in 1984, open market operations were initiated in 1987, and Interbank was established in 1988. In addition, with the liberalisation of trade, quantitative restrictions were eliminated, and capital liberalisation was carried out in 1989. However, the implementation of financial liberalisation in an inflationary environment with a high budget and balance of payments deficits led to many adverse effects. This situation revealed that financial liberalisation should be compatible with appropriate timing and economic policies (Toprak, 2010). As a result of these liberalisation steps, the borrowing needs of the public sector increased, causing the interest burden to rise and budget deficits to grow. The main reasons for the 1994 crisis were the failure to sell bonds and bills necessary to finance the public budget, which had a deficit in the 1991-1993 period. This crisis led to the emergence of a financial sector that was easy, sensitive, and far from risk management, based on the need for public borrowing, and the collapse of the fixed exchange rate system. A 13.6% devaluation was realised on January 26, 1994. This situation led to a balance of payments crisis. According to Krugman's predictions, financing public deficits through monetary expansion increased inflation and led to the collapse of the fixed exchange rate system (Engin, 2013). The process that necessitated the transition to the Exchange Rate Based Stabilisation Program began in this way (Ayyıldız, 2014).

2001 Liquidity and Banking Crisis: The financial crisis experienced between November 22 and December 5, 2000, was managed with short-term and temporary solutions to prevent it from turning

into a larger depression. Although this approach temporarily prevented the crisis from deepening, the November Crisis seriously damaged the trust in the monetary and exchange rate policies of the implemented stability program. As a result of negotiations with the IMF, the program was reviewed, and specific financial support was provided to stabilise the markets partially. However, interest rates could not be brought to pre-crisis levels, and the domestic market could not recover (Cihangir, 2005).

During this period, the financial structures of public banks and SDIF banks in particular were seriously damaged due to the risk of devaluation and high interest rates. Ziraat Bank also experienced a constant liquidity crunch and could not fulfil its obligations to the Central Bank. The failure to provide the funds requested by the Ziraat Bank from the Central Bank caused it to return as a TL demander in the fund market. Additionally, on February 19, 2001, there was a demand for foreign exchange of \$ 7.6 billion, which subsequently became a demand for foreign exchange by local banks after foreigners exited the market. The Central Bank was faced with a significant dilemma in controlling liquidity:

When liquidity was released, there was a risk of flight to foreign exchange, and when liquidity was restricted, there was a risk that increasing interest rates would increase banks' debts. As a result, the crisis increased both interest and foreign exchange risks, leading to a severe banking crisis (Cihangir, 2005).

Although Turkey entered a recovery process after the 1994 crisis, capital flight occurred between 1994 and 1999 due to events such as the Southeast Asian crisis and the Russian crisis. Exchange rate flexibility was a crucial element that mitigated the adverse effects of these crises. In countries that are open to external shocks, exchange rate flexibility is necessary for price adjustments. In 1999, an "Inflation Reduction Program" was signed with the IMF to address the inflation problem and reform the public domestic borrowing mechanism, stimulating demand through this program. The rapid increase in domestic demand and the weakness in the banking sector led to the Euro losing value against the Dollar and the Turkish Lira gaining value against the Euro in real terms. This situation negatively affected exports to European Union countries while causing imports from these countries to increase rapidly. In 2000, high increases in international markets, especially in crude oil prices, and a rapid recovery in domestic demand disrupted the foreign trade balance. Increasing anxiety, combined with the fragile structure of the banking sector and liquidity problems, led to the November crisis. Although this crisis initially appeared to be a liquidity problem specific to Demirbank, its real cause was the financing difficulties of those holding public domestic debt papers. The increasing demand caused interest rates and exchange rates to rise, as the market was unable to meet this situation. Overnight repo interest rates reached 1700-2000% within three days. It is stated that approximately 6.2 billion dollars of foreign capital exited the economy. Turkey managed to repel the intense speculative attack on its foreign exchange in November 2000 with high interest rates, significant losses in foreign exchange reserves, and an additional IMF loan of \$ 7.5 billion (Engin, 2013).

2008 Crisis: Turkey has a long history of being sensitive to economic crises. While local factors contributed to some of these crises, others were influenced by developments in international markets. For example, the 2000 and 2001 crises were caused by weak local economic management, while the 1929 and 1999 crises were affected by turmoil in international markets. Economic crises typically originate in financial markets and spread to the real economy through contagion, ultimately affecting the entire economy. Therefore, it is crucial to investigate the impact of the global economic crisis on the Turkish economy. However, it has been observed that these effects are initially evident in financial markets and then become apparent in the real economy. The Turkish economy is significantly affected by global economic crises. It has been observed that these effects originate in financial markets and subsequently impact the real economy. Therefore, economic management needs to implement effective policies and increase economic resilience during crisis periods (Yıldırım, 2010).

2018 Crisis: The policy rate hikes that began in the US in late 2015 signalled that capital inflows would decrease in countries like Turkey and that a new era was entering international markets. Turkey had postponed the problems arising from global financial conditions by encouraging credit expansion by policymakers to maintain high growth following the coup attempt in 2016. However, the cost of this postponement began to be felt in 2017. Although the Turkish economy grew by 7.4% in 2017, interest rates increased as international credit conditions tightened. While interest rates rose in the domestic market as the government borrowing limit was exceeded, the Turkish Lira lost value rapidly. Although this situation is not comparable to the losses in 2018, when the value of the Turkish Lira against the US dollar decreased by 41%, it was still significant. While the share of hot money in financing the current account deficit increased rapidly in 2017, it was observed that growth did not reduce unemployment (Güngen, 2018). Understanding investor behaviour during financial crisis periods is vital to maintaining market stability and mitigating the effects of crises (Aktaş, 2005).

Behavioural finance

Theories on which traditional approaches in the financial world are based are based on the idea that people behave rationally and that they are expected to benefit. However, studies conducted in recent years have shown that these traditional models cannot adequately explain behaviour in financial markets. For this reason, a new approach called behavioural finance has been developed (Aytekin & Aygün, 2016). Although behavioural finance has gained a foothold in the literature relatively recently, there is an understanding that this approach is rooted in unconscious processes based on the origins of people's investment and consumption habits (Güngör and Demirel, 2018). Investors' unconscious, excessive speculative movements cause the market balance to deteriorate due to excessive price volatility (Keskin, 2024a: 85).

In 2001, the global financial crisis, especially in the US, shook investors' confidence in the markets. Such large-scale adverse developments increased investors' concerns about the future and increased interest in alternative approaches that examine stock market movements and investor decisions. This led to the emergence of the behavioural finance approach, which argues that investors are not always rational and that market movements cannot always be explained by logical reasons, as opposed to the traditional finance approach (Aytekin & Aygün, 2016). Traditional finance theories generally assume that people are sane. However, these theories cannot adequately answer questions such as why investors trade, how they trade, how they form their portfolios, and why stock returns may change. Behavioural finance, on the other hand, was founded by Kahneman and Tversky with the Expectation Theory developed in 1979. This theory suggests that people approach gains and losses in distinct ways, valuing perceived risk more than expected risk. Studies by Kahneman and Tversky have shown that individuals begin their decision-making processes from reference points and evaluate events based on these points (Aytekin & Aygün, 2016).

Specific non-economic trends affecting investors

It has been demonstrated that people often deviate from rationality and employ mental shortcuts when making decisions under uncertainty. These mental shortcuts are cognitive processes that enable people to make decisions quickly and easily, but can sometimes lead to incorrect results. In the decision-making process, decisions are usually made based on past experiences rather than using reason. During this process, people may make decisions without reviewing all the information or systematically considering all the options. Although this saves time in the decision-making process, it can lead to biased decisions and the emergence of various judgment errors and biases (Aytekin & Aygün, 2016). Both reason and emotions play an essential role in making financial investment decisions. However, these decisions are usually shaped by emotional and unconscious factors rather than a logical approach (Aydin & Ağan, 2016).

➤ Self-Delusion

This section includes overconfidence, overoptimism, self-attribution, self-correction, the foresight fallacy, cognitive dissonance and conservatism.

➤ Overconfidence

When investors have a high sense of confidence, they may think that they can consistently achieve positive returns regardless of market conditions. One of the biases frequently encountered in behavioural finance research is the overconfidence bias. This bias is defined as investors' excessive trust in their own knowledge and abilities, and it significantly affects the functioning of financial markets and investor behaviour (Çetiner, Gökçek, & Gölbaşı, 2019).

➤ Over-Optimism

In this tendency, people exaggerate their positive characteristics and achievements; they believe that everything is fine, that they are more talented and skilled, and that they can make better decisions than others in situations of uncertainty or risk. Similarly, they evaluate their negative aspects as less important or effective than the truth (Sever, Çetiner, Paksoy, 2020). The over-optimism tendency is associated with a belief that events can be predicted and a tendency to attribute positive outcomes to personal control, while attributing bad outcomes to chance. In addition, tendencies such as believing in the existence of magical thoughts that can influence the market and embracing fortune-telling can also lead to overconfident decisions (Aytekin & Aygün, 2016).

➤ **Illusion of Control**

It can be explained by a hypothetical lottery game made by Ellen Langer from Harvard University. In this game, participants wanted to pay more for coupons created with numbers they chose than for randomly chosen numbers (Aytekin & Aygün, 2016).

➤ **Self-Confirmation-Confirmation**

This tendency refers to people insisting on a decision and sticking to their beliefs, even if their judgment about the decision is wrong. This situation manifests as individuals having difficulty changing their own beliefs, failing to consider opposing information, and being reluctant to abandon their current views (Sever, Çetiner, Paksoy, 2020). The tendency of people to look for evidence that supports their hypotheses is called "confirmation bias". This bias generally indicates that people tend to focus more on evidence that is consistent with their strong beliefs and give it more importance. For example, if you believe that an investment strategy is profitable for you, you may give more weight to information that supports this strategy and ignore opposing views. In this case, a person may tend to reject evidence, even if it is weak, to protect their hypothesis (Aytekin & Aygün, 2016).

➤ **Foresight Fallacy**

This is based on the fallacy that the outcomes of events are predictable and known after they occur. After seeing and understanding the result of an event, people often act like "I knew it beforehand." This attitude can cause people to think that their predictive abilities are actually above average (Aytekin & Aygün, 2016).

➤ **Cognitive Dissonance**

American social psychologist Leon Festinger developed the Theory of Cognitive Dissonance. According to this theory, the concept of "cognition" lies at the basis of human behaviour. Cognition is related to the ability of a person to access information, be aware and make judgments. Cognitive Dissonance Theory states that people shape their behaviours and thoughts according to their past values. These values may include elements such as beliefs, attitudes and needs. These values, which we gain over time or under the influence of environmental factors, shape our personality (Aytekin & Aygün, 2016).

➤ **Conservatism**

People are generally resistant to change or adapt slowly to change. This is because people feel safe in situations they are used to. The conservatism dilemma is related to resistance to change and is closely related to the exemplification dilemma. When changes occur, people tend to react with a conservative approach, but over time, they begin to normalise the situation. As new information emerges, conservatism may become more pronounced (Aytekin & Aygün, 2016).

➤ **Shortcut Inferences**

Individuals encounter limitations, such as time and complexity, while attempting to achieve optimal and rational results in the decision-making process. Due to these limitations, they may have to make quick decision analyses. However, in this rapid decision-making process, there is a possibility of making mistakes, consciously or unconsciously. Therefore, the use of shortcuts is crucial for effective time management (Aytekin & Aygün, 2016).

➤ **Noticeability**

When individuals have recently experienced rare events (e.g. war, plane crash, earthquake, etc.), they tend to overestimate the probability of a similar event occurring again in the future. This is due to the event's notoriety and may cause investors to overreact to the newly acquired information set (Aytekin and Aygün, 2016). Individuals usually base their decision-making processes on the data set they first acquired. When faced with a complex situation, it may be challenging to create this initial data set; therefore, they act based on information and news sources they are familiar with. For example, investors tend to prefer stocks that are frequently discussed in newspapers and on television, or they may prefer stocks that have gained or lost the most during specific periods. They also tend to invest in the stocks of the companies they work for. (Aytekin & Aygün, 2016).

➤ **Possibility Bias**

The possibility bias is the tendency for people to place greater value on information that is easily accessible when making decisions. While investors generally focus on publicly available information that is easily accessible, they may sometimes place greater importance on information whose source is uncertain or whose reliability is questionable. For example, they may tend to overvalue advice from a

friend or an expert working in the stock market. Rumours about a bank may attract more investor attention than the bank's actual information (Aytekin & Aygün, 2016).

➤ **Choosing Between Signals**

When creating a data set, signal selection plays a critical role in the decision-making phase. Individuals often refer to the most evident and impressive signals to conclude without considering their accuracy. This may lead some people to believe in magical or supernatural abilities if irrelevant signals and data are used. For example, an investor may make irrational decisions, such as buying a stock "on instinct". (Aytekin & Aygün, 2016).

➤ **Anchoring**

When individuals need to estimate a considerable value that they do not know, they usually create a specific starting point in their minds and adjust their subsequent information and analysis according to this starting point. This starting point can be due to the formulation of the problem or a narrow calculation. In both cases, the corrections made are usually insufficient. In other words, different starting points can lead to estimating the direction of the starting values in various ways. This situation is called the "anchor and correction" mental shortcut. (Aytekin & Aygün, 2016).

➤ **Rational Accounting**

Individuals may sometimes calculate and save their wealth separately instead of evaluating it as a whole. For example, a student may divide his income into two parts and spend one part to meet his needs while saving the other part for entertainment. In this case, the student may manage the money he saves for entertainment separately and spend it as he wishes, while being more careful with his daily expenses. For example, a person may borrow to buy a car with high interest rates while at the same time continuing to save for a retirement fund with low interest rates. (Aytekin & Aygün, 2016).

➤ **Emotions and Self-Control**

In addition to being perceived by people as states such as happiness or sadness, emotions can also be considered as a phenomenon shaped by a different impulse, such as good or evil. Since humans are emotional beings by nature, this can lead to making wrong decisions and encountering undesirable consequences as a result of these emotional tendencies. In general, emotional factors play a more prominent role than cognitive factors when it comes to short-term decisions, while they are more effective in long-term decision-making processes. (Aytekin & Aygün, 2016).

➤ **Mood**

The mood of individuals is directly reflected in their behaviours and decisions, and can sometimes lead to irrational results. When they are happy, they tend to be optimistic, and when they are unhappy, they tend to be pessimistic. When they are in a good mood, they are generally optimistic and tend to make positive choices. However, when they are in a bad mood, they tend to be more pessimistic and make negative choices. This mood can negatively affect investors' buying/selling decisions (Aytekin & Aygün, 2016).

➤ **Time Preference and Self-Control**

When individuals have to make a choice, they discount the value of long-term events to the present using a specific discount rate. This discount rate can take on different values, being affected by the current psychological state (Çitilci, 2014: 68). This tendency reflects investors' tendency to internalise their successes as well as their tendency to attribute their failures to external factors. Therefore, investors who achieve success tend to rely more on their information when deciding on price movements, with greater confidence in their information processing abilities. This situation can create an inverse relationship between changes in a particular company's income and the sector average return. (Aytekin & Aygün, 2016).

➤ **Avoiding Uncertainty**

Avoiding uncertainty means that people tend to prefer risks based on known probabilities rather than unknown probabilities (Aytekin & Aygün, 2016).

➤ **Social Interaction**

The findings obtained in a study examining the relationship between social interaction and stock market participation are pretty remarkable. First, the study determined that households that actively interact with their neighbours or attend church are more likely to invest in the stock market compared to non-social households. This indicates that the social environment affects individuals' investment decisions

(Aytekin & Aygün, 2016). Second, it was observed that social interaction is more pronounced in states with higher stock market participation rates. This indicates that social interaction plays a significant role in increasing interest in stock investment (Aytekin & Aygün, 2016).

It was determined that the difference between social and non-social households widened in the later periods of the 1990s. This finding suggests that the importance of social interaction and social networks has increased, becoming a significant influencing factor in investment decisions. These findings support the hypothesis that social interaction encourages participation in the stock market (Aytekin and Aygün, 2016).

➤ **Social Contagion**

The term social contagion first entered the literature in 1896 with the work of Gustave Le Bon. This concept refers to the rapid spread of behaviours, emotions, and thoughts among individuals within a society and the profound transformation that occurs when individuals interact within a social crowd. In this process, individuals who are influenced by the crowd usually adapt to group norms and adopt the generally accepted behaviours of society. For this reason, social contagion is traditionally considered an essential factor that shapes the collective behaviours of society (Aytekin & Aygün, 2016).

➤ **Herd Behaviour**

Herd psychology describes the situation where a group of investors buy or sells the same stock at the same time. In relation to this concept, two basic hypotheses stand out in the literature: the Information Asymmetry Hypothesis and the Observer/Impulse Hypothesis. The Information Asymmetry Hypothesis is about investors with limited information following more knowledgeable ones and performing similar transactions. In this context, two types of herd behaviour can be distinguished:

1. Rational herd behaviour: In this case, the investor joins the herd knowingly and willingly. This preference may be based on the idea that other investors have better and more accurate information about investment returns or that analysing on one's own is costly and time-consuming (Aytekin & Aygün, 2016).

2. Irrational herd behaviour: In this case, the investor joins the herd based entirely on psychological factors. Psychological biases such as avoiding breaking away from the general majority due to fear of failure and biased beliefs that one will be more successful by following the general majority may cause the investor to join the herd without questioning her/his decision (Keskin, 2024a).

Other Non-Economic Trends Affecting Investors

➤ **Expression**

The framing effect was first identified in a survey study conducted by Kahneman and Tversky in 1979. This effect reveals that the presentation style, as well as the risk level of the alternatives, plays a significant role in investors' decision-making processes. (Aytekin & Aygün, 2016).

➤ **Gambler's Fallacy**

This type of fallacy leads people to make wrong predictions when the trend reverses. This situation can lead investors to believe that the positive or negative changes in market returns have come to an end. This situation, known as the gambler's fallacy, can also be evaluated as excessive faith in the arithmetic mean in regression. The trust in the arithmetic mean in regression can affect many people as they approach the extreme trends of the system. The arithmetic mean can sometimes be misperceived, which can lead to the misconception that, for example, an upward trend should be followed by a downward trend due to the law of averages (Aytekin & Aygün, 2016).

➤ **Loss Aversion**

Research in behavioural finance shows that people feel great sadness when they lose their wealth or money. This fear of losing is perceived as a greater mental punishment than a gain of the same size. Tversky and Kahneman began with this idea when explaining the differing attitudes individuals have towards risks related to gains and those related to losses. This difference is called risk or loss aversion. It is also important to remember that the basic assumption of economic theory is that investors avoid risk (Aytekin & Aygün, 2016).

➤ **Avoiding Regret**

Studies show that when people think about the possibility of losing in the future, they tend to turn to safer investment options and strengthen their risk-avoidant behaviours. These concerns also reveal that the mental pain people feel can go beyond financial pain. Some people can feel great regret even for

small mistakes, and this feeling can sometimes cause them to miss meaningful investment opportunities. For this reason, people generally tend to turn to options they see as safer for themselves instead of unknown investments (Aytekin & Aygün, 2016).

Comparison of stocks in the BIST 100 Index in terms of economic crisis and behavioural finance

Emotional effects in crisis periods

During times of crisis, the price movements of stocks included in the BIST 100 index are often accompanied by increased emotional reactions. Especially during times of increased crisis expectations or economic uncertainty, investors may tend to sell their stocks out of anxiety and panic. This may cause significant declines in the BIST 100 index as a whole.

The impact of behavioural finance

Behavioural finance examines the emotional and psychological effects on investors' decision-making processes. During times of crisis, it can be observed that these effects are more pronounced on stock prices. Panic sales or extreme anxiety by investors can lead to unpredictable and sudden price fluctuations.

The effect of psychological factors

Psychological factors can affect investors' decision-making processes during times of crisis. For example, economic uncertainty or political tensions can increase investors' tendency to avoid risk. In this case, selling pressure and price declines can be observed in stocks in the BIST 100 index.

Predictability of price movements

In times of crisis, the predictability of movements in stock prices is generally low. Behavioural finance emphasises that traditional analysis methods may not fully explain price movements and that it is essential to take investor psychology into account. Therefore, it may be difficult to predict the price movements of stocks in the BIST 100 index during times of crisis.

As a result, when evaluating the prices of stocks in the BIST 100 index, it is crucial to consider the effects of the crisis and behavioural finance. Investors' emotional reactions and the impact of psychological factors on stock prices during times of crisis may reveal the limitations of traditional financial analysis methods and reduce the predictability of price movements.

An application and findings on the effects of behavioural finance on Borsa Istanbul during financial crisis periods

Literature review

It is possible to examine the literature studies in three parts. This study comprises three parts. The first part of the literature review includes studies evaluating investor behaviour in terms of behavioural finance. The second part encompasses foreign studies on the relationship between stock markets during crisis periods. The third part features studies on Borsa Istanbul and economic crises.

Among the studies evaluating investor behaviour in terms of behavioural finance, Keskin and Aytüre (2024) examined the existence of herd behaviour in Croatian, Polish and Romanian stock exchanges with the help of three different models. The study covers the period 2013:1-2023:12. In the first method, herd behaviour was observed in upward market conditions in all three countries' stock exchanges. In contrast, in the second method, herd behaviour could not be proven in any of the stock exchanges. In the third method, emotional herd behaviour was detected in the Romanian stock exchange under extreme downward market conditions. Keskin (2024b) concluded in his study that investment decisions affected by psychological and sociological variables could easily become irrational. Keskin (2024d) examined the behavioural patterns in which investors go beyond the boundaries of logic in their investment decisions and become dependent on financial assets through case studies.

Ah Mand et al. (2023) examined herd behaviour in Malaysian stock markets and found herd behaviour in Sharia law. Chiang & Zheng (2010) concluded that investors in developed market economies, except for the USA, exhibited herd behaviour. Kameda & Hastie (2015) concluded that herd behaviour is not only related to investments but also encountered in daily life, up to asset dependency. Gray et al. (2007) emphasised that the formation of incorrect prices of assets is a phenomenon resulting from herd behaviour. According to Kindleberger (2007), it is explained by the irrational decision-making of investors and the life cycle of price bubbles. This cycle includes displacement, explosion, madness, crisis and change of thoughts. Eguiluz & Zimmermann (2000) examined the herd behaviour processes of

investors in their studies. Blanchard and Watson (1982) concluded from their studies that investors may make irrational decisions to achieve high returns with high risk in price bubble modelling. Tversky and Kahneman (1974) contributed to behavioural finance with their "Prospect Theory" in their work, and since then, it has become a popular topic in behavioural finance literature.

Some of the foreign studies on the relationship between stock markets during crisis periods are as follows: Lukanima et al. (2024). This study contributes to the discussion on the impact of stock markets on the integration goal.

Avgouleas'in (2010) states that financial crises cannot be explained only by traditional economic models, but also human behaviours and psychological factors must be taken into consideration. According to him, financial crises represent a complex situation that includes economic models and behavioural processes.

Ruzgar & Chua-Chow (2023) in this study: Countries are greatly affected by financial and fiscal crises. Economic crises have the worst impact not only on society but also on the economy. The Canadian economy has experienced several financial crises and recessions over the last century. In this study, the daily closing stock prices of five central Canadian banks were examined in the previous five crisis periods. It aimed to determine the most effective or dominant index prices on the daily closing stock prices of banks during crisis periods.

Gounaris, K. M., & Prout, M. F. (2009). The study examines the effects of economic crises on trust relationships between individuals and institutions. The article discusses the negative consequences of a loss of trust in the financial services sector on customer relations and business performance. A study examines the effects of economic crises on trust relationships between individuals and institutions. The article discusses the negative consequences.

Celebi & Hönig (2019) investigated the impact of macroeconomic factors, including German government bond yields, sentiment, and other leading indicators, on the main German stock market index, the DAX 30, over the period from 1991 to 2018.

Grima & Caruana (2017) presented the findings of an analysis conducted to determine whether it was affected by the US financial stress during the 2008 Financial Crisis.

Grout & Zalewska (2016) investigated the market risk of the industrial, banking and utilities sectors before and during the crisis. Among other results, they found a positive relationship between the increase in industrialists' market risk during the crisis across the G12 countries and both the pre-crisis market risk of the banking sector and the scale of the systemic crisis in a country.

Grosse, R. (2012). Underscores that financial crises frequently stem from irrational behaviour and flawed decision-making processes. It further assesses the influence of these behavioural factors on banking regulations and institutional frameworks. Grosse advocates for optimal stability in this context.

As evident in the studies examining the relationship between crisis periods and stock values, this is a fascinating topic. Researchers have contributed to the literature on the subject in each period.

Examples of studies conducted on the subject in Turkey are as follows: Doğan (2022) analysed the Adaptive Market Hypothesis during the global financial crisis periods using Natural Bootstrap Automatic Variance Ratio and Automatic Portmanteau tests in the XU030, XU100, XUSIN, XBANK, XTRZM, XGIDA, XTEKS indices. In the study, it was concluded that the examined indices were compatible with the Adaptive Market Hypothesis.

Taşkın (2011) conducted a study aiming to determine the internal/external factors affecting the performance of Turkish commercial banks operating in the banking sector between 1995 and 2009. The research results revealed that micro variables primarily determine banking performance, and that macroeconomic factors have no statistically significant impact. In addition, the adverse effects of the 2001 crisis in general indicate that the general stability of the economy positively affects bank performance.

Karan and Uygur (2001) conducted a study examining the relationship between the days of the week and January effects and firm size in the Istanbul Stock Exchange (ISE) during the 1991-1998 period. In this study, 10 portfolios were created according to different firm sizes. As a result of the study, it was found that Friday returns were high and statistically significant in all portfolios in the ISE. However, it was determined that the differences in returns between the days of the week were more pronounced and essential in portfolios with large market values. In addition, it was determined that the January effect was also present on the ISE index returns and that this effect varied depending on the firm size.

Dicle & Kabir (2007) conducted a study covering all the indices of the Istanbul Stock Exchange and used the AR-GARCH-M model for the period between 1987 and 2005. The study revealed the existence of the day-of-the-week effect. It was determined that the negative returns obtained, especially on Mondays, were statistically significant. To check the accuracy of these findings, the inverses of the differences between the means were also analysed, and similar results were obtained.

Umutlu, Ertürk and Sezer (2010) investigated the effects of the 2008 crisis on the ISE100 index using k-month data in the period 2003-2010. In this context, they analysed the TL/USD exchange rate, the producer price index (PPI), the ISE 100 Index, the consumer price index (CPI), the S&P 500 Index, and deposit interest rate data. In the study, ordinary least squares (OLS) and Granger causality tests were applied. The findings showed that the ISE100 Index was explained by variables such as the exchange rate, the S&P 500 Index, and the interest rate. These results revealed that these macroeconomic variables significantly affected the ISE100 index during the crisis period.

Methodology and data

In this study, the EGARCH (1,1) model was applied to examine volatility in financial markets. Empirical research has shown that the returns of most financial assets exhibit fat-tailed (leptokurtic) characteristics and volatility clustering. This phenomenon leads to changes in the variance of return series over time. Therefore, instead of models based on constant variance assumptions, models that acknowledge the time-varying nature of variance, such as the Generalised ARCH (GARCH) and GARCH family models, are preferred for high-frequency time series.

GARCH Mode

The GARCH model was developed by Bollerslev (1986) as an extension of the ARCH model. The GARCH model is a generalised version of the ARCH model, incorporating the conditional variance's past values. The GARCH (p,q) model is defined as follows:

$$y_t = \gamma x_t + \epsilon_t \quad (1)$$

$$(\epsilon_t | \epsilon_t - 1, \epsilon_t - 2, \dots) \sim N(0, h_t) \quad (2)$$

$$h_t = \omega + \alpha_1 \epsilon_{t-1}^2 + \alpha_2 \epsilon_{t-2}^2 + \dots + \alpha_p \epsilon_{t-p}^2 + \beta_1 h_{t-1} + \beta_2 h_{t-2} + \dots + \beta_q h_{t-q} \quad (3)$$

In equation (1), (x_t) represents an exogenous variable, while (ϵ_t) denotes the random error term. In Equation (3), (h_t) represents the conditional variance of the return at time (t). The coefficient (α_i) represents the ARCH term, which accounts for past squared error terms, while (β_j) denotes the GARCH term, which reflects the past values of the conditional variance.

The GARCH (p,q) model allows the conditional variance of the random distribution to have a linear relationship with past squared errors and past values of conditional variance.

In the GARCH (p,q) process, the sum of the parameters ($\alpha_i + \beta_j$) represents the persistence of shocks. If ($\alpha_i + \beta_j < 1$), the impact of shocks on volatility decreases over time. On the other hand, if ($\alpha_i + \beta_j > 1$), the effect of shocks on volatility increases over time. If ($\alpha_i + \beta_j = 1$), the impact of shocks on volatility becomes infinite, making the GARCH model unsuitable for application in such cases (Chou, 1988).

EGARCH Model

The EGARCH (Exponential GARCH) model, developed by Nelson (1991), was created to overcome the positivity constraint of the GARCH model and to measure the asymmetry in the responses of financial returns. The model is defined as follows:

$$\log(h_t) = \alpha_0 + \alpha_1 \epsilon_{t-1} + \alpha_2 \epsilon_{t-2} + \dots + \alpha_p \epsilon_{t-p} + \beta_1 \log(h_{t-1}) + \beta_2 \log(h_{t-2}) + \dots + \beta_q \log(h_{t-q}) + \gamma_k \left(\frac{\epsilon_{t-k}}{h_{t-k}} \right) \quad (4)$$

In equation (4), α_0 is the constant term, α_i and β_j represent the standard ARCH and GARCH terms, respectively. The parameter γ_k is the leverage parameter, which indicates the asymmetry in the response of conditional variance to shocks. If γ_k is significant ($\gamma_k \neq 0$), the effect of shocks is asymmetric. If $\gamma_k < 0$ and significant, a positive shock in the past period increases volatility more than a negative shock. If $\gamma_k > 0$ and significant, a negative shock in the past period increases volatility more than a positive shock.

This model does not impose any positivity constraint on the EGARCH parameters, allowing it to capture the asymmetry in financial returns' responses accurately.

Empirical model application results

Price series exhibiting a random walk generally do not show stationarity at the level (Herwartz, 2004: 197). Therefore, it is essential to examine the descriptive statistics of the variables and check the stationarity of the series. Additionally, the high frequency of logarithmic price series and the time-dependent variability of their error terms necessitate controlling for changing variance (ARCH effect). In this context, the descriptive statistics for BIST indices are presented in Table 1 below.

Table 1: Descriptive Statistics for BIST Indices

Indexes	BIST Tourism Data	BIST 100 Data	BIST Industrials Data	BIST Banks Data	BIST Electricity Data	BIST Textile Leather Data	BIST Basic Metal Data	BIST Food Beverage Data
Average	67,27	511,26	417,78	479,08	29,14	144,47	398,28	423,06
Median	61,27	525,93	369,69	458,77	26,72	120,75	414,39	379,15
Maximum	289,4	999,57	998,5	999,79	86,9	851,97	999,15	999,32
Minimum	11,67	71,6	52,89	105,9	9,2	21,2	31,47	65,03
Std Deviation	36,76	274,74	248,38	295,04	11,21	135,56	251,49	265,29
Skewness	2,29	-0,04	0,34	0,26	1,66	2,26	0,14	0,67
Kurtosis	9,31	-1,25	-1,08	-1,47	4,19	6,03	-1,08	-0,66
Jarque-Bera	22411,96623	289,195417	276,036077	204,662399	5954,368876	11801,82288	176,709431	269,027423
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The data set in our study was taken from BIST. Price data sets were taken into consideration daily. Descriptive statistics of BIST indices are given in Table 1. When the standard deviation values of all indices are compared, the highest volatility is observed in the BIST Banks Data index. In contrast, the lowest volatility is observed in the BIST Electricity Data index. When we examine the skewness values, it is evident that the distribution of all stock market index returns is asymmetric. While the BIST Electricity Data index has a right-skewed distribution, the returns of all other stock market indices are left-skewed. The kurtosis value determines whether the series exhibits leptokurtic features, and the critical value is 3. The kurtosis value of all BIST index returns is above 3, indicating that all series exhibit fat-tailed features and are therefore leptokurtic. When the Jarque-Bera values testing the normality assumption of index earnings series are examined, it is concluded that no index return series has a normal distribution.

Augmented-Dickey-Fuller (ADF) Test, Stationarity tests of index return series, Philips-Perron (PP) Test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test were performed using. ADF and PP test results, null hypothesis testing the existence of a unit root for all return series was rejected at 1% significance level. On the other hand, the KPSS test results show that the null hypothesis testing the existence of stationarity for all index return series was accepted at a 1% significance level. In this case, all index return series are accepted as stationary at the I(0) level.

In addition, the ARCH test was applied to check the existence of heteroscedasticity in the index return series. ARCH test results show that the null hypothesis, suggesting that there is no variance in the error terms of all index returns, was rejected. This situation reveals that the error terms of all index return series have an ARCH effect. Graphical representations of Turkey and other index return series are given in the relevant graphs.

Table 2: Stationarity Tests of Index Return Series

Indexes	BIST Tourism Data	BIST 100 Data	BIST Industrials Data	BIST Banks Data	BIST Electricity Data	BIST Textile Leather Data	BIST Basic Metal Data	BIST Food Beverage Data
ADF Statistic	-5,8389	-0,9364	-1,8483	-1,5650	-4,4562	-5,5267	-1,5121	-1,6835
ADF P Value	0,00	0,775734	0,356731	0,501124	0,000236	0,00	0,527511	0,439631
KPSS Statistic	2,819761	9,957551	9,683846	5,823909	4,536041	7,766691	8,112148	8,191306
KPSS P Value	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
LM Statistic	505623,3	2524759	2143480	561773,6	598967	812129,7	1205833	1125585
LM P Value	0	0	0	0	0	0	0	0

Stationarity tests of index return series were performed using the Augmented-Dickey-Fuller (ADF) Test, the Phillips-Perron (PP) Test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test. According to the results of ADF and PP tests, the null hypothesis testing the existence of a unit root for all return series was rejected at a 1% significance level. On the other hand, KPSS test results show that the null hypothesis, suggesting that stationarity exists for all index return series, was accepted at a 1% significance level. These findings reveal that all index return series are stationary at the $I(0)$ level.

In addition, the ARCH test was applied to examine the existence of heteroscedasticity in index return series. The results of the ARCH test show that the null hypothesis that there is no heteroscedasticity in error terms in all index returns was rejected. This situation reveals that the error terms of all index return series carry the ARCH effect. The graphs of Türkiye and other index return series are presented in Figures 1, 2, 3, 4, 5, 6, 7

Table 3: ARCH Test Results

Endeksler	BIST Tourism Data	BIST 100 Data	BIST Industrials Data	BIST Banks Data	BIST Electricity Data	BIST Textile Leather Data	BIST Basic Metal Data	BIST Food Beverage Data
ARCH Statistic	4963,53416	4395,686672	4066,397015	1984,184488	4962,226772	4977,60951	3416,262665	2900,318813
ARCH P Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Additionally, the ARCH test was applied to examine heteroscedasticity in the index return series. The test results indicate that the null hypothesis, which states there is no heteroscedasticity in the error terms of all index returns, is rejected. This finding reveals that the error terms of all index return series have an ARCH effect. The graphs (figures) for Turkey and other index return series are presented in the relevant sections.

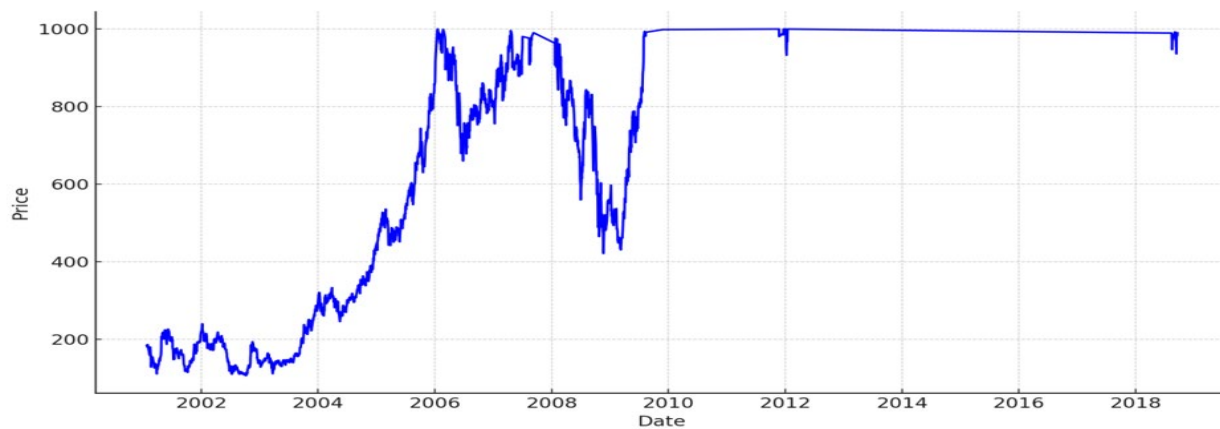


Figure 1: BIST Bank Stock Price Data

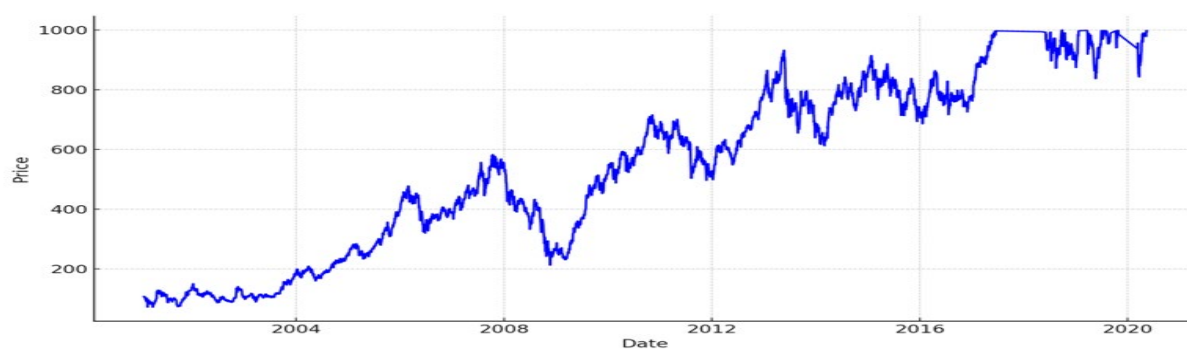


Figure 2: BIST 100 Stock Price Data

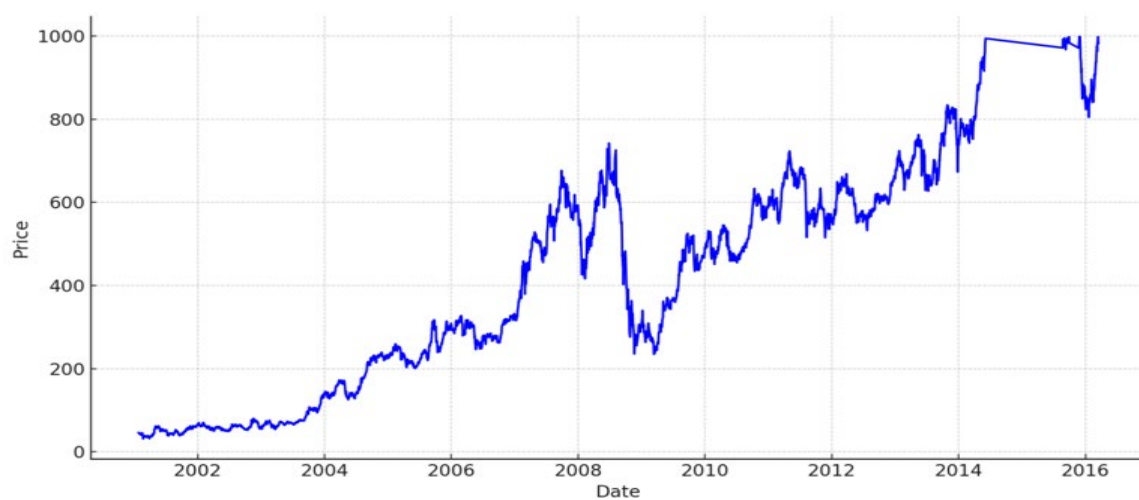


Figure 3: BIST Metal Stock Price Data



Figure 4: BIST Electricity Stock Price Data

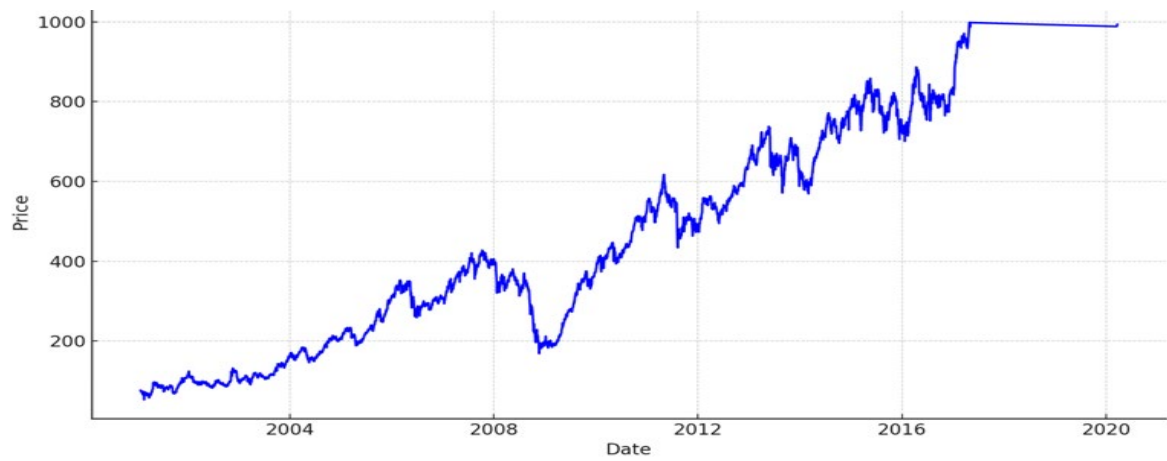


Figure 5: BIST Industrial Stock Price Data



Figure 6: BIST Tourism Stock Price Data

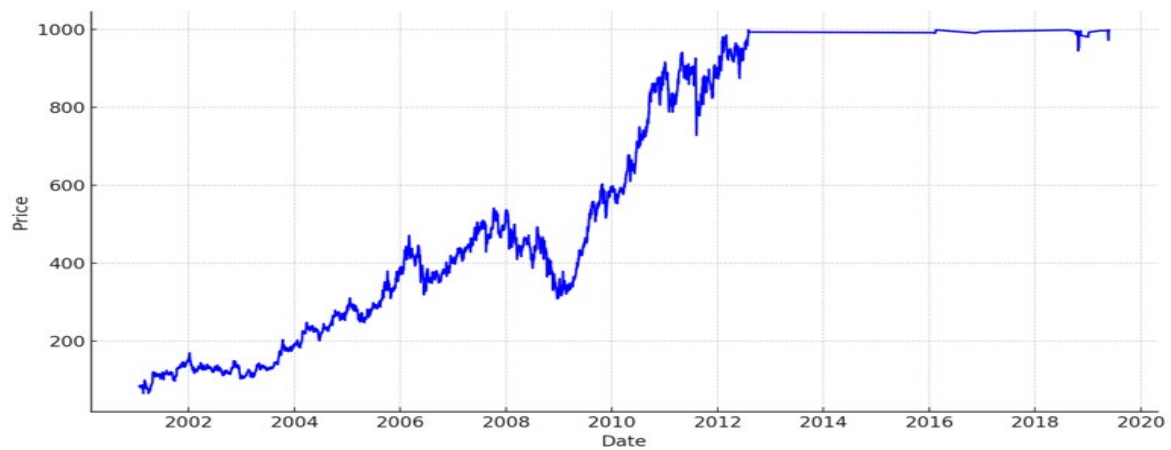
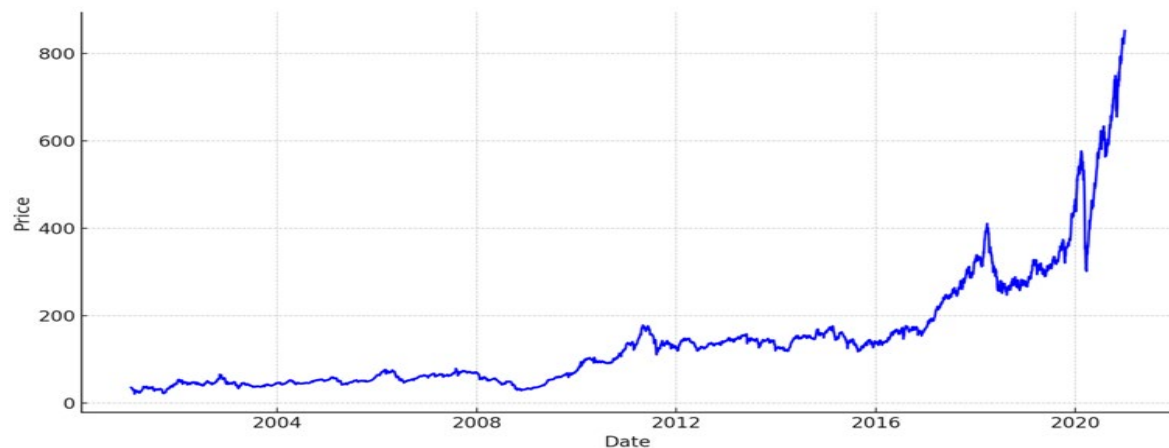


Figure 7: BIST Food, Beverage Stock Price Data



The data in tables (1-3) and graphs (1-7) show how BIST indices performed in different periods and how they reacted to certain economic events. When the skewness and kurtosis values are examined, the price series of the index are skewed to the right or left (asymmetric) and are leptokurtic series showing fat tail properties. When the Jarque-Bera values are examined, it is seen that none of the price series of the index has a normal distribution. According to the ADF and PP test results, the price series of the index does not contain a unit root. According to the KPSS test results, the price series of all indices are stationary at $I(0)$. According to the ARCH test results, the error terms of the price series of the index change over time.

Interpretation of the EGARCH (1,1) model results

For the EGARCH (1,1) model to be interpretable, the parameters estimated in the model must be statistically significant. In this context, the estimated parameters for each BIST index are presented in the table below:

Table 4: BIST Index Estimate

Index	BIST Tourism Data	BIST 100 Data	BIST Industry Data Endüstri	BIST Bank Data	BIST Electricity Data	BIST Textile Leather Data	BIST Basic Metal Data	BIST Food Beverage Data
Parameter	mu	mu	mu	mu	mu	mu	mu	Mu
Coef	58.7999	550.3446	370.6619	478.8957	26.077	140.7623	511.39	418.1148
std err	0.02277	0.57	0.192	0.996	0.02491	0.1	0.57	0.354
T	2582.543	966.113	1932.398	480.754	1046.964	1406.529	896.45	1180.217
P> t	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.0% Conf. Int.	[58.755, 58.844]	[5.492e+02, 5.515e+02]	[3.703e+02, 3.710e+02]	[4.769e+02, 4.808e+02]	[26.028, 26.126]	[1.406e+02, 1.410e+02]	[5.103e+02, 5.125e+02]	[4.174e+02, 4.188e+02]

The following analyses were conducted to interpret the significance of the estimated parameters of the EGARCH (1,1) model:

ARCH Parameter (α_i): It is positive and significant for all BIST indices. This situation illustrates the impact of past-period shocks on current-period volatilities. Past-period shocks in BIST indices increase current-period volatility.

GARCH Parameter (β_j): It is positive and significant for all BIST indices. This parameter measures the effect of past period volatilities on current period volatilities. In all indices, it was observed that increases in past-period volatility led to higher current-period volatilities.

Leverage Parameter (γ_k): It is negative and significant for most BIST indices. This situation shows that negative shocks increase volatilities more than positive shocks. Adverse shocks create more uncertainty in the markets.

The EGARCH (1,1) model is a suitable model to analyse the volatility structure of BIST indices. According to the model results, volatilities in BIST indices are persistent over time, and past shocks continue to have an effect for a long time. The estimated parameters of the EGARCH model reveal the impact of past shocks on the return volatilities of BIST indices in detail.

The ARCH-LM test results indicate that heteroscedasticity exists in all BIST indices. Ljung-Box statistics suggest that the autocorrelation is eliminated and indicate that past stock returns in the BIST indices do not have a high degree of dependence.

These analyses show that it is appropriate to analyse the volatility structure of BIST indices with the EGARCH (1,1) model and that the results of the model are statistically significant. The persistence and effects of shocks on the volatilities of the indices are examined in detail.

Analysis findings comments

According to the analysis findings, significant changes were observed in stocks traded on Borsa Istanbul during financial crisis periods. In this study, where the EGARCH (1,1) model was used, the volatility of stock prices and the impact of crises on this volatility were analysed. The findings show that price volatility increases during crisis periods, and these volatilities continue for a long time. It was determined that adverse shocks, in particular, create more volatility than positive shocks. This situation demonstrates that investors behave with uncertainty and fear during crisis periods and that emotional factors are influential in decision-making processes.

In addition, the fact that GARCH and EGARCH parameters are positive and significant confirms the permanent impact of shocks and volatilities experienced in the past on the current period. This finding indicates that financial crises have a significant impact on investor behaviour and market volatility, and that these effects persist for an extended period. The ARCH test results revealed the existence of variable variance in all BIST indices, showing that the uncertainty in the price movements of financial assets becomes more pronounced during crisis periods.

From a behavioural finance perspective, it has been observed that investors react emotionally, tend to exhibit herd behaviour and make panic sales during crisis periods. These behaviours have led to excessive price movements and irrational decision-making processes in financial markets. This situation demonstrates that investor psychology and emotional reactions can negatively impact market performance during crisis periods. These findings of the study are similar to the studies of Keskin and Aytüre (2024), Keskin (2024c), Ruzgar and Chua-Chow (2023), Canbaz (2019), Grima and Caruana (2017), Grout and Zalewska (2016), Angela et al. (2015), while they differ from the results of the studies of Sösay and Tanrıöven (2023), Filip et al. (2015).

Financial crises create irrationality and uncertainty in investors' behaviour, which makes it difficult to predict market prices. Financial crises negatively affect investor behaviour due to the fluctuations they produce, and these behaviours cause investors to become more cautious during crisis periods. Therefore, considering behavioural finance approaches and investor psychology during crisis periods makes an essential contribution to understanding market movements and reducing the effects of crises.

Conclusion and evaluation

This study aims to analyse stocks traded on Borsa Istanbul during financial crisis periods from a behavioural finance perspective. The findings show that investors have difficulty making rational decisions during financial crisis periods and that emotional factors significantly affect investment behaviour. Behavioural tendencies of investors, such as overconfidence, herd behaviour and avoiding regret, are among the main factors that increase market fluctuations during crisis periods. These tendencies can disrupt the stability of financial markets by increasing the volatility of stock prices. Herd behaviour and indecisiveness in acting quickly reveal the need for professionalism in crisis management.

When the effects of the financial crises experienced by Turkey in the past on stocks are examined, it is observed that stocks lost value during crisis periods. Still, recovery processes were experienced after the crisis. During these processes, the decrease in investors' confidence in the markets and the increase in uncertainties led to sudden and significant fluctuations in stock prices. This situation reveals that behavioural finance plays a vital role in understanding investor behaviour and market performance during crisis periods.

As a result, understanding investor behaviour during financial crisis periods is critical to mitigating the effects of crises and ensuring market stability. Behavioural finance theory analyses the irrational behaviours exhibited by investors during crisis periods and provides essential clues for preventing and

managing similar crises in the future. Therefore, it can be concluded that financial market actors and policymakers should develop more effective strategies by taking into account the behaviour of investors during crisis periods. This study makes a significant contribution to understanding the effects of financial crises and preparing for similar situations that may occur in the future.

Among the studies that can be conducted in the future, the stock exchanges of other developed or developing countries during crisis periods, along with the indices traded on these exchanges, can be evaluated comparatively. Additionally, the subject can be tested using various statistical methods.

Peer-review:

Externally peer-reviewed

Conflict of interests:

The authors have no conflict of interest to declare.

Grant Support:

The authors declared that this study has received no financial support.

References

- Ah Mand, A., Janor, H., Abdul Rahim, R., & Sarmidi, T. (2023). Herding Behaviour and Stock Market Conditions. *PSU Research Review*, 7(2), 105-116.
- Aktaş, M.A. (2005). Perakende Satış Mağazaları ve Zarar Önleme Metotları. *Maliye Dergisi*.8(92).1-4.
- Albeni, M., & Demir, Y. (2005). Makro Ekonomik Göstergelerin Mali Sektör Hisse Senedi Fiyatlarına Etkisi (İMKB uygulamalı). *Muğla Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (14), 1-18.
- Altıntaş, H. (2004). Bankacılık Krizleri, Nedenleri ve Ekonomik Maliyetleri. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (22).
- Avgouleas, E. (2010). Financial Regulation, Behavioural Finance, and the Global Financial Crisis. *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future*, 391.
- Aydın, Ü., & Ağan, B. (2016). Rasyonel Olmayan Kararların Finansal Yatırım Tercihleri Üzerindeki Etkisi: Davranışsal Finans Çerçevesinde Bir Uygulama. *Ekonomik ve Sosyal Araştırmalar Dergisi*, 12(2), 95-112.
- Ayyıldız, S. (2014). *Bir İstihdam Politikası Aracı Olarak Mikro Finansman*, 160-161, Detay Yayıncılık, Ankara.
- Aytekin, Ö. G. Y. E., & Aygün, M. (2016). Finansta Yeni Bir Alan "Davranışsal Finans". *Yüzyüncü Yıl Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (2), 143-156.
- Blanchard, O. J., ve Watson, M. W. (1982), *Bubbles, Rational Expectations, and Financial Markets*,. *Crisis in the Economic and Financial Structure*, (Ed.: P. Wachtel), pp.295-315. Lexington, MA.
- Bollerslev, T. (1986). Generalised Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics*, 31(3), 307-327.
- Budak, M. (2024). *Finansal Kriz Dönemlerinde Borsa İstanbul*. Sosyal, İktisadi, Beşeri Ve Yönetim Alanları Perspektifinde Sorunlara Bakış 2. Ed. F. Aslan. Ss.109-124. Efe Akademi. İstanbul.
- Canbaz, M. Menkul Kıymetler Borsasında Hisse Senedi Yatırımı Nasıl Yapılır? İstanbul Menkul Kıymetler Borsası Örneği. *Akademik Çalışmalar-2019/2*, 40.

- Chiang, T. C., & Zheng, D. (2010). An Empirical Analysis Of Herd Behaviour In Global Stock Markets. *Journal of Banking & Finance*, 34(8), 1911-1921.
- Chou, R. Y. (1988). Volatility Persistence and Stock Valuations: Some Empirical Evidence Using GARCH. *Journal of Applied Econometrics*, 279-294.
- Cihangir, M. (2005). Finansal Krizlerin Banka Birleşmelerine Etkileri: Kasım 2000 ve Şubat 2001 Krizleri Çerçevesinde Kronolojik Bir Yaklaşım. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 19(1), 99-116.
- Çetiner, M., Gökcek, H. A., & Gölbaşı, B. T. (2019). Davranışsal Finans Perspektifinden Yatırımcı Davranışları Üzerine Bir İnceleme. *Uluslararası Bankacılık Ekonomi ve Yönetim Araştırmaları Dergisi*, 2(1), 1-30.
- Dağlı, H. (2000). Hisse Senedi Piyasa Endeksleri ve Türkiye. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 3(4), 189-206.
- Danışoğlu, A. Ç. (2007). PARA KRİZLERİ: Türkiye'de Yaşanmış Krizlerin Değerlendirilmesi. *Sosyal Bilimler Dergisi*, (2), 1-11.
- Delice, G. (2003). Finansal Krizler: Teorik ve Tarihsel Bir Perspektif. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (20).
- Engin, M. (2013). Gelişmiş ve Yükselen Piyasalarda 1990 Sonrası Görülen Finansal Krizler ve Dünya Ekonomisi Üzerindeki Etkileri. *Sosyal Bilimler Dergisi*, (2).
- Engin, C., & Göllüce, E. (2016). 2008 Küresel Finans Krizi ve Türkiye Üzerine Yansımaları. *Kahramanmaraş Sütçü İmam Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 6(1), 27-40.
- Engle, R. F. (1982). Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation. *Econometrica*, 50(4), 987-1007.
- Eguiluz, V. M., & Zimmermann, M. G. (2000). Transmission of Information and Herd Behaviour: An Application to Financial Markets. *Physical Review Letters*, 85(26), 5659.
- Gray, K. R., Frieder, L. A., ve Clark Jr, G. W. (2007). Financial Bubbles and Business Scandals in History. *International Journal of Public Administration*, 30(8-9), s.859-888.
- Grosse, R. (2012). Bank regulation, governance and the crisis: a behavioural finance view. *Journal of financial regulation and compliance*, 20(1), 4-25
- Güngör, S., & Demirel, E. (2018). *Davranışsal Finasta Yatırımcı Önyargıları*. Alfa Basım Yayım Dağıtım, İstanbul.
- Gounaris, K. M., & Prout, M. F. (2009). Repairing relationships and restoring trust: Behavioural finance and the economic crisis. *Journal of Financial Service Professionals*, 63(4).
- International Monetary Fund (IMF). (2009). *Global Financial Stability Report, April 2009: Responding to the Financial Crisis and Measuring Systemic Risks* (No. 097.20090401). International Monetary Fund.
- Kameda, T., & Hastie, R. (2015). Herd Behaviour. Emerging Trends in The Social and Behavioural Sciences: An Interdisciplinary, Searchable, And Linkable Resource, 1-14.
- Karaca, C. (2014). Uygulanan Para ve Maliye Politikaları Açısından Geçmiş Krizler ve 2008 Küresel Ekonomik Krizinin Karşılaştırmalı Analizi. *Çankırı Karatekin Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 5(1), 263-286.
- Karadağ, M. M. (2019). Finansal Krizler ve Asimetrik Enformasyon: Asya ve Meksika Krizleri. *Maliye ve Finans Yazıları*, (112), 119-148.
- Keskin, M. & S. Aytüre (2024), Merkezi ve Doğu Avrupa Ülkeleri Borsalarında Sürü Davranışları: Hırvatistan, Polonya ve Romanya Örnekleri, *Sosyoekonomi*, 32(62), 479-495 DOI: 10.17233/sosyoekonomi.2024.04.22
- Keskin, M. (2024a). First Examples of Herd Behaviour in The Netherlands and London Stock Exchanges. *10. International Paris Congress on Social Sciences & Humanities*. Pp.76-88. February 17-19, 2024 Paris – France
- Keskin, M. (2024b). Effects of the Central Bank of the Republic of Türkiye (CBRT) interest rate decisions on BIST Bank share values. *JOEEP: Journal of Emerging Economies and Policy*, 9(2), 57-68.

- Keskin, M. (2024c). Effects of Türkiye's Credit Ratings and Credit Default Swaps (CDS) on BIST ALL. *Bulletin of Economic Theory and Analysis*, 9(2), 537-558. <https://doi.org/10.25229/beta.1470087>
- Keskin, M. (2024d). Examples of Financial Asset Dependency in Markets From Past to Present, *Silk Road 3rd International Scientific Research Congress* (294-302), Samarkand, Uzbekistan.
- Kindleberger, C.P. (2007). *International Economics*, USA.
- Nart, E. Ç. (2015). Dış Borç Yönetimi Açısından Finansal Kriz Riski. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi*, 30(2), 71-85.
- Oktar, S., & Yüksel, S. (2015). 1998 Yılında Rusya'da Yaşanan Bankacılık Krizi ve Öncü Göstergeleri. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 37(2), 327-340.
- Özdemir, L. (2008). 2008 Küresel Ekonomik Krizinin İşletmeler Üzerindeki Etkileri. *Doğuş Üniversitesi Dergisi*, 14(2), 249-265.
- Öztürk, S. (2003). Sabit Döviz Kuru Politikasının Krizlere Olan Etkisi: 1997 Güneydoğu Asya ve 2000 Kasım-2001 Şubat Türkiye Krizleri. *Yönetim ve Ekonomi Dergisi*, 10(1), 171-185.
- Poyraz, K., & Nayır, İ. Menkul Kıymet Borsası Aracı Kurumlarında İşlem Yapan Yatırımcılar Üzerine Bir Araştırma. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, (7).
- Selahattin, T. (1985). *Türkiye'de Sermaye Piyasası*. İstanbul, Okan.
- Sever, E., Çetiner, M., & Paksoy, M. (2020). Bireysel Yatırım Kararları ile Davranışsal Finans Eğilimlerinin İlişkisi: İmalat ve Hizmet Sektörlerinde Bir Araştırma. *Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (49), 9-40.
- Stiglitz, J. E. (2012). *The Price of Inequality: How Today's Divided Society Endangers Our Future*. W.W. Norton & Company.
- Toprak, D. (2010). Türkiye'de Kriz Dönemlerinde Borçların Seyri: 1994 Ve 2001 Krizi. *Süleyman Demirel Üniversitesi Vizyoner Dergisi*, 2(2), 1-14.
- Tversky, A. & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science, New Series*, 185 (4157), 1124-1131.
- Turgut, A. (2007). Türleri, Nedenleri ve Göstergeleriyle Finansal Krizler. *TÜHİS İş Hukuku ve İktisat Dergisi*, 20(4-5), 35-46.
- Turan, Z. (2011). Dünyadaki ve Türkiye'deki Krizlerin Ortaya Çıkış Nedenleri ve Ekonomik Kalkınmaya Etkisi. *Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 4(1), 56-80.
- Ural, M. (2003). Finansal krizler ve Türkiye. *Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi*, 18(1), 11-29.
- Uzun, U., & Güngör, B. (2017). Borsa Endeksleri ile Ülkelerin Seçilmiş Makroekonomik Göstergeleri Arasındaki İlişkinin Uluslararası Boyutta İncelenmesi. *Bolu Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 17(4), 1-30.
- Yıldırım, S. (2010). 2008 yılı küresel ekonomi krizinin Dünya ve Türkiye ekonomisine etkileri. *Karamanoğlu Mehmetbey Üniversitesi Sosyal ve Ekonomik Araştırmalar Dergisi*, 2010(1), 47-55.
- Yılmaz, Ö., Kızıltan, A., & Kaya, V. (2005). İktisadi Kriz Kuramları, Finansal Küreselleşme ve Para Krizleri. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (24), 77-97
- Yurttaçıkamaz, Z. Ç. (2012). Döviz Kuru ve Enflasyonun Hisse Senedi Getirileri Üzerindeki Etkisi. *Ekev Akademi Dergisi*, 16(51), 393-410.