Marmara Üniversitesi Öneri Dergisi • Cilt 19, Sayı 61, Ocak 2024, ISSN 2147-5377, ss. 95-122
DOI: 10.14783/maruoneri.1352101

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

INVESTIGATION OF INVESTOR SENTIMENT THROUGH CONFIDENCE AND EXPECTATION INDICES: A BEHAVIORAL APPROACH*

YATIRIMCI DUYARLILIĞININ GÜVEN VE BEKLENTİ ENDEKSLERİ ARACILIĞIYLA İNCELENMESİ: DAVRANIŞSAL BİR YAKLAŞIM

Tunahan TAYAR**
Ramazan AKTAŞ***

Abstract

In this study, the effect of confidence and expectation indices, which are the factors of investor sentiment, on investment decisions was investigated. In the sample, United States and Turkey were chosen as the examples of a developed country and a developing country respectively. The effects of independent variables on investment instruments were examined with multiple linear regression models, and then generalized autoregressive conditional variance models were created for volatility estimates. Stock index returns (BIST100 and S&P500) and the changes in the total amount of deposit in the local currencies of both countries were used as dependent variables. As independent variables; the Consumer Confidence Index, Economic Confidence Index, Total Confidence Index and VIX Volatility Index were included for both countries in analyses. The monthly dataset between December 2012 – April 2022 was included. As a result of the regression models, it has been observed that the independent variables generally affect the investments in both countries. As a result of the volatility

* This article is extracted from the master thesis of Tunahan Tayar which was written under the supervision of Ramazan Aktaş in the Department of Business Administration at TOBB University of Economics and Technology.

During the master's education Tunahan Tayar was supported as a scholar of 2210-A National MSc/MA Scholarship Program by TUBITAK.

** TOBB University of Economics and Technology, Business Administration, tunahantayar@etu.edu.tr, ORCID: 0000-0001-7778-1974 (PhD student at Bilkent University).

*** TOBB University of Economics and Technology, Business Administration, raktas@etu.edu.tr, ORCID: 0000-0002-8884-3357.

Received: 29.08.2023
Accepted: 14.11.2023

models, while the expectation and confidence indices did not affect BIST100 index significantly, it was observed that the variables related to expectations and confidence had a significant effect on the other three investment instruments.

Keywords: Investor Sentiment, Confidence Indices, Expectation Indices

Öz

Bu çalışmada, yatırımcı duyarlılığının etkenlerinden olan güven ve beklenti endekslerinin yatırım kararları üzerindeki etkisi araştırılmıştır. Örneklemde, gelişmiş ülke örneği olarak Amerika Birleşik Devletleri ve gelişmekte olan ülke örneği olarak Türkiye seçilmiştir. Çalışmada çoklu lineer doğrusal regresyon modelleri ile bağımsız değişkenlerin yatırım araçları üzerindeki etkileri incelenmiş ve ardından da oynaklık tahminleri için genelleştirilmiş otoregresif koşullu değişken varyans modelleri oluşturulmuştur. Hisse senedi endeks getirileri (BIST100 ve S&P500) ve her iki ülkenin yerel para birimlerindeki toplam mevduat miktarı değişimleri bağımlı değişken olarak kullanılmıştır. Bağımsız değişkenler olarak, analizlerde, her iki ülke için Tüketici Güven Endeksi, Ekonomik Güven Endeksi, Genel Güven Endeksi ve VIX Korku Endeksi'ne yer verilmiştir. Aylık periyottaki veri seti Aralık 2012 – Nisan 2022 tarihlerini içermektedir. Getiri ve değişim tahmin modeli sonucunda her iki ülkede de genel olarak bağımsız değişkenlerin yatırımları etkilediği görülmüştür. Oynaklık tahmin modelleri sonucunda ise, BIST100 endeksine yapılan yatırımlarda bağımsız değişkenlerin etkisi bulunmazken, beklenti ve güvene ilişkin değişkenlerin diğer üç yatırım aracı üzerinde anlamlı etkisi gözlemlenmiştir.

Anahtar Kelimeler: Yatırımcı Duyarlılığı, Güven Endeksleri, Beklenti Endeksleri

1. Introduction

The importance of the finance is increasing with the economic crises and the increased fluctuations in the markets experienced mainly in recent years. The fluctuations in financial instruments and the increase in price anomalies make it difficult for investors to make decisions. Due to the technological developments, the financial market of each country is affected by the financial markets of other countries. In particular, the increase in capital losses makes the decisions made by both individual and institutional investors difficult. While the researches in that subject have been increasing, the trend of the researches is changing.

In the first years of studies on finance and investment, the assumption that investors are rational was dominant. In this sense, the economic approach created in the literature is called the modern portfolio theory (Markowitz, 1999). According to the modern portfolio theory, which is evaluated in the neo-classical economic perspective, it is accepted that investors focus on maximizing their own benefits, namely wealth, while at the same time by avoiding risk. The measure of the risk stated in the theory is the deviations in the historical price movements of the assets (Daly, 2008).

Fama (1970), proposed efficient market hypothesis and tested the theory with empirical data; and showed that there are anomalies and/or fluctuations depending on the information availability in the market causing different level efficiency forms. Thus, Behavioral Finance has been highly popular research area in academic studies regarding finance and investment. As Kahneman & Tversky (1979) stated in their study, people do not act rationally when making decisions under the risk, unlike the

neo-classical approach suggests. According to this theory, which entered the literature as the expectancy theory, the main motivation that determines the behavior of an individual is the expectations related to the outcome of that behavior. While expectations are shaped in the minds of individuals, they are affected by various emotional, psychological and social illusions (Ricciardi & Simon, 2000; Ritter, 2003; Shiller, 2003).

When recent investments have been examined, some abnormal movements and anomalies were observed (Hou, Xue & Zhang, 2020). For example, although the interest yields on the bonds of developing countries have been quite high in the last few years, investors avoid investing in these instruments and tend towards investments with less return or only capital gains to avoid risks (i.e.: Drake, 2022). Therefore, the assumptions of modern portfolio theory start to leave and give the place to the behavioral approach in practical life.

Confidence and expectation indices are so important in terms of giving information about the general economic situation of a country, especially in investment, consumption and savings decisions. These indices are measured by surveys conducted with the citizens, including direct investors, or in the light of information obtained directly from financial markets. Thus, the results could be classified as trustworthy indicators reflecting the belief in the economic environment of the country in a general sense. Therefore, any situation related to these indices could be considered to have an impact on the country's macroeconomic environment, including investment decisions (Başarır, Bıcıl & Yılmaz, 2019).

Investors' general views and confidence in the economy affect their consumption and direct their decisions positively or negatively (Fukuyama, 2000). Confidence indices also show households' future perspectives on economic conditions that may play a role in saving decisions. Investors' negative perspectives or low confidence in national economies may adversely affect their investments in national financial instruments. The importance of providing a positive environment of trust stems from this generalization.

In this study, the effects of the main macro indicators in the economy related to confidence and expectations on the decisions of investors were investigated for developing and developed countries. In this way, the reasons for the aforementioned abnormal financial movements were tried to be explained, and suggestions were made to both investors and regulatory authorities. In addition, the findings of the study were evaluated within the framework of modern portfolio theory and behavioral finance, and interpreted in a comparative way.

First of all, when the previous studies on the subject are scanned, as mentioned in the literature analysis section in more details, research have been carried out either on a single country or covered developed countries. In the current study, a single country or countries with the same level of development were not considered as a reference. Instead, as a contribution to the literature, one country for developed countries and one country for developing countries were included in the sample (United States of America as a developed country and Turkey for a developing country). Secondly, when

the existing literature is reviewed, it is seen that the studies conducted so far generally focus on only one dependent variable as it was mentioned in the second part. Also, the main focus on the studies was stock investments. However, since the confidence and expectation indices reflect the opinions on the country's economy, it is expected for them to affect the investments made in national currencies. Therefore, in this study, both the stock market returns (Borsa Istanbul 100 index and Standard and Poor's 500 index), and also the deposit investments made in national currencies (total Turkish Lira deposits and total US Dollar deposits) were separately examined for both countries and used as two different dependent variables. Another important contribution of this study is the interpretation of the effect of the confidence and expectation indices on the volatility of investment decisions over time by analyzing them separately by models. In the view of these contributions, following questions was aimed to be answered within the study:

• How do expectations and confidence indices affect stock market investments in developed and developing countries?

• How do the expectations and confidence indices affect deposit investments made in national currency in developed and developing countries?

• How do expectations and confidence indices affect the volatility of stock market investments in developed and developing countries?

• How do the expectations and confidence indices affect the volatility of deposit investments made in national currency in developed and developing countries?

In the following sections of the study, firstly, literature review section which consists of the summary information about similar studies conducted in the past years was given. Next comes the methodology section, which includes information about the dataset used in the study, and the theoretical background of the applied methods. The findings of the analyzes were reported in Section 4. Finally, in the discussion part, the findings, contributions, and comments that could be made to the theoretical and practical life were evaluated.

2. Literature Review

In this section, summary results of previous studies related to the topic were given. Also, the contributions of this research to the existing literature were mentioned and the original points of the study that distinguish it from the preceding ones were emphasized.

Jansen & Nahuis (2003) investigated the short-term relationships between the developments in the stock market and the Consumer Confidence Index with the dataset covering the years 1986 and 2001 for 11 European countries. While there was a positive relationship between stock returns and changes in sensitivity of investors for nine countries, no significant result was observed for Germany.

In addition, with Granger Causality analysis, stock returns were generally found to be a factor changing the consumer confidence in the short-run.

Korkmaz & Çevik (2009) examined the relationships between the Real Sector Confidence Index and the Istanbul Stock Exchange 100 index, including the volatility analysis. The monthly dataset between December 1987 and December 2007 was used in the study. As a result of the EGARCH analysis, it was obtained that both variables have significant and opposite effects on each other's variances. In addition, corresponding to the Dynamic Causality and Extended EGARCH analysis, it was summarized that there are bidirectional and statistically significant causality relations between the indices.

Some confidence indices and main indicator of country's stock markets' indices for eight developed countries were used in the study of Pinho & Madeleno (2011). Their dataset consisted of the variables from the first quarter of 1985 to the last quarter of 2009, and impulse response functions were examined by applying the VAR method. While it was determined that the Industrial Production Confidence Index has longer and larger effects on stock market indicators for all countries, the effects of Consumer Confidence and Economic Confidence Indices are shorter and smaller.

Köse & Akkaya (2016) studied how investor sentiment affects financial markets in their research. In the study, in which monthly dataset between January 2007 and March 2016 were used, BIST100 index returns were used as a dependent variable. Firstly, according to the results of the multiple linear regression analysis, it was found that the Real Sector Confidence Index and the VIX Volatility Index are significant variables that affect the BIST100 returns. According to the result of the VAR Causality Test, in which the sub-distributions of the Real Sector Confidence Index were included in the analysis as independent variables, it was determined that the sub-breakdown indices such as general trend and quarterly order confidence indices had a causal effect on the BIST100 returns.

Eyüboğlu & Eyüboğlu (2017) examined the relationships between the Economic Confidence Index and BIST100, BIST Industry and BIST Service Indices in their study. In this study, the monthly dataset between 2012 and 2016 was used, and the Engle – Granger Cointegration Test was applied. As a result of the study, significant and long-term two-way interactions were found between the Economic Confidence Index and BIST100, BIST Industry and BIST Service indices. As a result of the error correction model, the Economic Confidence Index was reported as a reason affecting for each of the three BIST indices.

Usul, Küçüksille & Karaoğlan (2017) studied the effects of Real Sector Confidence Index and Consumer Confidence Indices on stock market returns for Turkey. Monthly dataset which covers the period between January 2007 and January 2017 was used. KSS Cointegration Test was performed to investigate short-term relationships and DOLS regression method was conducted to examine long-term effects. Consequently, both the Real Sector Confidence Index and Consumer Confidence Indices had significant relationship with the BIST100 index in the short term. In the long run, there was

evidence that both the Real Sector Confidence Index and Consumer Confidence Indices have significant and positive effects on the BIST100 returns.

Sarıkovanlık, Altuntaş & Mera (2018) investigated the effects of expectation and confidence in the Turkish financial markets. Multiple linear regression, Granger Causality Test and VAR analyzes were applied in the study in which monthly data from 2007 to 2016 were selected as a sample. As a result of the multiple linear regression analysis, it was found that the Real Sector Confidence Index is a significant variable in estimating the BIST100 index. According to the Granger Causality Test result, a significant and one-way causality relationship was found from BIST100 index to the Real Sector Confidence Index, and from the VIX Volatility Index to the Real Sector Confidence Index. The VAR analysis, on the other hand, showed that there are short-term and long-term relationships between BIST100 and the Real Sector Confidence Index.

In a study, Sadeghzadeh (2018) investigated the effects of VIX Volatility Index and Turkish Consumer Confidence Index on BIST100 index. In this study, in which data with monthly frequency were used, January 2004 and April 2018 were preferred as the time range. As a method, Phillips – Oualiaris Cointegration Test, DOLS regression model and Granger Causality Test were applied. According to the Phillips – Oualiaris cointegration analyzes, it was observed that both the VIX Volatility Index and Consumer Confidence Index have significant connections on the BIST100 index in the short-run. Results of the DOLS model showed that both indices have significant and negative long-run effects on BIST100. Finally, according to the Granger Causality Test, it was found that the developments in the BIST100 have a significant causality connection on the Consumer Confidence Index.

In another study of Durgun Kaygısız (2019), the existence of the relationships between confidence indices and some macroeconomic variables were tested with the VAR model. In this study, monthly dataset for Turkey between 2010-2018 was used. As a result of the first model, two-way significant relationships were found between Consumer Confidence Index and Consumer Price Index, exchange rate and BIST 100 index. In addition, the results of the second model showed that there are significant two-way relationships between the Real Sector Confidence Index; the interest rate, industrial production index, and employment rate.

Münyas (2019) investigated the effects of various confidence indices on investments in Borsa Istanbul sub-indices. Quarterly dataset covering the period of 2011-2018 was used, and quantile regression method was chosen as a model. As a result, Economic Confidence, Consumer Confidence, and Real Sector Confidence Indices were found the factors positively affecting returns of BIST100, BIST50, and BIST30 indices.

Evci (2019) examined the relationships between the Economic Confidence Index and financial instruments with Toda – Yamamoto Causality Test. The dataset was included in monthly basis, between January 2017 and June 2019. As a result of the analyzes, it was determined that there is a one-way causality relationship from the Economic Confidence Index to the BIST100 index, and from

the US Dollar to the Economic Confidence Index. However, no relationship was found between the Economic Confidence Index and the gold price.

Akkuş & Zeren (2019) investigated the relationships between Consumer Confidence Index and Islamic stocks. In this study monthly dataset between January 2011 and August 2018 were chosen and Hatemi J – Irandoust Cointegration and Hatemi – J Asymmetric Causality analyzes were conducted. As a result of the analysis, it was summarized that there is a positive cointegration between the Consumer Confidence Index and the Participation – 30 Islamic Stock Index in a long-run.

Alacahan & Akarsu (2019) investigated whether the index showing the yield rates of bonds issued by companies having corporate governance capacity from developing countries in Europe, and Central Africa and the Turkish Consumer Confidence Index have effects on BIST100 index or not. In the study monthly dataset between February 2004 and June 2018 was included. It was determined that both independent variables have significant and positive effects on the BIST100 index, according to the multiple linear regression models.

In a study of Canöz & Erdoğdu (2019), in which sectoral analysis was conducted for the sample of Turkey, the effects of Financial Services Confidence Index on Borsa Istanbul sectoral indices were examined. According to the results of Hacker and Hatemi – J Causality Test, no symmetrical connections were found between the variables. Results of the Hatemi-J Causality Test showed significant evidence including negative and positive causality relationships between sectoral confidence indices and sector indices.

Kocabıyık & Aktürk (2020) investigated the relationships between the Consumer Confidence Index, Financial Services Confidence Index, the CDS premium, and BIST100 index. In this study, in which monthly and daily data were used, different time intervals were selected. Toda – Yamamoto Causality Test was applied as a method in the research. Results of the study indicated that there is one-way causality relationship from Consumer Confidence Index and CDS premium to BIST100 index, and there is a one-way causality relationship from BIST100 index to Financial Services Confidence Index.

Tunçel & Gürsoy (2020) examined the causality relationships between risk perception and financial markets. They used daily dataset from 6 August 2010 to 6 January 2020, and performed Toda – Yamamoto Causality Test. It was determined that there is a one-way causality from VIX Volatility Index to BIST100 returns.

Beşiktaşlı & Cihangir (2020) investigated the effect of investor sentiment on the financial markets by using some confidence indices for Turkey sample. Dependent variables of the study were selected from three different financial markets as monthly between January 2015 and April 2019; and Granger Causality Test and cointegration analysis were applied. According to the results of Granger Causality analysis, it was found that there is a causal relationship between Consumer Confidence Index and US Dollar, BIST100 index, government bond interest rate, Producer Price Index, and Consumer

Price Index. In addition, it was determined that the Consumer Confidence Index has long-term relationship with the variables representing the money market and general macroeconomic indicators.

Topaloğlu & Metin (2021) investigated the effects of Consumer Confidence Index on stock returns for G7 countries. Both the long-term cointegration analysis and the Granger Causality Test were chosen as a method of the study, and monthly dataset between January 2014 and November 2020 were used. It is stated that there are long-term and positive relationships between Consumer Confidence Index and returns in the stock markets. In addition, it was reported that there is a two-way causality relationship between these two variables.

In another study, at Süsay & Eyüboğlu (2021), it was investigated whether the Service Confidence Index has relationships with BIST sector indices. Monthly dataset between January 2011 and May 2020 were used in the study. Fourier ARDL Cointegration Test and Granger Causality analysis were applied. According to the results of the study, one-way positive causality relationship was found between the service trust index and sector indices.

Alptürk et al. (2021) tested the existence of a causal relationships between Financial Services Confidence Index and BIST city indices. Monthly dataset between 2012 and 2020 were preferred in the study. As a result of the Toda Yamamoto Causality Test some evidences were found for one-way causality relations from the Financial Services Confidence Index to BIST city indices.

Tüzün, Ceylan & Ceylan (2021) examined the effects of various confidence indices on the stock market for Turkey. In the study, monthly data between May 2012 and November 2018 were included. The results of the Bootstrap Causality Analysis and Bootstrap Sliding Window Causality Analysis indicated that there are one-way and two-way causality relations between confidence indices and BIST sub-indices.

Önem (2022) investigated the relationships between Consumer Confidence Index and some BIST sub-indices with ARDL Boundary Test and Granger Causality analysis. In the study, the monthly dataset between January 2012 and August 2021 was contained. According to the causality analysis, it was found that there is a one-way causality relationship from the Consumer Confidence Index to the BIST Bank sector index. Also, there was no evidence found for long-term relationships between the variables.

In this section, important studies investigating the effects of confidence and expectation indices on financial markets were given. In these studies, generally, only stock market returns were emphasized. Apart from the studies reported here, there are also studies trying to examine the performance of the gold, and US Dollar exchange value against the Turkish Lira and the relationships of these two instruments with confidence and expectation indices (Güngör, 2019). In the current study, it was aimed to contribute to the existing studies by considering deposit investments in local currency in addition to the stock market indices. Additionally, comparing developed and developing countries in their dynamics is one of the biggest contributions of the study. Finally, investigating the relationships

between confidence and expectation indices and the volatilities of the instruments is another important novel side of the study.

3. Method

3.1. Data

In this study, the effects of the main macroeconomic indicators related to confidence and expectations in the economy on investor decisions were examined comparatively for Turkey and United States. Secondary data obtained from reliable data sources used. The dataset description and data sources used were presented in the Table below (Table 1).

BIST100 and S&P500 returns, and total deposit rate in national currency for Turkey and United States of America were included to represent investor decisions in the current study. In order to examine the confidence of the investors, Consumer Confidence Index, Economic Confidence Index, and Total Confidence Index data which includes political confidence, were used separately for both of the countries. Finally, VIX Volatility Index was added to represent the global investor expectations.

Table 1. Dataset of The Study

Data Code	Data Description	Data Source
BIST100	Monthly Change of Borsa Istanbul 100 Index Returns	Thomson Reuters
SP500	Monthly Change of Standard and Poor's 500 Index	Thomson Reuters
TL_D	Monthly Change of Total Turkish Lira Deposit in Turkey	TCMB EVDS
USD_D	Monthly Change of Total Dollar Deposit in United States	FRED Data
TR_CCI	Turkish Consumer Confidence Index	OECD
TR_ECI	Turkish Economical Confidence Index	OECD
TR_TCI	Turkish Total Confidence Index	OECD
US_CCI	United States Consumer Confidence Index	OECD
US_ECI	United States Economical Confidence Index	OECD
US_TCI	United States Total Confidence Index	OECD
VIX	CBOE Volatility Index	Thomson Reuters

Monthly data ranging from 2012 December to 2022 March, which is the widest common accessible interval for all dataset, was used. In order to use financial time series in econometric models and to provide assumptions, methods such as taking difference in data, looking at logarithmic transformation or percentage changes could be applied (Benoit, 2011). In this study, a transformation was made by taking the amount of change in the data compared to the previous period in order to purify the dataset from the trend effect and to make it suitable for the assumptions in the models.

3.2. Models

Two different methods were used in the study and the theoretical background of these two methods was explained in the following sub-titles. All analyzes were conducted with the EViews 10 software.

There are perspectives regarding the appropriateness of determining the critical values of the significance levels by the researcher, according to the nature of the study (Fisher, 1950; Fisher, 1955; Neyman, 1976). In this study, the significance of all models and coefficients were evaluated within the 1%, 5% and 10% significance levels, and the model and coefficients outside these levels were interpreted as insignificant.

3.2.1. Multiple Linear Regression Models

Firstly, multiple linear regression models were created to investigate the effect of confidence and expectation indices on investment decisions. In multiple linear regression models, the effects of independent variables, and lagged values of both dependent and independent variables on the dependent variable could be investigated (Cowpertwait & Metcalfe, 2009). In the study, four different multiple linear regression models were conducted and both comparative analyzes between Turkey and the United States of America for dependent variables and the varying effects between two different investment instruments within each country were examined.

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \ldots + \beta_n Y_{t-n} + \ldots + \beta_{n+1} X_{1,t} + \ldots + \beta_k X_{1,t-k} + \ldots + \beta_i X_{i,t-k} + \varepsilon_t \qquad (1)$$

A general model of the method was given in Equation 1. Y represents the predicted variable, that is, the dependent variable, each X_i represents the each one of the independent variables. The symbol "t", which is given as a subscript in each variable, represents the lag value and/or time of the related variable, the symbol "β" represents the coefficients of the variables, and the symbol "β" represents the error term of the prediction model.

In the study, the relations between the variables were examined by using the lagged values in the analysis. The ideal lag values of the variables in each model were determined with the help of the AIC values (Whitehead, 2007). In this measurement, which helps to explain the largest variance with the least variable in estimation models, it is recommended to choose the model that provides the smallest AIC value.

Lastly, the assumptions that the multiple linear regression models must satisfy were tested for all models one by one after the results. They could be listed as: stationarity of the variables, independent and identically distributed errors (normality and zero variance), no multicollinearity between independent variables, and homoscedasticity (Williams, Grajales & Kurkiewicz, 2013). All of these assumptions were controlled after the application of model as follows: First, whether there is a multicollinearity problem or not was tested with the VIF (Variance Inflation Factor) value (Harrell, 2001). The common view on this subject is that between 1 and 5 there is a low dependency, and between

5-10 there is a medium collinearity. VIF values in these ranges do not pose a problem contrary to the assumption. In this study, since the lagged values of the variables were also used in the models, between 1 and 10 were considered as acceptable limits. Regarding other assumptions of the model: Jarque-Bera tests were used for normality, Brush-Godfrey for autocorrelation and Brush-Pegan-Godfrey tests for homoscedasticity assumptions (Pedroni, 1996; Gujarati & Porter, 2011; Sarıkovanlık et al., 2020). According to the literature; the null hypothesis of the Jarque-Bera normality test assumes that the data have a normal distribution, the null hypothesis of the Brush-Godfrey test is that the errors of the estimation model do not have autocorrelation, and the null hypothesis of the Brush-Pegan-Godfrey test is that there is no problem of heteroscedasticity. After each model, these assumptions were checked with relevant tests and were reported respectively in the result section.

3.2.2. Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Models

In the second analysis part of the study, the GARCH model was used to investigate the effect of confidence and expectation indices on the volatility of investment decisions. The ARCH(p) models created by Engle (1982) use the p time-delayed squared of the error terms to estimate volatility. In GARCH(p, q) models, the series of q time-delayed variance terms is added to the volatility estimation equation (Bollerslev, 1986; Taylor, 1986).

In this study, four different GARCH models were generated for the volatility estimation of the financial instruments. As the independent variable for the mean estimation in the models, the lagged values of the dependent variables were used. The determination of the lag values was arranged based on the significance in the multiple linear regression models in the first part of the analysis section. In this way, the predictive power of the models was tried to be increased. The GARCH (1,1) model was preferred in the study, as GARCH (1,1) models mostly provide better estimations than ARCH (1) models in volatility prediction (Cryer & Chan, 2008).

$$\sigma^2_t = \beta_0 + \beta_1 \mathcal{E}^2_{t-1} + \beta_2 \sigma^2_{t-1} + \beta_3 X_1 + \ldots + \beta_n X_{m,t} + w \qquad (2)$$

A general model of the related method was presented in Equation 2. "σ^2" represents the estimated variance of the dependent variable. "$\mathcal{E}^2_{t-1}$" refers to the squares of the errors occurring in the prediction model with one time lag, and "σ^2_{t-1}" refers to the variance values that occur with one time lag. Each X variable represents the "t" timed independent variables included in the model. The "β" symbol in front of the forecast variable in each one represents the coefficients of the variables, and the "w" symbol represents the error term of the forecast model.

Lastly, just like the multiple linear regression models, there are some assumptions that must be met in order the outputs of GARCH models to yield unbiased results, namely; stationarity of the variables, independent and identically distributed errors (normality and zero variance), and also summation of the coefficients of the p and q variables of GARCH(p,q) model should not exceed 1 (Cryer & Chan, 2008). These assumptions were checked one-by-one after each models, as it was done in the regression models. The assumption about the coefficients were checked directly from

the model outputs. To test the normally distributed error terms assumption, again, Jarque-Bera Normality Test was performed. The null hypothesis of this test assumes the normality. Last assumption which requires no autocorrelation between error terms was examined by the ARCH LM (Langrange Multiplier) Test, in which null hypothesis assumes no relations among errors (Sarıkovanlık et al., 2020). Like the assumptions of multiple regression analysis, again, after each GARCH models these assumptions were tested with written tests and were explained one by one in the result section.

4. Results

In this section, the findings of the multiple linear regression models and GARCH models for volatility estimation were presented respectively. After each model, the outputs and explanations of the tests of models' assumptions were also given. Before that, in the table below, statistical findings of the test for the stationarity assumption required for use in econometric analyzes for both models were given (Table 2). Augmented Dickey-Fuller unit root analysis was used to test this assumption (Dickey & Fuller, 1979). As it could be seen from the results of the test, all the data used in the analysis were stationary at the 1% significance level.

Table 2. Outputs Of Augmented Dickey-Fuller Stationary Test

Data	T-Satistic
BIST100	-10.06***
SP500	-12.06***
TL_D	-8.64***
USD_D	-9.45***
TR_CCI	-4.56***
TR_ECI	-3.92***
TR_TCI	-10.17***
US_CCI	-8.20***
US_ECI	-4.17***
US_TCI	-8.06***
VIX	-13.25***

*: p<0.10. **: p<0.05. ***: p<0.01.

4.1. Results of Regression Models

The outputs of the multiple linear regression equation created to estimate the returns of the BIST100 were shown in the Table below (Table 3). When the model is evaluated as a whole, the probability of the F value was significant at 5%. In addition, it could be seen from the Table that the BIST100 index was significantly and negatively affected by the three time-lagged values of its own variable. Again, the BIST100 index was significantly and negatively affected by the time-lagged

value of the Consumer Confidence Index. Another independent variable that significantly affects the BIST100 index was the Economic Confidence Index, and the effect was positive. The effect of the VIX Volatility Index, which is the last significant variable in the model, on the BIST100 index was negative. The predictability power of the model on the variations of the dependent variable was 11% (Adjusted R^2).

Table 3. Multiple Linear Regression Model For BIST100 Index (Model-1)

Independent Variable	Coefficient	T-Statistic	VIF Value	Model F-Statistic	Adjusted R^2
CONSTANT	3.44	0.91	-	2.06**	0.11
BIST100(-1)	-0.01	-0.03	1.29		
BIST100(-2)	0.05	0.46	1.16		
BIST100(-3)	-0.17	-1.66*	1.20		
BIST100(-4)	-0.13	-1.35	1.15		
TR_CCI	3.10	1.16	2.81		
TR_CCI(-1)	-6.01	-2.07**	3.32		
TR_CCI(-3)	1.97	0.68	3.34		
TR_CCI(-4)	-4.03	-1.50	2.87		
TR_ECI	10.2	1.62*	5.60		
TR_ECI(-1)	-6.85	-1.26	4.30		
TR_TCI -0.48		0.05	2.15		
VIX	-0.05	-2.34**	1.16		

*: p<0.10. **: p<0.05. ***: p<0.01.

For the test of the no multicollinearity assumption, the fact that the VIF values presented in Table 3 were less than 10 indicates that there was no statistically significant relationship between the independent variables. The outputs of other assumption test were given the Table 4 below. As it could be seen from the probability values of the related tests, there were no statistically sufficient evidence for the results in the multiple linear regression model did not fulfill the necessary assumptions. Thus, it could be said that the prediction model was unbiased.

Table 4. Outputs For Assumption Tests Of Model-1

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	1.89	0.39
AUTOCORRELATION	Brush – Godfrey Test	1.38	0.26
HOMOSCEDASTICITY	Brush – Pegan – Godfrey Test	0.97	0.48

Table 5. Multiple Linear Regression Model For S&P500 Index (Model-2)

Independent Variable	Coefficient	T-Statistic	VIF Value	Model F-Statistic	Adjusted R^2
CONSTANT	-0.74	-0.50	-	29.54***	0.61
SP500(-1)	-0.19	-1.84*	2.91		
US_CCI	-0.08	-0.08	1.33		
US_ECI	2.77	2.05**	1.56		
US_TCI	-0.59	-1.04	2.17		
VIX	-0.10	-11.79***	1.15		
VIX(-1)	-0.05	-3.92***	2.35		

*: p<0.10. **: p<0.05. ***: p<0.01.

The results of the multiple linear regression model conducted for the estimation of the returns of the S&P500 index were shown in the Table 5. The fact that the F value was within the statistically significance limits indicates that the model was significant as a whole. Additionally, S&P500 index was significantly and negatively affected by a time-delayed data belonging to its own variable. Among the confidence indices, only the Economic Confidence Index had a significant and positive effect on the S&P500. Finally, both the simultaneous and one time lagged values of the VIX Volatility Index had significant effects on the S&P500 index and these effects were negative. The estimation power of the independent variables used in the model to explain the deviations observed in the dependent variable was 61% (Adjusted R^2).

The fact that the VIF values, which is one of indicator of the model's fulfillment of the assumptions, were less than 10, it could be suggested as a statistical proof that the independent variables were unrelated (Table 5). The results regarding other assumptions were shown in Table 6. As it could be seen from the values of normality and autocorrelation tests, the null hypothesis could not be rejected. Accordingly, it could be concluded that the model had also met these two assumptions. The presence of statistically sufficient evidence to reject the null hypothesis for the Brush – Pegan – Godfrey Test showed that the assumption of covariance did not meet. Considering the fact that this result had been seen as a consequence of sudden and rapid fluctuations in the global markets in recent years, the ARCH Test, which is another heteroscedasticity test, was performed as an additional analysis. Since the ARCH Test's yields better results in fluctuating datasets (Gujarati, 2011), it was chosen. The probability value of the test was not sufficient to reject the null hypothesis, which signals heteroscedasticity, at the 5% level; but it was at the limit for 10% significance level. Therefore, it could be interpreted that the estimation model created for the S&P500 satisfied the necessary assumptions to be unbiased.

Table 6. Outputs For Assumption Tests of Model-2

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	2.63	0.27
AUTOCORRELATION	Brush – Godfrey Test	0.51	0.60
HOMOSCEDASTICITY	Brush – Pegan – Godfrey Test	4.24	0.00
HOMOSCEDASTICITY	ARCH Test	2.77	0.10

The outputs of the multiple linear regression model in which TL Deposit data was used as a dependent variable were presented below in the Table 7. It could be said that the prediction model was significant as a whole by the significance of F-value. The dependent variable was significantly and positively affected by the two and three time lagged values of its own series. The simultaneous value of Consumer Confidence Index and its one and two time lagged data had statistically significant effects on TL Deposits. When the direction of these effects was considered, the direction of the simultaneous and two time-delayed effects were negative; and the direction of a time-delayed effect was positive. Another data that had a significant effect on the TL Deposit was the simultaneous value of the Economic Confidence Index, and this effect was negative. Finally, it could be said from the results in the Table that Total Confidence Index had a statistically significant and negative effect on TL Deposit. The model's prediction power on the dependent variable was 16%, as it is seen the value of Adjusted R^2.

Table 7. Multiple Linear Regression Model for TL Deposit (Model-3)

Independent Variable	Coefficient	T-Statistic	VIF Value	Model F-Statistic	Adjusted R^2
CONSTANT	2.84	1.93*	-	3.26***	0.16
TL_D(-1)	0.07	0.68	1.12		
TL_D(-2)	0.19	1.69*	1.10		
TL_D(-3)	0.37	3.22***	1.15		
TR_CCI	-3.04	-2.59**	3.55		
TR_CCI(-1)	5.69	3.55***	6.60		
TR_CCI(-2)	-2.61	-2.26**	3.45		
TR_ECI	-2.33	-1.88*	1.48		
TR_TCI	-0.16	-1.70*	1.45		
VIX	-0.003	-0.35	1.05		

*: p<0.10. **: p<0.05. ***: p<0.01.

Table 8. Outputs For Assumption Tests of Model-3

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	81.82	0.00
AUTOCORRELATION	Brush – Godfrey Test	0.10	0.90
HOMOSCEDASTICITY	Brush – Pegan – Godfrey Test	2.14	0.03
HOMOSCEDASTICITY	ARCH Test	1.73	0.11

The fact that the VIF values were less than 10 indicates that the independent variables were not statistically related to each other (Table 7). The outputs of the results of the other econometric tests applied for the other assumptions were shown in Table 8. There was not enough evidence to reject the hypothesis that the errors are independent from each other according to the outputs of the test for the autocorrelation. Based on the outputs of the Brush – Pegan – Godfrey Test, there was sufficient evidence to reject the null hypothesis. The ARCH Test result, which is an additional test for homoscedasticity assumption, showed that the null hypothesis could not be rejected statistically. Due to the intense fluctuations seen in financial data in recent years, this additional test was preferred again (Sarıkovanlık et al., 2020). The probability value of the test for error's normality showed that the null hypothesis should be rejected. However, the fact that the assumption of normal distribution is not met in financial data due to the nature of the data set, this situation is an acceptable for interpretation (Sarıkovanlık et al., 2020; Gürbüz & Şahin, 2014). In addition, at the end of the study, only the significance and impact directions of the coefficients were evaluated. The absence of an estimation could also eliminate the possibility of biased estimation of the models. Thus, it could be concluded that the model provided all the assumptions not fully, but enough for interpretations, thus the model was accepted to be sufficiently unbiased.

Table 9. Multiple Linear Regression Model for USD Deposit (Model-4)

Independent Variable	Coefficient	T-Statistic	VIF Value	Model F-Statistic	Adjusted R^2
CONSTANT	0.40	1.02	-	14.34***	0.65
USD_D(-1)	0.26	2.89***	2.40		
USD_D(-2)	-0.07	-0.72	2.75		
USD_D(-3)	0.48	5.41***	2.38		
US_CCI	0.05	0.18	1.88		
US_ECI	-0.88	-1.79*	4.56		
US_ECI(-1)	1.92	3.73***	5.00		
US_TCI	-0.66	-5.15***	2.55		
US_TCI(-1)	-0.50	-3.61***	2.93		
US_TCI(-2)	-0.37	-3.17***	2.18		
US_TCI(-3)	0.15	1.51	1.52		
US_TCI(-4)	0.21	2.31**	1.33		
VIX	0.00	-1.00	1.26		
VIX(-1)	0.00	0.68	1.59		
VIX(-2)	0.01	3.66***	1.73		
VIX(-3)	0.00	1.85*	1.59		

*: p<0.10. **: p<0.05. ***: p<0.01.

The results of the regression model for the USD Deposit series were shown above (Table 9). The F-statistic of the model could be shown as an evidence for the statistical significance of the whole model. The dependent variable, the US Dollar Deposit series, was significantly and positively affected by its one and three time lagged values. The simultaneous and one time lagged Economic

Confidence Index series had a statistically significant effect on the dependent variable. The coefficient of the concurrent variable was negative, while the delayed one was positive. The simultaneous, one, two and four time delayed values of the Total Confidence Index had significant effects on the USD Deposit. While the direction of the effect of only four time-delayed series was positive, the effects of others were negative. It could also be said that VIX Volatility Index, with two and three time delays, was statistically significant and positive factors in the model. The power of this estimation model to explain the variations of dependent variable was 65% (Adjusted R^2).

The fact that all the VIF values in Table 9 were less than the limit of 10, that was a statistical proof that the independent variables were unrelated. The outputs of the other tests applied for assumptions were shown in the Table 10. According to the Jarque-Bera Normality Test, the assumption that the errors are normally distributed could not be rejected. When the existence of heteroscedasticity was examined, there was not enough evidence found for violation. According to the Brush-Godfrey Test, the null hypothesis could not be rejected at the 5% level. However, since 10% were considered as significance in all models, an additional test, Durbin-Watson Statistics was performed. It was found that all error terms were statistically independent from each other (Enders, 2015). As a result, it could be proposed that this model was also unbiased.

Table 10. Outputs For Assumption Tests of Model-4

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	1.73	0.42
AUTOCORRELATION	Brush – Godfrey Test	3.16	0.05
AUTOCORRELATION	Durbin Watson Test	2.24	[1.2-2.8]*
HOMOSCEDASTICITY	Brush – Pegan – Godfrey Test	1.05	0.42

*: Required Range of Test Statistic for Durbin Watson Test

4.2. Results of GARCH Models

In this sub-section, outputs of the GARCH models which predict volatility of the dependent variables, were given. Since the estimations for the index returns and monthly changes of deposits were discussed in detail in the previous sub-section, explanations were given only for volatility estimations in this sub-section, not for mean estimation. The determination of the independent variables of the mean estimation part of the model, that was lagged series of each dependent variable itself, was based on the results of the multiple linear regression models explained in the previous part. In addition, the reason for the low R^2 values in the models in this section was the usage of less independent variables for mean estimation parts. Since estimation models for volatility were created in this part of the study, this situation did not pose a problem in terms of variance interpretations (Enders, 2015).

Table 11. GARCH Model for BIST100 Index (Model-5)

MEAN ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**R^2**
CONSTANT	1.23	12.46***	0.03
BIST100(-3)	-0.21	-2.15**	
VOLATILITY ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**Adjusted R^2**
CONSTANT	0.003	0.13	0.03
ARCH(1)	-0.13	-1.90*	
GARCH(1.0)	0.58	1.47	
TR_CCI	-0.001	-0.01	
TR_ECI	-0.001	-0.01	
TR_TCI	-0.003	-0.34	
VIX	0.004	1.33	

*: p<0.10. **: p<0.05. ***: p<0.01.

BIST100 index was used as the dependent variable in the first GARCH model. In this model, 3 time-lagged value of the dependent variable was included in order to strengthen the model in estimating the mean. The findings of the model were presented in Table 11. It has been concluded that there was no expectation and confidence index that has significant effect on the volatility of the BIST100. Only ARCH(1), the square of a time-delayed value of errors, had significant and negative effects on the volatility of the BIST100 index.

It could be seen from the negativity of the coefficient of the ARCH(1) effect in Table 11, the assumption related to the coefficients was not valid. However, as stated in the study of Cryer & Chan (2008), this negative effect could be seen in some conditions, and it could not affect the reliability of the estimation. The fact that the summation of the coefficients of the ARCH(1) and GARCH(1,0) variables was 0.45 indicates the relevant assumption was satisfied sufficiently. The outputs of other tests were shown in the Table 12. There was not enough statistical evidence to reject the hypothesis that the errors exhibit normal distribution according to the test of normality. In addition, according to the ARCH LM Test, the null hypothesis of the test could not be rejected. Although there was an exception for one part of the one assumption which was acceptable with the basis of literature, all assumptions for the unbiasedness of the volatility estimation for the BIST100 index were sufficiently fulfilled.

Table 12. Outputs for Assumption Tests of Model-5

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	3.57	0.17
AUTOCORRELATION	ARCH LM Test	1.53	0.22

Table 13. GARCH Model for S&P500 Index (Model-6)

MEAN ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**R^2**
CONSTANT	1.16	514.01***	0.01
SP500(-1)	-0.14	-313.94**	
VOLATILITY ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**Adjusted R^2**
CONSTANT	0.0001	0.09	0.01
ARCH(1)	0.14	0.96	
GARCH(1.0)	0.73	4.15***	
US_CCI	-0.001	-0.04	
US_ECI	0.001	-0.04	
US_TCI	0.001	-0.02	
VIX	0.001	3.83***	

*: p<0.10. **: p<0.05. ***: p<0.01.

With the second GARCH model, the volatility of the S&P500 index was tried to be estimated. In order to strengthen the mean estimation of the model, a time-lagged value of the dependent variable was included in the model. The output of model was summarized in the Table 13. According to these results, it was statistically found that the squared variance of the dependent variable (GARCH(1,0)) had a significant and positive effect on the volatility of the S&P500 index. In addition, it was found that VIX Volatility Index affects the volatility of the S&P500 significantly and positively.

Table 14. Outputs For Assumption Tests Of Model-6

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	1.52	0.47
AUTOCORRELATION	ARCH LM Test	0.01	0.94

It could be seen from Table 13 that the coefficients of the ARCH(1) and GARCH(1,0) variables were positive and their summation was less than 1. The outputs of the other two assumption tests were also presented in Table 14. Accordingly, as a result of the analysis for the test of the normal distribution of errors, there was not enough statistical evidence that they did not have the characteristics of normal distribution. The results of the ARCH LM analysis indicated that statistically significant results could not be reached in order to reject the null hypothesis. Therefore, it could be deduced that the estimation model created was unbiased by satisfying the necessary assumptions.

In another GARCH model, TL Deposit data was used as a dependent variable. In order to increase the predictive power of the model, 2 and 3 time-delayed values of the dependent variable were included for the mean estimation. The output of the relevant model was presented in Table 15. According to the results, the first factor that had significant effect on the volatility of the TL Deposit was the GARCH(1) variable. The effect was positive. Additionally, it was determined that the Consumer Confidence Index, which was another statistically significant estimator, had a negative effect on the

volatility of the TL Deposit. The last independent variable that significantly affected the volatility of the TL Deposit was Total Confidence Index, and the direction of this effect was negative.

Table 15. GARCH Model For TL Deposit (Model-7)

MEAN ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**R^2**
CONSTANT	0.77	6.39***	0.001
TL_D(-2)	0.12	1.56	
TL_D(-3)	0.12	1.26	
VOLATILITY ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**Adjusted R^2**
CONSTANT	0.04	3.23***	0.001
ARCH(1)	0.06	1.42	
GARCH(1.0)	0.83	14.86***	
TR_CCI	-0.04	-3.09***	
TR_ECI	0.003	1.37	
TR_TCI	-0.004	-1.71*	
VIX	0.001	1.19	

*: p<0.10. **: p<0.05. ***: p<0.01.

Table 16. Outputs For Assumption Tests Of Model-7

Checked Assumption	Test Name	Test Statistic	Probability
NORMALITY	Jarque – Bera Test	13.57	0.02
AUTOCORRELATION	ARCH LM Test	0.16	0.69

The positive signs of the coefficients of ARCH(1) and GARCH(1,0) predictors and the summation of these coefficient which was less than 1, were supporting evidences for the first assumption of model (Table 15). The outputs of the tests applied for other assumptions were presented in the Table 16. The fact that the ARCH LM Test's probability value was not at a significant level indicated that the null hypothesis was not violated statistically. According to the result of the Jarque-Bera Normality Test, the null hypothesis for the errors to have normal distribution characteristics was rejected. As explained earlier in the paper, this assumption could be ignored again due to the volatile nature of financial time series data, and the reasons for not making predictions for the future (Sarıkovanlık et al., 2020; Gürbüz & Şahin 2014). Thus, it was concluded that Model 7 fulfilled the necessary and sufficient assumptions and yielded unbiased coefficients.

Finally, the results of the last GARCH model, in which the USD Deposit data used as a dependent variable, were shown in the Table 17. In this model, one and three time-lagged values of dependent variable itself used for mean estimation part to strengthen the results. GARCH(1,0) term significantly and positively affected the volatility of USD Deposit. Total Confidence Index was another

statistically significant variable in estimating the volatility of deposit investment in US Dollars. The direction of that effect was negative. Lastly, VIX Volatility Index was found to have an effect on the volatility of the USD Deposit significantly and positively.

The fact that the summation of the coefficients of the ARCH(1) and GARCH(1,0) terms in the last estimation model was 0.9, and that both coefficients were positive showed that one of the first assumptions of the model was met (Table 17). The results of the other two tests related to the assumptions were presented in Table 18. Jarque-Bera Test indicated that there was no significant evidence to reject the null hypothesis. According to the ARCH LM Test, the condition that the errors terms were independent could not be statistically rejected at the 5% level, but could be rejected at the 10% level. In this case, another independence test, the Autocorrelation Function Test (ACF Test), was additionally applied to test of the relevant condition and strengthen the result (Hansen, Lunde & Voev, 2014). The results showed that there was not enough statistical evidence to reject the null hypothesis that the errors were independent at 10% significance level. Thus, it could be interpreted that this model was also statistically unbiased.

Table 17. GARCH Model for USD Deposit (Model-8)

MEAN ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**R^2**
CONSTANT	0.54	3.93***	0.13
USD_D(-1)	0.23	2.26**	
USD_D(-3)	0.24	2.43**	
VOLATILITY ESTIMATION			
Independent Variable	**Coefficient**	**Z-Statistic**	**Adjusted R^2**
CONSTANT	0.001	0.64	0.11
ARCH(1)	0.06	0.92	
GARCH(1.0)	0.84	8.20***	
US_CCI	0.001	0.55	
US_ECI	0.001	1.45	
US_TCI	-0.003	-29.13***	
VIX	0.0004	2.58***	

*: p<0.10. **: p<0.05. ***: p<0.01.

Table 18. Outputs For Assumption Tests of Model-8

Checked Assumption	**Test Name**	**Test Statistic**	**Probability**
NORMALITY	Jarque – Bera Test	1.06	0.59
AUTOCORRELATION	ARCH LM Test	3.59	0.06
AUTOCORRELATION	ACF Test (2 Time-Lagged)	0.05	0.57

5. Discussion

The current study investigated the effect of confidence and expectation indices on investment decisions by comparing one developed and one developing countries. United States and Turkey were chosen as the samples of a developed country and a developing country respectively. Monthly returns of Borsa Istanbul (BIST) 100 index, monthly change of Total Turkish Lira Deposit, monthly returns of Standard and Poor's (S&P) 500 index and monthly change of US Dollar Deposit were used as dependent variables. Turkish Consumer Confidence Index, Turkish Economic Confidence Index, Turkish Total Confidence Index, United States Consumer Confidence Index, United States Economic Confidence Index, United States Total Confidence Index and VIX Volatility Index were independent variables of the study. In the analysis part of the research, both the multiple linear regression models and the generalized autoregressive conditional variance models were applied.

Multiple linear regression models were created to determine the factors affecting the average return of stock indices and monthly change values of national currency deposits. The results of the initial analysis for Turkey revealed that the Consumer Confidence Index, Economic Confidence Index, and VIX Volatility Index had a significant impact on the BIST100 index. However, the Total Confidence Index had no discernible effect. On that model, the coefficients of the Consumer Confidence Index and the VIX Volatility Index were negative, while the effect of the Total Confidence Index was positive. In addition, significant and negative influence of the three time-lagged value of the BIST100 Index were observed on itself. In the second multiple linear regression model for Turkey, the factors having effects on the Total Turkish Lira Deposit were investigated. As a result of this model, significant effects of Consumer Confidence Index, Economic Confidence Index, Total Confidence Index were observed. Also, two and three time lagged values of dependent variable were significant. Among these effects, past time values of the dependent variable itself and one time lagged value of the Consumer Confidence Index were found to have positive impact on Turkish Lira Deposit. The impacts of the simultaneous and two time lagged series of the Consumer Confidence Index, the Economic Confidence Index, and the Total Confidence Index on the dependent variable were determined negatively. There was not enough evidence to show that the VIX Volatility Index had a significant effect on the Total Turkish Lira Deposit.

It is noteworthy that the confidence indices had a greater effect on the total local currency deposit investments compared to the stock market investment in the regression models developed for the Turkish sample. The Consumer Confidence Index had a detrimental effect on both stock market investments and deposits in local currency, indicating a propensity for potentially riskier investments. Another important result in terms of investment in Turkey was that while confidence in the economy affected deposit investment negatively, it had a positive effect on stock market index. As the confidence in economic activities increases, investors shifted decisions towards the stock market by increasing their risk appetite. Actually, it was an expected result within the framework of risk-return relations of neo-classical economics. This situation could yield an important result in terms of policy

making: With every step that needs to be done toward allocating a trust for economic activities, the appropriate resource flow would be offered to enterprises that have a substantial role in the growth of the nations. On the other hand, negative effects of VIX Volatility Index on BIST100 returns were found. Since that index is considered as a risk indicator on a global basis, this negative situation could be explained with a more behavioral approach. From a rational standpoint, it was anticipated that the stock markets of developing nations would be appealing as the world's tolerance when risk increased. It indicates that investors were actually turning to safer instruments while the global risk appetite for risk-taking increases. This conclusion makes more sense by considering the negative effects of VIX Index on S&P500 Index; but deposit investments in US Dollars were positively affected from the risk index. The pandemic that emerged in recent years and the policies developed by countries to recover the retarder effects of the pandemic could be presented as a cause of this situation. It was observed that the environment of uncertainty had an impact on investors' psycho-social processes, and they actually chose low-return investments by avoiding risk and opting for safe investments, even in settings where risk was generally encouraged. Therefore, an environment of certainty and trust for investors should be provided not only by economic indicators, but also by the effect of cognitive and psychological processes that are more abstract to measure.

Multiple linear regression models were created for also United States sample. The results of the model created for the S&P500 index showed that the Economic Confidence Index and the VIX Volatility Index have a significant impact. On the other hand, the Consumer Confidence Index and the Overall Confidence Index had no effect statistically. The direction of the effect of the Economic Confidence Index was positive; while the negative impacts of the VIX Volatility Index on S&P500 were observed. In addition, one time lagged value of dependent variable was significantly negative factor for itself. Corresponding to the multiple linear regression model for total deposits in USD, a significant influence of independent variables other than the Consumer Confidence Index was observed. Also, past time values of the dependent variable yielded significant impacts on itself. The effect directions of the one and three time lagged values of the dependent variable, the values of the VIX Volatility Index, the one-time lagged series of the Economic Confidence Index and the four time lagged values of the Total Confidence Index were found as positive. As negative and significant factors; the simultaneous value of the Economic Confidence Index, and the simultaneous, one and two time lagged values of the Total Confidence Index were determined.

It was observed that confidence in economic activities increases investment in the stock market for the United States, similar to Turkey. The fact that the Consumer Confidence Index did not have a significant impact on the both investment instruments in the United States could be explained by the form of efficiency of financial markets. Correspondingly, independent variables of the study about beliefs and expectations had more significant impacts on investments in Turkey. As market efficiency increases in developed countries, issues of expectation and confidence affect prices more quickly. Therefore, concurrent and lagged effects produce less significant outcomes in these countries.

Furthermore, in behavioral terms, the fact that market uncertainties are higher in developing countries might cause investors to make more instant and faster responses in their decision-making processes.

The BIST100 index was used as a dependent variable in the first GARCH model developed to examine the factors affecting the volatility of financial instruments for Turkey. In this model, the term ARCH(1) had significant and negative effects on the volatility of the dependent variable. However, the volatility of the BIST100 index was not significantly influenced by any of the confidence and expectation indices. In the second volatility estimation model for Turkey, Total Turkish Lira Deposit was used as a dependent variable. Based on this model, significant and negative effects of the Consumer Confidence Index and the Total Confidence Index were determined. It was noticed that the other independent variables, the Turkish Economic Confidence Index and the VIX Volatility Index, had no statistically important impacts on the volatility of the dependent variable. Furthermore, while GARCH(1,0) term had statistically significant and positive influence on the standard deviation of total local currency deposits of Turkey, the term ARCH(1) had no significance.

In the first volatility model of the United States, S&P500 index was selected a dependent variable. According to this model, VIX Volatility Index and the GARCH(1,0) terms was significantly and positively influencer factors. Whereas, statistically meaningful results could not be obtained for Consumer Confidence Index, Economic Confidence Index, Total Confidence Index, and the ARCH(1) term. Based on last model, Total Confidence Index had significantly negative effects on the volatility of the Total USD Deposit data. Additionally, significant and positive impacts of the VIX Volatility Index, and the GARCH(1,0) term on the volatility of the dependent variable were found. The influences of the ARCH(1) term, Consumer Confidence Index, and Total Confidence Index was not meaningful on the volatility of the Total USD Deposit.

Although the impacts of any expectation and confidence indicators on the Turkish stock market were not observed for volatility forecasts, the VIX volatility index was found to be an important factor in United States stock investment. It could be thought that this situation is due to the fact that investors of S&P 500 index are more sensitive to global risk expectations. However, confidence indices did not meaningfully affect volatility of the stock markets for both countries. It may indicate that stock market investors do not consider short-term changes in local confidence-related conditions with the possibility of long-term oriented perspective.

In deposit investments case, the Consumer Confidence Index and the Total Confidence Index were negative factors on the volatility of instrument in Turkey. On the other side, Total Confidence Index yielded negative effects for United States. These results indicate that the movement in investment positions decreased with the increase in confidence. The fact that investors attach more importance to the issue of trust in local currency deposit investments has an important implication: Domestic activities are valued for local currency investments rather than stock market investments. When comparing countries in the volatility model: The VIX Volatility Index, a global measure of risk

appetite, was observed to have a significant impact on the volatility of US assets. On the other hand, negligible volatility effects of VIX Index on both investment instruments of Turkish side were determined. This conclusion can be taken as evidence that Turkish investors are more sensitive to local developments than global ones.

In general, by comparing the results of this study with the studies included in the literature review, it could be said that most of the generated models were significant and yielded similar results with literature in terms of the significant effects of the independent variables. These results show that; in order to satisfy investor sentiment and manage perceptions in a good way, both companies and regulators should provide positive expectations in a sustainable manner. In the most basic sense, they need to give the necessary confidence to the financial markets. In addition to this, directly measurable indices of confidence and expectations had negative influences on investments unexpectedly. Thus, it could be proposed that other factors in the psycho-social context are debatable influencer of investment decisions. Accordingly, economic policy makers and company managers should try to ensure investor confidence and improve the expectations in every sense including perceptions by emphasizing sustainability of the programs, long-term orientation, and good governance.

The fact that the comparisons were made on the basis of two countries and two investment instruments is an important contribution of this study to the literature. In addition, modeling the volatility of financial instruments and making cross-country comparisons, similar with the mean estimation models, could be presented as another important novelty of the current research. Yet, the dataset of the study which consisted of only stock market indices and deposit investments could be considered as a limitation of the study. That was preferred to compare the safe and risky investments. Future studies including other financial instruments for both countries could carry the literature further. In addition to this, instead of using secondary data, experiments and direct observational case studies could be conducted. With that, the effects of impulsive decisions regarding confidence and expectation on investment decisions would also be examined in the future. Thus, interactions that are directly related to investor sentiment would be better tracked.

References

Akkuş, H. T., & Zeren, F. (2019). Tüketici güven endeksi ve Katılım-30 İslami hisse senedi endeksi arasındaki saklı ilişkinin araştırılması: Türkiye örneği. Third Sector Social Economic Review, 54(1), 53-70.

Alacahan, N.D., & Akarsu, Y. (2019). Türkiye açısından tüketici güven endeksi ile Bist 100 endeks değerleri ve Merryl Lynch tahil faiz getirileri arasındaki ilişkinin ampirik olarak incelenmesi. 5. Uluslararası Ekonomi Yönetimi ve Pazar Araştırmaları Kongresi, İstanbul, September, 26-27.

Alptürk, Y., Tunçel, M. B., Çetenak, E. H., & Bekçi, I. (2021). Finansal Hizmetler Güven Endeksi ile BİST şehir endeksleri arasındaki ilişkinin tespitine yönelik bir araştırma. Bingöl Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 5(2), 271-293.

Başarır, Ç., Bıcıl, İ. M., & Yılmaz, Ö. (2019). The relationship between selected financial and macroeconomic variables with consumer confidence index. Yaşar Üniversitesi E-Dergisi, 14, 173-183.

Benoit, K. (2011). Linear regression models with logarithmic transformations. London School of Economics, London, 22(1), 23-36.

Beşiktaşlı, D. K., & Cihangir, Ç. K. (2020). Tüketici güven endeksinin finansal piyasalara ve makroekonomik yapiya etkisİ. Finans Ekonomi ve Sosyal Araştırmalar Dergisi, 5(1), 54-67.

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. Journal of Econometrics, 31(3), 307-327.

Canöz, İ., & Erdoğdu, A. (2019). Sektörel güven endeksleri ve BİST sektör endeksleri arasındaki ilişkilerin simetrik ve asimetrik nedensellik analizi. Yönetim ve Ekonomi Dergisi, 26(3), 833-849.

Cowpertwait, P. S., & Metcalfe, A. V. (2009). Introductory time series with R. Springer.

Cryer, J. D., & Chan, K.S. (2008). Time series analysis: With applications in R. (Vol. 2.) New York: Springer.

Daly, K. (2008). Financial volatility: Issues and measuring techniques. Physica A: Statistical Mechanics and Its Applications, 387(11), 2377-2393.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of The American Statistical Association, 74(366a), 427-431.

Drake, P. P. (2022). The gold-stock market relationship during COVID-19. Finance Research Letters, 44, 102111.

Durgun Kaygısız, A. (2019). The relationship between consumer and real sector confidence incides and the selected macroeconomic variables in Turkey: 2010-2018. Journal of Management & Economics Research, 17(1), 314-332.

Enders, W. (2015). Applied econometric time series. (Fourth Edition.) New Jersey: John Wiley and Sons.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. Econometrica: Journal of The Econometric Society, 50(4): 987-1007.

Evci, S. (2019). Ekonomik güven endeksi ile yatırım araçları arasındaki nedensellik ilişkisi: Toda-Yamamoto yaklaşımı. İşletme Araştırmaları Dergisi, 11(4), 2893-2901.

Eyüboğlu, K., & Eyüboğlu, S. (2017). Ekonomik güven endeksi ile hisse senedi fiyatları arasındaki ilişkinin incelenmesi: Türkiye örneği. Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 19(2), 603-614.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), 383-417.

Federal Reserve Economic Data. Access Date: 2 May 2022. https://fred.stlouisfed.org/.

Fisher, R. (1955). Statistical Methods and Scientific Induction. Journal of the Royal Statistical Society. Series B (Methodological), 17(1), 69-78.

Fisher, R.A. (1950). Contributions to mathematical statistics. Washington DC: Wiley Publications.

Fukuyama, F. (2000). Social capital and civil society. Available at SSRN 879582.

Gujarati, D., (2011). Econometrics by example. New York: Palgrave Macmillan.

Gujarati, D., N., & Porter D. C.. (2011). Basic econometrics. (5th Edition.) New York: McGraw-Hill Higher Education.

Güngör, S. (2019). Ekonomik güven endeksi ve finansal yatirim araçlari getirileri arasindaki nedensellik ilişkisi: 2007-2017 döneminde ABD Dolari ve altin getirileri örneği. Journal of Management and Economics Research, 17(1), 22-39.

Gürbüz, S., & Şahin, F. (2014). Sosyal bilimlerde araştırma yöntemleri. Ankara: Seçkin Yayıncılık.

Hansen, P. R., Lunde, A., & Voev, V. (2014). Realized beta GARCH: A multivariate GARCH model with realized measures of volatility. Journal of Applied Econometrics, 29(5), 774-799.

Harrell, F. E. (2001). Regression modeling strategies: with applications to linear models, logistic regression, and survival analysis (Vol. 608). New York: Springer.

Hou, K., Xue, C., & Zhang, L. (2020). Replicating anomalies. The Review of Financial Studies, 33(5), 2019-2133.

Jansen, W. J., & Nahuis, N. J. (2003). The stock market and consumer confidence: European evidence. Economics Letters, 79(1), 89-98.

Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen. Cognition, 7(4): 409–411.

Kocabıyık, T., & Alptürk, Y. (2020). Güven endeksleri ve CDS primleri ile hisse senedi fiyatları arasındaki ilişkinin keşfi. International Journal of Business Economics and Management Perspectives, 4(1), 149-168.

Korkmaz, T., & Çevik, E. (2009). Reel Kesim Güven Endeksi ile İMKB 100 Endeksi arasındaki dinamik nedensellik ilişkisi. İstanbul Üniversitesi İşletme Fakültesi Dergisi, 38(1), 24-37.

Köse, A. K., & Akkaya, M. (2016). Beklenti ve güven anketlerinin finansal piyasalara etkisi: BIST 100 üzerine bir uygulama. Bankacılar Dergisi, 99, 3-15.

Markowitz, H. M. (1999). The early history of portfolio theory: 1600–1960. Financial Analysts Journal, 55(4), 5-16.

Münyas, T. (2019). Borsa İstanbul endeksleri ile güven endeksleri arasındaki ilişkinin araştırılması üzerine bir inceleme. Tesam Akademi Dergisi, Türkiye Ekonomisi Özel Sayısı, 299-320.

Neyman, J. (1976). Tests of statistical hypotheses and their use in studies of natural phenomena. Communications in Statistics-Theory and Methods, 5(8), 737-751.

Önem, H. B. (2022). Tüketici güven endeksi ve bazi Bist endeksleri arasindaki eşbütünleşme ve nedensellik ilişkisi. Finans Ekonomi ve Sosyal Araştırmalar Dergisi, 7(1), 12-22.

Organisation for Economic Co-operation and Development (OECD) Database. Access Date: 2 May 2022. https://data.oecd.org/.

Pedroni, P. (1996). Fully modified OLS for heterogeneous cointegrated panels and the case of purchasing power parity. Manuscript, Department of Economics, Indiana University, 5, 1-45.

Pinho, C., & Madaleno, M. (2011). On the influence of expectations over international stock returns and macroeconomic variables. International Review of Accounting Banking and Finance, 3(2), 67-103.

Ricciardi, V., & Simon, H. K. (2000). What is behavioral finance?. Business, Education & Technology Journal, 2(2), 1-9.

Ritter, J. R. (2003). Behavioral finance. Pacific-Basin Finance Journal, 11(4), 429-437.

Sadeghzadeh, K. (2018). Borsanin psikolojik faktörlere duyarliliği: Oynaklik Endeksi (VİX) ve Tüketici Güven Endeksi (Tge) ile Bist 100 endeksi arasindaki ilişkiler. Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 19(2), 238-253.

Sarıkovanlık, V., Koy, A., Akkaya, M., Yıldırım, H. H., & Kantar, L. (2020). Finans Biliminde Ekonometri Uygulamaları Kavram – Uygulama – Analiz. Ankara: Seçkin Yayıncılık.

Sarıkovanlık, Vedat, Altuntaş, S.T., & Mera, N. (2018). Effects of expectations and confidence indices on financial markets. IV. International Symposium on Accounting and Finance, Ohrid, July, 3-5.

Shiller, R. J. (2003). From efficient markets theory to behavioral finance. Journal of Economic Perspectives, 17(1), 83-104.

Süsay, A., & Eyüboğlu, K. (2021). Hizmet Güven Endeksi ile BIST Hizmet Sektör Endeksleri arasındaki saklı ilişkilerin yapısal kırılmalar altında incelenmesi. Çankırı Karatekin Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 11(1), 195-220.

Taylor, S. J. (1986). Modeling financial time series. Chichester: John Wiley & Sons.

Thomson Reuters Eikon Data. Access Date: 2 May 2022. https://cs.thomsonreuters.com/ua/mobile_link/cs_us_en/configurator/csh_main_form.htm.

Topaloğlu, E., & Metin, S. (2021). Tüketici güven endeksi ile pay piyasası arasındaki ilişki: G7 ülkeleri üzerine bir zaman serisi analizi. İşletme Araştırmaları Dergisi. 13(3), 2832-2844.

Tunçel, M. B., & Gürsoy, S. (2020). Korku endeksi (VIX), bitcoin fiyatlari ve Bist100 endeksi arasindaki nedensellik ilişkisi üzerine ampirik bir uygulama. Elektronik Sosyal Bilimler Dergisi, 19(76), 1999-2011.

Türkiye Cumhuriyet Merkez Bankası Elektronik Veri Dağıtım Sistemi. Access Date: 2 May 2022. https://evds2.tcmb.gov.tr/index.php?/evds/serieMarket.

Tüzün, O., Ceylan, İ. E., & Ceylan, F. (2021). Güven endeksleri ile hisse senedi piyasasi arasindaki nedensellik analizi: Türkiye örneği. Journal of the Cukurova University Institute of Social Sciences, 30(2).

Usul, H., Küçüksille, E., & Karaoğlan, S. (2017). Güven endekslerindeki değişimlerin hisse senedi piyasalarina etkileri: Borsa İstanbul örneği. Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 22(3), 685-695.

Whitehead, H. A. L. (2007). Selection of models of lagged identification rates and lagged association rates using AIC and QAIC. Communications in Statistics—Simulation and Computation, 36(6), 1233-1246.

Williams, M. N., Grajales, C. A. G., & Kurkiewicz, D. (2013). Assumptions of multiple regression: Correcting two misconceptions. Practical Assessment, Research, and Evaluation, 18(1), 116-130.