



The Effects of VIX Index, Exchange Rate & Oil Prices on the BIST 100 Index: A Quantile Regression Approach

VIX Endeksi, Döviz Kuru ve Petrol Fiyatlarının BIST 100 Endeksi Üzerindeki Etkileri: Bir Kuantil Regresyon Yaklaşımı

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Abstract

The aim of this study is to investigate the effect of oil price, US Dollar rate and VIX on Borsa Istanbul by employing quantile regression model. In the literature, there are studies that examine the effect of the mentioned factors on stock market, but the number of studies in which these factors are used together and the quantile regression approach is used is not enough. This is the motivation source of the study. In this context it is examined that how and in which quantiles the mentioned global factors influence the stocks market in Turkey. The quantile regression approach allows the observation of the dynamic relations. This information will help investors who will invest in BIST in investing strategies. The results of the study show that BIST index is significantly affected by volatility index in all quantiles. On the other hand, the dollar was impacted on the BIST index only in high quantiles. The stock market effect of oil prices indicates that there is not an asymmetric relationship between two variables, only meaningful in middle quantile.

Keywords: Stock Markets, BIST, VIX, Oil, Exchange Rate, Quantile Regression

JEL Codes: C01, C21, C58, D53

Özet

Bu çalışmanın amacı petrol fiyatlarının, ABD Doları'nın ve VIX'un Borsa İstanbul üzerindeki etkisini kantil regresyon modeli kullanarak araştırmaktır. Literatürde bu çalışmaya konu olan faktörlerin etkisi incelenmekle birlikte, kantil regresyon yaklaşımının kullanıldığı çalışmaların sayısı nispeten azdır. Çalışmanın motivasyon kaynağını bu nokta oluşturmuştur. Bu bağlamda, bahsedilen küresel faktörlerin, Türkiye'de hisse senetleri piyasasını nasıl ve ne derece etkilediği incelenmiştir. Kantil regresyon yaklaşımı dinamik ilişkilerin gözlemlenmesine izin verir. Bu bilgi, BIST'e yatırım yapacak yatırımcılara yardımcı olacaktır. Çalışmanın sonuçları, BIST endeksi üzerinde en fazla etkili olan faktörün VIX endeksi olduğunu göstermiştir. Öte yandan dolar kuru sadece borsa yükselirken anlamlı etkiye sahip iken, petrol fiyatlarının BIST endeksini asimetric olarak etkilemediği görülmüştür. BIST endeksinin tüm kantillerdeki volatilite indeksinden önemli ölçüde etkilendiğini göstermektedir. Öte yandan Dolar kuru BIST üzerinde yalnızca yüksek kantillerde etkili olmuştur. Petrol fiyatlarının BIST üzerindeki etkisine bakıldığında ise, iki değişken arasında asimetric bir ilişki olmadığı ve bu ilişkinin yalnızca orta kantillerde anlamlı olduğu görülmektedir.

Anahtar Kelimeler: Hisse senedi piyasası, BIST, VIX, Petrol, Döviz Kuru, Kuantil Regresyon

Introduction

The volume of transactions of international investments that exceed the borders of the countries are growing rapidly in world financial markets. This situation is accompanied by local financial markets in the countries at the same time becoming a global financial market feature. Global markets have been influenced by developments in the world such as economic developments, economic conditions, wars, internal conflicts, supply and demand, natural catastrophes, political tensions and conflicts etc. In addition, BRICS countries and emerging markets such as South Africa, Brazil, India, Indonesia and Turkey, which have been starting to be called fragile quintiles since 2013, are the markets with high potential risk of return at the same time with high risk. The high level of risk in these countries necessitates more detailed analysis and more factors to be taken into account. It is important at this point that all possible factors affecting the markets are discussed as much as possible in the academic studies. Presenting and revealing the factors that escape from the eye to the attention of investors with different methods of analysis and new findings will enable more efficient and careful investment decisions.

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As is known, the main purpose of the companies is to make the company value maximum in favor of shareholders. This is only possible by maximizing the market prices of the relevant company's stocks. Determining the market value of the shares requires the determination of the stock returns. It is well known that stock prices are generally sensitive to external factors as well as to financial and financial indicators issued by companies. The accumulation of knowledge on financial markets supports the view that stock prices are affected by a wide range of unexpected events and some events more influence stock prices than others. In this context, when it comes to finance literature, it seems that the issue of what matters about stock market is increasing day by day. In this context for example many studies attempting to explain the relationship between stock prices and exchange rate fluctuations have tried to prove that there is a statistically significant and strong relationship between the two variables (Ajayi & Mougoue, 1996; Buberökü, 1997; Granger, Huang & Yang, 2000). On the other hand it is known the volatility in oil prices has an effect on stock prices and earnings in emerging economies (Basher and Sadorsky, 2006). There is a large literature on the relationship between oil prices and macroeconomic variables (Cueppers and Smets, 2015). Based on this literature, various studies about the link between oil prices and the stock market arose later (Jones and Kaul, 1996; Sadorsky, 1999; Park and Ratti, 2008; Reboredo and Rivera-Castro, 2014). Besides these, the number of studies on the effect of volatility indices in developed financial markets on stock markets in other countries is relatively small. As is known, traditional finance models assume that investors are rational and will always force capital market prices to equal the present value of future expected cash flows. Nevertheless, when we look at the history of stock market in the world, it is seen that there are dramatic collapses under the influence of many events still called by their names today: the Long Depression (1878), the Great Crash (1929), the Tronics Boom (1960s), the Go-Go Years (late 1960s), the Nifty Fifty bubble (early 1970s), the Black Monday crash (October 1987), and the Internet bubble (1990s) and other economic and debt crises in the world: During the last twenty years, the world has relieved the sovereign debt crises (Ghosh, 2006; Baker and Wurgler, 2007). In particular, the Latin American (1982), the Mexican "Tequila" (1994-95), the East Asian (1997), the Russian collapse (1998), the Brazilian (1998-99), the Turkish (1994, 2000-2001). At the point of explanation of these changes, traditional finance theories are desperate. Behavioral finance researchers therefore try to increase the standard model with an alternative model built on two basic assumptions (Baker & Wurgler, 2007). One of these assumptions that Baker and Wurgler (2007) stated in their work, put forward by Delong, Shleifer, Summers and Waldmann (1990), implies that investors are subject to emotions. A comprehensive investor sentiment is a belief in future cash flows and investment risks that can not be justified by the facts available.

In this study, the effects of global economic factors such as exchange rate, oil, VIX index (S&P 500 volatility index) on the value of BIST 100 index between 2002-2016 were examined. For this purpose, the daily closing prices of the BIST 100 index are taken as dependent variable and the daily prices of the Dollar, Brent Oil and VIX index are taken as independent variables. In the study, the quantile regression approach which allows the observation of the dynamic relations and mostly unused in the previous studies is used. This approach will be covered in more detail later in this study. The next section of the study will include literature review of the independent variables considered in this study and their relation to stock market.

2. Literature Review

2.1. VIX Index (Chicago Option Exchange Volatility Index) Value and Stock Prices

The VIX index (Chicago Board Options Exchange Volatility Index) is also known as the "fear index" or "investor fear gauge" was created by the Chicago Board of Trade in 1993. VIX is an index based on volatility in financial markets and measuring the degree of fear in financial markets. Index was created to determine the calculated and implied volatility of American-style buy and sell options on the S & P 100 index, which is 22 trading days (30 calendar days) left by the Chicago Board of Options Exchange. In the VIX index, problems arising from buying / selling price fluctuations can be eliminated by calculating the price of each option by taking the average of recently traded options (Kaya, 2015). VIX measures the expected volatility of the market for 30 calendar days and fluctuates continuously throughout the trading day. As is known, investor sensitivity is an important factor in investment decisions of professional investors. The index is seen as a standard indicator of risk volatility for investors in the United States.

In the literature we see that the volatility indices and especially the VIX index have a limited number of studies on the effects of stock markets. When we look at the work done on the international field in this subject, it is seen that the work of first multiplier is done by the Mensi, Hammoudeh, Reboredo and Nguyen (2014). The researchers investigated global factors affecting stock market in BRICS (Brazil, Russia, India, China and South Africa) countries. In their quantile regression study, the shift in global stock markets, commodity prices, uncertainty in the US economic policy, and stock market uncertainty (based on the Chicago Board of Options Exchange Volatility Index (VIX)) have had an impact on stock markets in BRICS countries. As a result of the studies covering between September 1997 and September 2013, asymmetric dependency between BRICS stock exchanges and global stock exchanges has been revealed. In addition, VIX is an important factor in the bear market, as well as in the bull market, except in Brazil and India.

Gonzalez and Novales (2009) analyzed the content of information on current and future market conditions in the volatility indices of international stock markets. In their study, they were based on the S & P 500 Volatility Index (VIX), VDAX (German Volatility Index), VSMI (Swiss Volatility Index) and VIBEX35 (Spanish Volatility Index: they have calculated this volatility index themselves) indexes from January 1, 1999 to March 30, 2008, based on daily closing data of the markets. As a result of their analysis with the Granger causality test, they found a strong negative correlation between the change in volatility indices and the current market returns in both directions. According to the results of the study, the future volatility estimates obtained from the volatility indices are as good as those obtained from the historical volatility, but they are not

as good as they can be used for risk management. They point out that volatility indexes better reflect current market sentiment than expectations about future market conditions.

Tsai (2014), one of the studies conducted in this regard, revealed that the fear index (VIX) is a clear link to the spread of the US stock market to other markets. This spillover effect indicates the asymmetry and positive baseline information and the possibility of spreading non-essential information.

Kaya (2015) investigated the causality between the BIST 100 index and the VIX index. The Johansen-Jeselius cointegration test and the vector error correction model have been applied to their work from January 2, 2009 to January 11, 2013. They found cointegration between the BIST 100 index and the VIX index as a result of the study and found that BIST 100 index was affected by the VIX index.

Another study on global factors affecting the stock market was conducted by Syriopoulos, Makram and Boubaker (2015). The study looked at the relationship between the imports of US industrial and financial sectors and the imports of the same sectors of BRICS countries. The study focuses on volatility in the stock market and portfolio risk. The empirical methodology of their study is based on a VAR-GARCH model that allows for spreading effects in both return and conditional volatility. According to the results of the study, the US industrial sector imports mainly affect the imports of Brazil, followed by Russia, India and South Africa. On the other hand, they concluded that the US financial sector had significant influence on the imports of South Africa and Russia. Asymmetric dependencies, shocks and fluctuations have emerged between the US and BRICS stock exchanges and sectors. Empirical findings for both sectors (industry and finance) show that their volatility in the past is a critical factor in determining future volatility. In addition, US industrial and financial sector diversity benefits of a portfolio of stocks have indicated that BRICS industry and financial sector shares will also be included. In this context, they indicate that such a global diversification portfolio will provide improved risk-adjusted return performance.

Chang, Hsieh & McAleer (2016) investigated whether VIX exposures affect ETF implications in their study. As a result of the study they found significant negative effects on European ETF incomes in the short term; significant impacts that are stronger than those of the European ETF on the single market ETF asset; and lower impact than the S&P 500 brought on European ETF inflation. .

2.2. Oil Price and Stock Prices

One of the macro-determining factors affecting the economic indicators of countries is global oil prices. Over the past 40 years, oil prices have attracted considerable attention as economic indicators in academia, economies of the countries and the press. Numerous empirical studies in this context reveal a strong link between oil prices and economic indicators (Ready, 2014). Because of the prominence of oil prices, it has become necessary to examine the relationship between oil prices and other traded assets, such as equity, to help better understand the link between oil prices and the economy. An analysis of the statistical significance, level and periodicity of this relationship over a long period of time will guide both investors and decision makers to take decisions.

When we look at the literature, we see that there is a lot of studies on the relationship between oil prices and financial markets. Zhu, Guo, You and Xu (2016) examined the relationship between changes in crude oil prices and the Chinese stock exchange industrial sector. Surveys include monthly data from March 1994 to June 2014. They used a quantile regression approach, which allows a more detailed examination of the degree of attachment and structure as a method of analysis in their study. According to the results of their work, the reaction of market inputs to crude oil has reached the conclusion that they are heterogeneous and positive throughout the conditional distribution of industrial sector incomes. Moreover, this commitment is only present in stagnant or declining markets where unexpected returns are low. While adherence to low quantities is not limited to a market, this is a common feature among industries.

In another study on the effect of oil prices on stock returns, Reboredo and Ugolini (2016) examined the effect of quantile and multi-quantile oil price movements on different stock return coefficients by testing the equality hypothesis of conditional and unconditional quantile dispersion functions of stock returns. From 2000 to 2014, share data from three developed economies (US, UK and European Monetary Union) and five BRICS countries were analyzed. According to the results, the effects of oil prices on the upper and lower share price are much smaller than those seen after the onset of the crisis. The negative release effect was greater in many countries before the onset of the crisis and in all the countries after the onset of the crisis than in the opposite direction. Moreover, the positive and negative small-scale movements in oil prices have reached the point that there is no effect on the stock return coefficients before or after the beginning of the crisis.

Berk and Aydoğan (2012) tested the effects of changes in crude oil prices on stock returns at BIST. Using the daily values of Brent crude oil prices and BIST-100 revenues from January 2, 1990 to November 1, 2011, they tested the relationship between the vector autoregression (VAR) model and these two variables. They also tested the relationship between oil prices and stock returns under global liquidity conditions, including the VIX index, which they refer to as a liquidity proxy variable. The results of the study reveal that there is little empirical evidence that crude oil price shocks are rationally assessed in the Turkish stock market. However, the most important factor leading to the change in stocks came as a result of global liquidity conditions. Abdioğlu and Değirmenci (2014) examined the relationship between oil prices and stock prices on a sectoral basis. They used the Granger causality test in the study. According to the results of their studies covering between 2005 and 2013, they have shown a correct causality from stock prices to oil prices for most sub-sectors.

2.3. Exchange Rates and Stock Prices

One of the most important indicators affecting the functioning of world economies and the activities taking place in financial markets is the exchange rates. Shares are closely related to the exchange rate (Çürük ve Boyacıoğlu, 2016). Turkey, one of the countries mentioned as fragile quintiles, is influenced by basic economic developments abroad and fluctuations in exchange rates as well as in other countries (Sahin, 2016).

In the literature, we see that there are a lot of studies that have studied the relationship between these two variables. Pekkaya and Bayramoğlu (2008), Kiran (2009), Anlaş (2012), Veli and Gazel (2014), Boyacıoğlu and Çürük (2016) and Şahin (2016) are some of the researchers analyzing the relationship between exchange rates and the stock market. Besides that, Ajayi and Mougoué (1996) studied eight advanced economies by analyzing the relationship between stock indexes and exchange rates. The error correction model (ECM) of both variables was used to estimate the short and long term dynamics of the variables. According to the ECM results, significant short- and long-term feedback between the two markets has been revealed. In particular, they found that the increase in local stock prices had a short-term negative impact on the local currency value. However, in the long run, increases in stock prices have a positive impact on the value of the local currency. On the other hand, the depreciation of the exchange rate has a positive effect on the short term and long term.

Granger, Huang, and Yang (2000) investigated the relationship between stock prices and exchange rates during the crisis period, which lasted until the first quarter of 1998, which was called Asian inflation. They tried to determine Granger relations using unit root and cointegration models in the analysis. By analyzing data from South Korea, they reached the conclusion that the exchange rates were controlling the stock prices. As a result of the analysis of, stock prices of Philippines have reached the result that they lead to negative correlated exchange rates. Data from Hong Kong, Malaysia, Singapore, Thailand and Taiwan showed strong feedback.

Buberökü (1997) analyzed Japan, Canada, England, Switzerland, Germany and Australia as developed countries and Singapore, South Korea and Turkey as developing countries in his study of the relationship between stock prices and exchange rates in developed and developing countries. Long-term correlational cointegration tests were used and short-term correlations were tested using Granger causality test, VAR effect response function and variance decomposition methods. According to the results of the study, there is a one-way causality relationship between exchange rates and stock prices in Canada and Switzerland. Japan, Germany, the United Kingdom and Australia have not identified any cause-and-effect relationships. Singapore and South Korea have identified a one-way causality relationship from exchange rates to stock prices. In Turkey, it has determined a causality from stock prices to foreign exchange rates. Finally, there is no long-term relationship between variables in any country except Singapore.

Ayvaz (2006) tested the relationship between stock market and exchange rate using time series analysis. The exchange rate is US Dollars. According to the results of the work done on the monthly data, the exchange rate and the national 100 index have determined that there is a long-term stable relationship between the exchange rate and the financial sector index and the exchange rate and the industry sector index. Nevertheless, there was no correlation between the exchange rate and the service sector index. In addition, a two-way causality between the exchange rate and the stock price index has been revealed. Another researcher, Berke (2012), investigated the validity of the "traditional" and "portfolio balance" approaches that explain the relationship between exchange rate and stock prices in the BIST100 index. According to the results of his study using FMOLS, CCR and DOLS methods, he points out that the portfolio balance approach is supported because of the "negative" relationship between the two variables.

3. Data, Model and Analysis

In this study, a quantile regression method was applied. The quantile regression approach was developed by Koenker and Bassett (1978). This approach allows to reveal the effects of the different points of the distribution of each of the variables thought to have an effect on stock market. Another feature is that it can be used for non-distributed data sets. For this reason, it is a very useful method for studying the behaviors or effects of extreme values (Çolak, Öztürkler and Tokatlıoğlu, 2008). Standard linear regression techniques estimates the conditional expectation of a response variable taking into account the hierarchical data structure, but can not characterize the entire conditional distribution of the dependent variable. These techniques may also summarize the average relation between the regression group and the resultant variable on the basis of the conditional mean function $E(y|x)$. This provides only a partial view of the relationship, since we can deal with explaining the relationship at different points in the conditional distribution of Y. Quantile regression provides this ability (Baum, 2013).

The quantile regression model of the study is simply (Y_i, X_i) , $i = 1, 2, 3, 4, 5$ and 6 , where X is the population of all historical data of the variables of VIX and Oil, exchange rates. Data cover the period between 07/02/2002 and 29/12/2016 represent sample (N) ..., N can be expressed. In this model, the Y: BIST 100 index refers to the daily closing scores from 2002 to 2016, and the explanatory variables (VIX Score, Oil Price and Exchange Rate) in the X: Kx1 dimension. According to this relation,

$$Y_i = X_i' \beta_\theta + u_{\theta_i}$$

$$\text{Quant}_\theta(Y_i/X_i) = X_i' \beta_\theta$$

In this model $\theta: 0 < \theta < 1$ and the analyzed quantile. $\text{Quant}_\theta(Y_i/X_i)$ indicates the conditional quantization of Y_i , depending on the explanatory vector X_i . u_{θ_i} is the error term and $\text{Quant}_\theta(u_i(\theta)|X_i) = 0$. Estimation of the parameters θ th sampling quantile of β_θ is done by solving the minimization problem below,

$$\min_{\beta \in R^k} \left\{ \sum_{i: Y_i < \beta X_i} \theta |Y_i - \beta X_i| + \sum_{i: Y_i \geq \beta X_i} (1 - \theta) |Y_i - \beta X_i| \right\}$$

Since the θ th conditional quantile of the Y_i is $\text{Quant}_\theta(Y_i/X_i) = X_i' \beta_\theta$, the prediction is made with the $\text{Quant}_\theta(Y_i/X_i) = X_i' \beta_\theta$. In the minimization equation, $\theta = 1/2$ gives the median regression of equally weighted error terms. θ continuously increases from 0 to 1, and the conditional distribution of Y can be monitored in this process. The parameters of the independent variables in the Cartesian regression are related to a marginal variation in the independent variable θ . It is expressed as a change in the conditional quantile (Çolak, Öztürkler and Tokatlıoğlu, 2008).

The coefficients of β_θ indicate the dependent variable effect of the independent variable in each regression quantile. The advantage of quantile regression is that it provides information about whether the interdependence relation between dependent and independent variables is static or dynamic and whether the relationship is asymmetric or symmetric. If the values of the explanatory variables are similar to each other over the quantile $\beta_{0.05, 0.10, 0.25, 0.50, 0.75, 0.90, 0.95}$, the relationship between the dependent variable and the independent variable is fixed. On the other hand, the extreme values of $\beta_{0.05}$ and $\beta_{0.95}$ are different from each other, indicating that the relationship between dependent and independent variables is asymmetric. Another advantage of quantile regression is that it provides more accurate prediction parameters for normal non-scattering data (Naifar, 2016). The results of the analysis carried out with Eviews and Stata statistical package programs in line with these explanations are given below.

Table 1: Descriptive statistics of variables

	R	OIL	USD	VX
Mean	0.000507	0.000248	0.000261	19.85265
Median	0.001007	0.000352	-0.000251	17.17000
Maximum	0.121272	0.181297	0.070449	80.86000
Minimum	-0.133408	-0.168320	-0.119294	9.890000
SD	0.018601	0.021897	0.008359	9.032528
Skewness	-0.138404	0.082708	0.010405	2.285501
Kurtosis	7.436756	7.400073	18.85422	10.36971
Jarque-Bera	3076.196	3018.067	39127.87	11707.18
Probability	0.000000	0.000000	0.000000	0.000000
Adf test	-60.86410		-59.15712	-4.171785
Probability	0.000	0.000	0.000	0.000

In the descriptive statistics presented in Table 1, the series appear to be stationary. It can be said that oil is the most risky instrument because it has the highest standard deviation. The fact that the stock market Istanbul index has a negative skewness coefficient indicates that investors lose more than gain.

Table 2: Correlation matrix of variables

	VX	USD	OIL	R
VX	1.000000	0.064503	-0.043249	-0.003514
USD	0.064503	1.000000	0.007636	0.010398
OIL	-0.043249	0.007636	1.000000	-0.027684
R	-0.003514	0.010398	-0.027684	1.000000

Looking at Table 2, the correlation between oil and VIX is negative for the stock exchange Istanbul. The increase in the VIX index, which is showing signs of volatility in global markets, is expected to make the correlation negative, as it shows investors can withdraw their money from the stock market. Since oil prices are a significant cost factor for companies, an increase in prices may reduce the value of companies in the stock market. The positive correlation between dollar and BIST index implies that they both act in the same direction. There are no multiple linear autocorrelation problems in the model because the correlations of the variables in the model are not high.

Table 3: Quantile regression estimation results

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
OIL	-0.012	-0.026	-0.026	-0.026**	-0.015	0.002	-0.031
t statistic	-0.025	-1.237	1.466	-1.751	-0.813	0.113	-1.006
USD	-0.124	-0.049	0.047	0.048	0.071	0.119**	0.146**
t statistic	-1.397	-0.686	0.813	1.105	1.429	2.115	1.835
VIX	-0.006***	-0.004***	-0.002***	-0.0006***	-0.01***	-0.003***	-0.006***
t statistic	-4.840	-7.240	-3.645	0.502	2.7287	5.300	4.394
a	-0.016***	-0.010***	-0.010***	-0.010	0.007**	-0.010***	-0.010***
t statistic	-6.205	-8.333	-5.193	0.813	6.690	10.649	6.766
Pseudo R ²	0.0318	0.0197	0.0049	0.0009	0.0008	0.0202	0.0353

Table 3 present that BIST index is significantly affected by volatility index in all quantiles. The fact that the coefficients in each quantile are negative indicates that the BIST index is depreciating as the VIX index, which represents the ambiguity in the world and represents the implicit volatility, increases. On the other hand, the impact of the dollar currency on the BIST index was only in high quantities. In this case, the dependence between the dollar and the stock market is existing while the stock market is in the bull market. The stock market effect of oil prices only proves that there is no asymmetric relationship between the two variables, which is significant in the middle quantile.

To sum up, the stock Exchange Istanbul index in general is influenced by the volatility index, which measures the global risk appetite rather than the macro economic factors. In contrast to the judgment that the stock market and dollar exchange in Turkey move in the opposite direction, in this study the dollar emerges as a dragging factor that attracts the market even further when the BIST is in the bull market. Oil prices are only effective in normal periods on the BIST. The market does not require investors to perceive oil prices as a risk factor.

Conclusion

Knowing the factors that affect the stock returns will help investors make more informed decisions. In this study, the VIX index, oil prices and dollar rate were analyzed by the quantile regression method as global factors that affecting stock markets. In the literature, there are studies that examine the effect of the mentioned factors on stock market, but the number of studies in which these factors are used together and the quantile regression approach is used is not enough. This is the motivation source of the study. In this context, the effect of oil prices, dollar exchange rate and VIX index on the bullish and bear market results of the stock exchange BIST100 index is investigated. As a result, BIST investors are thought to be the most likely to follow the risk appetite and future uncertainty in the world. On the other hand, the influence of the exchange rate on the BIST index is significant and positive only in the bull market. Therefore, in the case of the bull market, the dollar rises return of BIST. Bu bulgu Türkiye de beklentilerin aksine bu iki değişkenin zıt yönde hareket etmediğini göstermiştir. Dolayısıyla yatırımcılar dolar ile borsaya aynı anda yatırım yaparak portföy risklerini düşüremezler.

Oil prices are not a dynamic factor affecting the BIST index.

In subsequent studies, the BIST effect of some macro variables such as interest rates and inflation can be investigated.

References

- Abdioğlu, Z., & Değirmenci, N. (2014). Petrol Fiyatları-Hisse Senedi Fiyatları İlişkisi: BIST Sektörel Analiz. *Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 5(8).
- Ajayi, R. A. & Mougoué, M. (1996). On the dynamic relation between stock prices and exchange rates. *Journal of Financial Research*, 19(2), 193-207.
- Anlas, T. (2012). The Effects of Changes in Foreign Exchange Rates On ISE-100 Index. *Journal of Applied Economics & Business Research*, 2(1).
- Ayvaz, Ö. (2006). Döviz Kuru ve Hisse Senetleri Fiyatları Arasındaki Nedensellik İlişkisi. *İktisadi ve İdari Bilimler Fakültesi Dergisi*, 8(2), 1-14.
- Baker, M., & Wurgler, J. (2007). Investor sentiment in the stock market. *The Journal of Economic Perspectives*, 21(2), 129-151.
- Basher, S. A., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. *Global finance journal*, 17(2), 224-251.
- Baum, C. F. (2013). Quantile regression. URL [http://fmwww. bc. edu/EC-C S, 2013](http://fmwww.bc.edu/EC-C S, 2013).
- Bekaert, G. & Hoerova, M. (2014). The VIX, the variance premium and stock market volatility. *Journal of Econometrics*, 183(2), 181-192.
- Berk, I., & Aydoğan, B. (2012). *Crude oil price shocks and stock returns: evidence from Turkish stock market under global liquidity conditions* (No. 12/15). EWI Working Paper.
- Berke, B. (2012). Döviz Kuru ve İMKB100 Endeksi İlişkisi: Yeni Bir Test. *Maliye Dergisi*, 163, 243-257.
- Boyacıoğlu, M. A. & Çürük, D. (2016). Döviz Kuru Değişimlerinin Hisse Senedi Getirisine Etkisi: Borsa İstanbul 100 Endeksi Üzerine Bir Uygulama. *Journal of Accounting & Finance*, (70).
- Büberkökü, Ö. (1997). Hisse Senedi Fiyatları İle Döviz Kurları Arasındaki İlişkinin İncelenmesi: Gelişmiş ve Gelişmekte Olan Ülkelerden Kanıtlar. *İMKB Dergisi*, C, 13.

- Chang, C. L., Hsieh, T. L., & McAleer, M. (2016). *How are VIX and Stock Index ETF related?* (No. 16-010/III). Tinbergen Institute Discussion Paper.
- Çolak, Ö. F., Öztürkler, H., & Tokatlıoğlu, İ. (2008). Türkiye'de tüketim fonksiyonunun dilim regresyon yöntemi ile tahmini. *Iktisat İşletme ve Finans*, 23(268), 62-93.
- Cüppers, L., & Smeets, D. (2015). How Do Oil Price Changes Affect German Stock Returns?. *International Journal of Energy Economics and Policy*, 5(1), 321.
- Ghosh, A. (2006, July). Capital Account Crises: Lessons for Crisis Prevention. In *High-Level Seminar on Crisis Prevention, Singapore, July* (pp. 10-11).
- González, M. T., & Novales, A. (2009). Are volatility indices in international stock markets forward looking?. *RACSAM-Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas*, 103(2), 339-352.
- Granger, C. W., Huangb, B. N., & Yang, C. W. (2000). A bivariate causality between stock prices and exchange rates: evidence from recent Asian Flu. *The Quarterly Review of Economics and Finance*, 40(3), 337-354.
- Jones, C. M., & Kaul, G. (1996). Oil and the stock markets. *The Journal of Finance*, 51(2), 463-491.
- Kaya, E. (2015). Borsa İstanbul (BIST) 100 Endeksi ile Zimni Volatilité (VIX) Endeksi Arasındaki Es-Bütünleşme ve Granger Nedensellik/Cointegration and Granger Causality Between Implied Volatility (VIX) Index and İstanbul Stock Exchange (BIST) 100 Index. *Sosyal ve Ekonomik Araştırmalar Dergisi*, 17(28), 1.
- Kiran, B. (2009). Türkiye'de döviz kuru ve hisse senedi fiyatlarının sınır testi analizi. *Iktisat İşletme ve Finans*, 24(275), 66-88.
- Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. *Econometrica: journal of the Econometric Society*, 33-50.
- Mensi, W., Hammoudeh, S., Reboredo, J. C., & Nguyen, D. K. (2014). Do global factors impact BRICS stock markets? A quantile regression approach. *Emerging Markets Review*, 19, 1-17.
- Naifar, N. (2016). Do global risk factors and macroeconomic conditions affect global Islamic index dynamics? A quantile regression approach. *The Quarterly Review of Economics and Finance*, 61, 29-39.
- Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the US and 13 European countries. *Energy economics*, 30(5), 2587-2608.
- Pekkaya, M. ve Bayramoğlu, M. F. (2008). Hisse Senedi Fiyatları ve Döviz Kuru Arasındaki Nedensellik İlişkisi: YTL/USD, İMKB 100 ve S&P 500 Üzerine Bir Uygulama. *Muhasebe ve Finansman Dergisi*, (38).
- Ready, R. C. (2014). Oil prices and the stock market. *Browser Download This Paper*.
- Reboredo, J. C., & Rivera-Castro, M. A. (2014). Wavelet-based evidence of the impact of oil prices on stock returns. *International Review of Economics & Finance*, 29, 145-176.
- Reboredo, J. C., & Ugolini, A. (2016). Quantile dependence of oil price movements and stock returns. *Energy economics*, 54, 33-49.
- Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy economics*, 21(5), 449-469.
- Sahin, A. (2016). Döviz Kurunun Hisse Senedi Endeksi Üzerine Kısa ve Uzun Dönemde Etkileri: Kirilgan Besli Ülkeleri Üzerine Yumusak Geçişli Esik Hata Düzeltme Modeli Uygulaması. *Ege Akademik Bakış*, 16(2), 319.
- Syriopoulos, T., Makram, B., & Boubaker, A. (2015). Stock market volatility spillovers and portfolio hedging: BRICS and the financial crisis. *International Review of Financial Analysis*, 39, 7-18.
- Tsai, I. C. (2014). Spillover of fear: Evidence from the stock markets of five developed countries. *International Review of Financial Analysis*, 33, 281-288.
- Veli, A. & Gazel, S. (2014). Döviz Kurları İle BIST Sanayi Endeksi Arasındaki Eşbütünleşme İlişkisi: Bir ARDL Sınır Testi Yaklaşımı. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (44), 23-41.
- Zhu, H., Guo, Y., You, W., & Xu, Y. (2016). The heterogeneity dependence between crude oil price changes and industry stock market returns in China: Evidence from a quantile regression approach. *Energy Economics*, 55, 30-41.

Genişletilmiş Özet

Finans alanında, hisse senedi piyasalarını etkileyen unsurların neler olduğu konusunun gün geçtikçe önemini arttırdığı görülmektedir. Bu konuda risk ve getiri bağlamında yapılan çalışmaların temel noktası piyasaların risk yapısının getiriler üzerindeki etkisinin ve dolayısıyla finansal varlıkların fiyatlanmasının anlaşılmasıdır. Literatüre bakıldığında daha çok tek bir makro düzeyde veya işletme düzeyindeki faktörün hisse senedi piyasaları üzerindeki etkisinin incelendiği görülmektedir. Özellikle Türkiye'de volatilité endekslerinin hisse senedi piyasasına etkisini konu alan çalışma sayısı sınırlıdır. Bu çalışmanın motivasyon kaynağını da bu nokta oluşturmuştur. Bu çalışmada kantil regresyon yaklaşımı ile 2002-2016 yılları arasında döviz kuru, petrol, S&P 500 Volatilité endeksi olan VIX endeksi gibi global ekonomik faktörlerin BIST 100 endeksinin değeri üzerindeki etkisi incelenmiştir. Bu amaçla BIST 100 endeksinin söz konusu yıllar arasındaki günlük kapanış fiyatları bağımlı değişken olarak ve Dolar, Brent Petrol ve VIX endeksi' nin günlük fiyatları ise bağımsız değişken olarak alınmıştır. Bu çalışmanın amacı petrol fiyatlarının, ABD Doları'nın ve VIX'un Borsa İstanbul üzerindeki etkisini kantil regresyon modeli kullanılarak araştırmaktır. Literatürde bu çalışmaya konu olan faktörlerin etkisi incelenmekle birlikte kantil regresyon yaklaşımının kullanıldığı çalışmaların sayısı nispeten azdır. Çalışmanın motivasyon kaynağını bu nokta oluşturmuştur. Bu bağlamda, bahsedilen küresel faktörlerin, Türkiye'de hisse senetleri piyasasını nasıl ve ne derece etkilediği incelenmiştir.

Bu çalışmada kantil (dilim/quantile) regresyon yöntemi uygulanmıştır. Kantil regresyon yaklaşımı dinamik ilişkilerin gözlemlenmesine izin verir. Kantil regresyon yaklaşımı Koanker ve Bassett (1978) tarafından geliştirilmiştir. Bu yaklaşım, hisse senedi piyasalarına etkisi olduğu düşünülen değişkenlerden her birinin dağılımının farklı noktalarındaki etkilerini ortaya koymaya imkân tanımaktadır. Bir diğer özelliği normal dağılımayan veri setleri için de kullanılabilirliğidir. Bu

nedenle aşırı (uç) değerlerin davranışlarının veya etkilerinin de incelenmesinin istendiği çalışmalar için oldukça faydalın bir yöntemdir (Çolak, Öztürkler ve Tokatlıoğlu, 2008).

Çalışmanın sonuçları, BIST endeksinin tüm kantillerdeki volatilité indeksinden önemli ölçüde etkilendiğini göstermektedir. Öte yandan Dolar kuru BIST üzerinde yalnızca yüksek kantillerde etkili olmuştur. Petrol fiyatlarının BIST üzerindeki etkisine bakıldığında ise, iki değişken arasında asimetrik bir ilişki olmadığı ve bu ilişkinin yalnızca orta kantillerde anlamlı olduğu görülmektedir.

Borsaların getirilerine etki eden faktörlerin bilinmesi yatırımcıların daha bilinçli karar vermelerine yardımcı olacaktır. Bu çalışmada Borsa İstanbul 100 endeksinin yükselirken ve düşerken diğer bir anlatımla boğa ve ayı piyasası halindeki getirilerine petrol fiyatlarının, dolar kurunun ve VIX endeksinin etkisi araştırılmıştır. Sonuç olarak BIST yatırımcılarının en öncül olarak dünyadaki risk iştahını ve geleceğe dair belirsizliği takip etmelerinin faydalı olacağı düşünülmektedir. Diğer taraftan döviz kurunun BIST endeksi etkisi sadece boğa piyasasında anlamlı ve pozitif olmaktadır. Dolayısıyla doların yükselmesi boğa piyasası durumunda BIST yatırımcısına da kazandırmaktadır. Petrol fiyatlarının ise BIST endeksine etki eden dinamik bir faktör olmadığı ortaya çıkmıştır. In some researches, people who share different social categories such as education level, social structure and attitudes are more likely to establish communication and interaction process than others. One of the strongest social relations established among people at the end of this process is friendship (Blau, 1977; Verbrugge, 1977).
