

EFFECTS OF COVID-19 OUTBREAK ON TURKISH STOCK MARKET : A SECTORAL-LEVEL ANALYSIS

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Abstract: The Novel Coronavirus (COVID-19) has brought uncertainties to all countries in the world, causing human suffering and economic downturn that are unprecedented in recent history. This paper is the first empirical research that analyzes the effects of the outbreak on the Turkish stock market. The paper employed a fixed-effect model with daily data to explore the economic impact of the global pandemic at the sectoral level. Findings showed that sectoral indices were affected by the number of cases reported in Turkey than the number of cases in Europe and in the world. Furthermore, the most adversely affected sectors were metal products, machinery and sports, insurance and banking sectors. Despite the substantial economic downturn, food-beverage, wholesale and retail trade and real estate investment sectors have been the less affected industries from the outbreak.

Keywords: COVID-19, Pandemic, Borsa Istanbul, Sectoral Indices, Panel Data

KOVID-19 Pandemisinin Türkiye Hisse Senedi Piyasasına Etkileri: Sektörel Bir Analiz

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Özet: Yeni Koronavirüs (KOVID-19), tüm dünya ekonomilerinin öngöremediği büyüklükteki belirsizlikleri beraberinde getirmiş, ülkelerin daha önce karşılaşmadığı bir insani ve iktisadi kriz ortamına sebep olmuştur. Bu çalışma, KOVID-19 salgının finans piyasaları üzerindeki etkisini ampirik olarak inceleyen ilk çalışmadır. Bu makalede, KOVID-19 virüsünün neden olduğu küresel pandeminin sektörel düzeydeki ekonomik etkileri günlük verilerin sabit etkiler yöntemiyle incelenmesi suretiyle açıklanmaya çalışılmıştır. Bulgular, sektörel endekslerin Avrupa ve Dünya vaka sayılarından ziyade Türkiye'deki vaka sayılarından daha çok etkilendiğini göstermiştir. Ayrıca, KOVID-19 salgının olumsuz ekonomik etkileri en çok metal ürünleri ve makine sektörlerinde görülmektedir. Spor, bankacılık ve sigortacılık sektörleri ise bu endüstrileri takip etmektedir. Yaşanan ekonomik durgunluğa rağmen ülkede yiyecek-içecek, toptan-perakende satış ve gayrimenkul yatırım sektörleri ise salgından en az etkilenen sektörler olmuştur.

Anahtar Kelimeler: KOVID-19, Pandemi, Borsa İstanbul, Sektörel Endeksler, Panel Veri

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1. INTRODUCTION

Severe Acute Respiratory Syndrome (SARS), Middle Eastern Respiratory Syndrome (MERS), and the Coronavirus (COVID-19) are all infectious disease viruses, thus possessing certain similarities in nature. These viruses were recognized as global pandemic during their time as a result of their socio-economic and political impacts. However, closed borders, curfews in major cities, shuttered supply chains, and cancelled or postponed historically main stream events (e.g, olympic games) across the world are not among the experiences of humanity during the last century. An unseen minute creature almost shuts down all economies in the world and suspends human activities and civilization.

The COVID-19 outbreak is considered as a humanitarian crisis and a major economic disruption on a global scale far beyond the catastrophic events in the recent history including the global financial crisis, similar outbreaks such as MERS, SARS and H1N1, even World War II. The leading international organizations have issued warnings for the severe impacts of the COVID-19 outbreak. In particular, World Health Organization (WHO) officially declared the COVID-19 outbreak as a pandemic which describes “a worldwide spread of a new disease” in March 11th, 2020. The Organization for Economic Co-operation and Development (OECD) reports that the economic turmoil is bigger than the global financial crises during 2007-2009 (BBC Business News, March 23rd, 2020). International Monetary Fund (IMF) describes it as “the coronavirus pandemic had instigated an economic downturn the likes of which the world has not experienced since the Great Depression” (Reuters Business News, April 9th, 2020).

Several distinctions of COVID-19 pandemic cause unprecedented stress in the world economies. Among others, sharing common symptoms with seasonal flu causing it difficult to identify COVID-19 virus, having a much higher death rate (more than 2 percent compared to 0.1 percent for influenza), lack of vaccine, and being easily contagious are challenges to anticipate the scale and pace of the infection. Governments and international organizations are struggling to identify the period and scale of already introduced measures to contain the outbreak. Thus, COVID-19 pandemic heightened the uncertainty, deteriorate the confidence, increase the risk aversion, and deepen the turmoil in global financial markets.

The spread of COVID-19 has a drastic impact on the global economy from tourism to international trade, manufacturing to service sector, and airline to many other industries across the world. Despite the mounting economic downturn, international food markets remain balanced as the reported stocks for cereals and other agricultural commodities are exceeds the anticipated demand (Food and Agricultural Organization-Market Monitor, April, 2020). Therefore, it is highly expected that the COVID-19 outbreak would have significantly varying effects across industries.

The present paper aims to outline the economic impact of COVID-19 pandemic on a variety of sectors in Turkey in the financial markets. Despite Turkey is one of the latest COVID-19 observed country, the number of infected people is mounted around seventy thousands (as of April 15th, 2020) listing it among the highest confirmed coronavirus cases countries in the world (World Health Organization, WHO). The study includes all sectors listed in stock exchange market (Borsa Istanbul) to present a more comprehensive outlook on the economic impacts of the outbreak on the country's overall economy. Particularly, the study aims to reveal whether an empirical association exists between daily confirmed case numbers due to the coronavirus outbreak and stock prices for all sector indices using in a panel data analysis starting from the beginning of the outbreak in January, 2020.

Findings reveal that COVID-19 pandemic affects all sectors at different levels. The most adversely affected sectors are metal products, machinery and sports, insurance and banking sectors. Contrary to the majority of the sectors, the results suggest that the negative impact of COVID-19 is less on the food-beverage, wholesale and retail trade and real estate, investment sectors.

The paper contributes to the existing literature in two folds. First, the study provides empirical evidences from the point of an emerging economy, Turkey, based on a formal econometric analysis beyond qualitative statements. In addition, it is one of the few studies which outline the economic impact of COVID-19 pandemic at the sectoral level.

The article continues with a brief literature review on the recent pandemics and the recent COVID-19 outbreak. Then, the data and estimation procedures used to analyze the economic impact of the pandemic are presented in the following section. Next, the empirical results are reported and discussed. The paper concludes with a summary of the key findings.

2. LITERATURE REVIEW

In a strongly connected world, it does not take too long for a contagious disease to spread beyond the borders. Though COVID-19 outbreak began in China, it has spread across the globe in a short period of time, making Europe the epicenter in March then the USA in April 2020. Although social distancing measures have flatten the curve in some countries, many are still suffering from the increasing number of confirmed cases every day. This has led to an unprecedented impact on the lives and economic activities of billions of people over the world. Main backbones of the economic mechanism, from international trade to tourism, to transportation are prone to this shock. The supply side of the markets has been disrupted with a sudden and massive reduction in the production while the consumption side has shown different patterns; stockpiling essential goods, totally abandoning other goods and services. Financial markets have reflected similar effects of this global turbulence as well. Hence, every market inevitably got its share from the outbreak.

The economies witnessed similar reactions to the outbreaks that took place in the past. The HIV/AIDS virus affected households, firms and governments. Several studies show the impact of HIV/AIDS across different sectors (Cuddington, 1993; Haacker, 2002a; Haacker, 2004b; Over, 2002; Freire, 2004) and some Computable General Equilibrium (CGE) models were simulated to study the impact of AIDS on macroeconomics variables (Arndt and Lewis, 2001; Bell et al., 2004).

SARS outbreak had disrupted the economy as it caused a decline in consumption of several goods and services, and increased the costs of businesses. The impact of SARS on most industries was negative (Overby et al., 2004; Oliver, 2004; Lee and McKibbin, 2003; Chou et al., 2004; Hai et al., 2004; Ba Sui and Wong, 2004) with one exception (Chen, Chen and Tang, 2009) to the health care product markets as the outbreak increased the demand for and investment into the market.

A limited number of studies analyze the effects of COVID-19 on economic and financial variables for various countries and various sectors. Baldwin and Tomiura (2020) analyze the trade effect of the pandemic for most hard-hit countries (China, Korea, Italy, Japan, US, and Germany). The authors state that since the COVID-19 is both a supply and demand shock, its effects will be more prominent on trade than previous crises. The authors suggest that the pandemic should not be a justification for anti-globalization. Thunstrom et al. (2020) forecast the effects of social distancing with a cost-benefit analysis of the controlling COVID-19 pandemic for the USA. McKibbin and Fernando (2020) analyze the effects of COVID-19 on macroeconomic variables and financial markets using a CGE model for 20 countries including Turkey. They found a significant impact of the outbreak in the short run under seven different scenarios. Zeren and Hızarcı (2020)

examine the effects of the outbreak on financial markets of five countries (China, South Korea, Germany, Italy and Spain) using Makki co-integration test with a daily data. They found a co-integration between COVID-19 and SSE, KOSPI and IBEX35 markets, but no co-integration with FTSE, MIB, CAC40, DAX30. Ramelli and Wagner (2020) study the stock price effects and find that the stock markets are quite responsive to concerns on potential economic consequences of COVID-19.

Given the limited number of empirical analysis on the topic, there is a need for further research on the effects of the outbreak particularly at the sectoral level. This paper is an attempt to quantify these effects using an empirical analysis.

3. DATA DESCRIPTION

To capture the impact of COVID-19 on the sub-sector price indices of the stock market trading on İstanbul Stock Market (BIST), we use four variables including daily observations for each stock indeces, the number of COVID-19 cases, Turkey's daily Credit Default Swap (CDS), and the Chicago Board Options Exchange (CBOE) Volatility Index (VIX) data during the period of January 2, 2020 to April 15, 2020.

Data for each variable obtained from several sources. Stock prices come from the FINNET Financial Analyze Program⁵. Data for the number of confirmed cases, which is obtained from the European (EU) Open Data Portal⁶, we consider three different reported cases: Turkey, EU-28 countries, and the whole world.

We also include CDS and CBOE VIX indices as a common indicator of macroeconomics. CDS is an indicator that shows the country's risk for the collection of the debt and is closely related to the price indices in the international stock markets. An increase in the CDS means that the risk of not paying the debt on time is high and the increase always negatively influences the markets. CDS index is retrieved from Thompson Reuters Datastream⁷. Similar to the CDS, VIX is an index that measures the degree of fear and the perception of risk in the stock markets. Increasing VIX index states uncertainties and rapid declines in the markets. VIX index is obtained from CBOE's website. All nominal series are transformed by taking natural logarithms.

Table 1 provides descriptive statistics for each variable over the sample period. The mean values for all variables are positive, which range from 3.159 to 10.989. With regard to Jarque-Bera (JB) test results all variables are statistically significant, which implies that all series are not normally distributed except BIST Sports, BIST Wholesale and Retail Trade, BIST Technology, and BIST Investment Trusts.

4. MODEL SPECIFICATIONS

As experienced in all other countries of the world, adverse effects of the coronavirus pandemic are also observed in Turkey's real and financial sectors. However, the direction and the magnitude of this effect have not been analyzed in a formal econometric analysis. Therefore, the main objective of this study is to assess the impact of coronavirus pandemic on the Turkish industrial, financial and service sectors. Specifically, the study analyzes how these sectors have been affected from the increasing number of cases during the pandemic term. Since the world economies are in close relation with each other, Turkish sectors have been affected from not only the number of cases in the country, but also the number of cases in other countries in the world, especially the countries

⁵ The FINNET database is accessible from Hitit University Library computers.

⁶ EU Open data publishes daily latest available public data on COVID-19 for each country based on the reports health authorities worldwide.

⁷ The Datastream database is accessible from Hitit University Library computers.

having intense trade with Turkey. Hence, the current study includes the number of cases occurred in Turkey, Europe and the world separately to analyze how a variation in these number of cases affect the Turkish stock market.

Table 1. Summary Statistics

Variables	Obs.	Mean	Std. Dev.	J-B	Prob.
XUAll	75	9,815	0,168	9,702	0,007
XU100	75	9,763	0,167	9,714	0,007
XU50	75	9,710	0,166	9,625	0,008
XU30	75	9,947	0,169	9,561	0,008
Industrial (XUSIN)	75	9,959	0,171	9,930	0,006
Food, Beverage (XGIDA)	75	10,026	0,154	8,491	0,014
Textile, Leather (XTEKS)	75	8,907	0,234	9,433	0,008
Wood, Paper, Printing (XKAGT)	75	9,497	0,181	6,112	0,047
Chemical, Petroleum, Plastic (XKMYA)	75	9,761	0,172	9,059	0,010
Non-Metal Mineral Products (XTAST)	75	9,445	0,190	9,256	0,009
Basic Metal (XMANA)	75	10,529	0,146	8,883	0,011
Metal Products, Machinery (XMESY)	75	10,206	0,217	11,311	0,003
Service (XUHIZ)	75	9,528	0,125	9,399	0,009
Electricity (XELKT)	75	6,603	0,176	9,719	0,007
Telecommunication (XILTM)	75	8,655	0,104	9,856	0,007
Sports (XSPOR)	75	9,069	0,267	2,423	0,297
Wholesale and Retail Trade (XTCRT)	75	10,559	0,069	4,080	0,129
Tourism (XTRZM)	75	7,537	0,271	9,089	0,010
Transportation (XULAS)	75	10,052	0,283	9,037	0,010
Financial (XUMAL)	75	9,910	0,202	9,238	0,009
Banks (XBANK)	75	10,083	0,211	8,715	0,012
Insurance (XSGRT)	75	10,989	0,131	10,719	0,004
Holding and Investment (XHOLD)	75	9,585	0,200	9,354	0,009
Real Estate, Investment, Trusts (XGMYO)	75	8,768	0,188	9,108	0,010
Technology (XUTEK)	75	9,858	0,122	1,878	0,390
Information Technology (XBLSM)	75	8,735	0,171	6,994	0,030
Leasing, Factoring (XFINK)	75	9,387	0,218	7,012	0,029
Investment Trusts (XYORT)	75	9,216	0,111	4,994	0,082
The number of COVID-19 case (Turkey)	75	6,414	2,447	11,296	0,003
The number of COVID-19 case (Europe)	75	6,983	3,597	6,703	0,035
The number of COVID-19 case (World)	75	8,301	2,479	14,031	0,000
CDS Index	75	5,846	0,347	8,735	0,012
VIX Index	75	3,159	0,914	58,809	0,000

Source: Datasetream and FINNET, 2020.

In order to assess the influence of increasing number of cases due to the pandemic on the Turkish Stock Market, the study employs the price indices for the sectors whose shares are traded on the Istanbul Stock Exchange known as Borsa İstanbul (abbreviated as BIST). The indices used in the analysis are divided into sector and sub-sector indices and analyzed and reported separately. Besides, the study also employs the impact of the pandemic on major stock exchange indices, such as BIST-All shares, BIST-100, BIST-50 and BIST-30, which respectively tracks the performance of 100, 50 and 30 companies, selected from the national market and real estate-venture capital investment trusts listed on the BIST. These indices have been used in many studies as main indicators of the national market (Çıtak, 2019; Çağlı and Mandacı, 2017). In the analysis, the price indices are used at the closing value of the trading session.

Before estimating the impact of the pandemic on the Turkish real and financial sectors, several econometric tests are applied in the study. First, the Hausman test is conducted to determine whether a fixed effect or a random effect model is appropriate for the dataset. The Hausman test is a statistical hypothesis test which evaluates a more efficient model against the less efficient one by checking the significance of an estimator versus an alternative estimator (Hausman, 1978). The test results strongly suggest that the fixed effects models are appropriate for the dataset. Second, the Modified Wald test is conducted for group-wise heteroskedasticity in fixed effect models. In order to deal with the heteroskedasticity problem, we estimate robust fixed effect

models and obtain heteroskedasticity consistent standard errors. Lastly, the Pesaran test for cross-sectional dependence in panel data models is applied on the dataset. The test results indicate cross-sectional dependence in the model and therefore the model is estimated using robust standard errors.

The impact of the pandemic on the Turkish sectors is estimated using the following model:

$$\ln CI_{i,t} = \beta_0 + \beta_1 \ln NC_{t-1} + \beta_2 \ln CDS_t + \beta_3 \ln VIX_t + \alpha_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

where $\ln CI_{i,t}$ is the dependent variable of the model and represents the price indices for sector i on day t . As discussed above, $\ln CI_{i,t}$ includes not only the price indices for the sectors and sub-sectors, but also the indices for the major stock exchange indices such as BIST100. $\ln CI_{i,t}$ simply shows that how the sectors and the national market react the variations in the number of coronavirus cases in Turkey, Europe and whole World.

In Equation (1), NC_{t-1} is the main interest variable of the model and stands for lag of the total number of coronavirus cases in Turkey, Europe and the world on day $t-1$. Therefore, Equation (1) is estimated first for Turkey, then for Europe and finally for the whole world case numbers. The reason for the model is estimated for different areas separately is to provide a comparison of the national market's reaction to the country's own number of coronavirus cases and the other countries' number of cases.

Equation (1) includes $\ln CDS_t$ as a control variables to represent the relation between the market and credit risks for the investors on day t . Finally, Equation (1) comprises $\ln VIX_t$ as another control variable to address how fear or anxiety about the markets influence the sectors operating in Turkey on day t . All the variables included in the Equation (1) are transformed into the natural logarithm form to have a more normalized dataset and report percentage changes in the variables. Besides, the models also include α_i that stands for sector fixed effects in the regressions since unobservable time invariant sector specific and historical factors simultaneously may bias the estimators. Lastly, to eliminate influence of the factors that cause national and global day by day changes, the model includes daily dummies which are represented as τ_t in the model. $\beta_0 - \beta_3$ are the parameters to be estimated and $\varepsilon_{i,t}$ represents idiosyncratic heteroskedasticity consistent robust error terms.

5. EMPIRICAL RESULTS

The regression results for the impact of the coronavirus cases on 21 Turkish sectors listed in the Borsa Istanbul are presented in Table 2. In each model, the number of observations is 1,554 (21 sectors and 74 days) and CI's (Closing Index) represent the dependent variables and show the price indices for the sectors at the close of trading session. Since the dependent and the independent variables in the models are used in the natural logarithmic form, the coefficients in the table represent the elasticities. In other words, the coefficients in the models are the estimated percent change in the dependent variable with respect to the percent changes in the independent variables.

The first column of Table 2 reports the estimation results for the impact of the number of coronavirus cases in Turkey on the Turkish stock market. Based on the results, the elasticity between coronavirus cases in Turkey and price indices of the Turkish sectors is -0.105 and statistically significant. It means that a 10 percent increase in the number of coronavirus cases in Turkey is associated with a 1 percent decrease in Turkish stock market, on average.

This negative relation is an expected result as the pandemic negatively affects all economies in the world. Interestingly, increasing VIX index has a positive and significant relations with the

sectors in the Turkish market. This can be because the volatility in the international market attracts the international investors to Turkish market. Similarly, CDS has also positive but insignificant associations with the sectors of the Turkish stock market.

The regression shown in column two of Table 2 includes the direct effect of the number of coronavirus cases in European countries on the Turkish stock market. There is a statistically strong negative effect (-0.063) from European coronavirus cases on the price indices of BIST, as expected. This result suggests a 10 percent increase in the number of coronavirus cases in European countries decrease the Turkish stock market by 0,6 percent, on average. Based on the results depicted in the columns one and two of Table 2, it can be concluded that the coronavirus cases in European countries have less impact on the Turkish market compared to the domestic coronavirus cases. The third column of Table 2 provides information for how the number of coronavirus cases in the world affects the Turkish stock market. The results suggest that the impact of the total number of coronavirus cases in the world on the Turkish market is unexpectedly positive, but the magnitude is very limited (0.009).

Table 2. Fixed Effect Regression Results for 21 Turkish Sectors

Indep. Vars / Dep. Var.	Model (1) Turkey CI	Model (2) Europe CI	Model (3) World CI
Number of Cases in Turkey	-0.105*** (0.011)		
Number of Cases in Europe		-0.063*** (0.007)	
Number of Cases in World			0.009*** (0.002)
CDS	0.018 (0.017)	-0.037** (0.015)	-0.344*** (0.022)
VIX	0.560*** (0.068)	0.372*** (0.050)	-0.107*** (0.020)
Constant	7.936*** (0.222)	8.716*** (0.156)	11.694*** (0.133)
R-square	0,812	0,812	0,735
Observations	1,554	1,554	1,554
Number of Sectors	21	21	21

Note: One-day lagged values of all independent variables are used in the models. The numbers in the parentheses show the robust standard errors. ***, **, and * denote statistical significance at 1 percent, 5 percent, and 10 percent levels, respectively.

Among the sectors, Metal Products, Machinery sector is the worst affected sector from the number of coronavirus cases in Turkey since the industrial production has come to a halt due to the pandemic. Sports, Insurance and Banking sectors follow the Metal production sector as the sectors harshly affected by the corona virus outbreak in the country. Food-Beverage, Wholesale and Retail Trade and Real Estate, Investment, Trusts sectors are the less affected sectors by the outbreak. Among the main sectors of the Turkish stock market - BIST Industrials, BIST Services and BIST Financial – the finance sector is the most negatively affected index from the outbreak in Turkey and industrial and service sectors follow the finance sector, respectively. Among 21 sectors listed in the stock market, Leasing and Factoring sector is the only sector which is positively and significantly affected from the coronavirus cases in the country (0.014***). Information Technology and Wood, Paper and Printing sectors are also positively affected from the outbreak but this effect is not statistically significant. The results for CDS and VIX variables included in the regression model are not reported in Table 3 to prevent the complexity in the table.

However, the estimation results for these variables show that they negatively affect the stock market, as expected (The results for CDS and VIX are available and can be provided upon request).

The column two in Table 3 provides the estimation results for the relationship between the outbreak in European countries and the Turkish stock market. The number of Coronavirus cases in European countries has negative but statistically insignificant impact on the price indices, such as BIST-ALL, BIST-100 and BIST-50, which are the main indices showing the overall condition of the Turkish stock market. On the other hand, the outbreak in Europe has positive impact on most of the sub-sectors but this impact is not statistically significant for the majority of the sectors. In general, it can be concluded that the corona virus outbreak in Europe does not have a significant impact on the Turkish market. Wood, Paper, Printing, Information Technology and Real Estate, Investment, Trusts sectors are positively affected sectors, while Banking and Basic Metal sectors are negatively impacted sectors from the European outbreak.

Table 3. Estimated Regression Coefficients for Each 28 BIST Indices

Stock Market Indices	Model (1)	Model (2)	Model (3)	
	Turkey (n=74)	Europe (n=74)	World (n=74)	
	CI	CI	CI	
Main Indices	XUALL	-0,013***	-0,002	0,001
	XU100	-0,014***	-0,006	-0,002
	XU50	-0,014***	-0,007	-0,002
	XU30	-0,016***	-0,009*	-0,004**
Sectoral Indices	Industrial (XUSIN)	-0,014***	0,001	0,001
	Food, Beverage (XGIDA)	-0,008**	0,005	0,006***
	Textile, Leather (XTEKS)	-0,017***	0,008	0,013***
	Wood, Paper, Printing (XKAGT)	0,010	0,035***	0,023***
	Chemical, Petroleum, Plastic (XKMYA)	-0,011***	0,006	-0,001
	Non-Metal Mineral Products (XTAST)	-0,010**	0,007	0,006**
	Basic Metal (XMANA)	-0,013***	-0,008*	-0,003
	Metal Products, Machinery (XMESY)	-0,030***	-0,011	-0,002
	Service (XUHIZ)	-0,007***	0,003	0,001
	Electricity (XELKT)	-0,015***	-0,003	0,008***
	Telecommunication (XILTM)	-0,009***	-0,001	-0,002
	Sports (XSPOR)	-0,025*	0,029	0,023**
	Wholesale and Retail Trade (XTCRT)	-0,002	0,006	-0,000
	Tourism (XTRZM)	-0,013	0,023	0,019***
	Transportation (XULAS)	-0,012**	0,003	0,002
	Financial (XUMAL)	-0,016***	-0,009*	-0,001
	Banks (XBANK)	-0,018***	-0,016***	-0,002
	Insurance (XSGRT)	-0,020***	-0,009	0,003
	Holding and Investment (XHOLD)	-0,014***	-0,004	-0,003
	Real Est., Investment, Trusts (XGMYO)	-0,009*	0,006	0,010***
Technology (XUTEK)	-0,010	0,018	0,016***	
Information Technology (XBLSM)	0,010	0,048***	0,029***	
Leasing, Factoring (XFINK)	0,014***	0,015**	0,011***	
Investment Trusts (XYORT)	-0,017**	0,004	0,014***	

Note: ***, **, and * denote statistical significance at 1 percent, 5 percent, and 10 percent levels, respectively.

With regard to the results for whole world cases in the third column of Table 3, the number of corona virus cases in the world has a minor negative impact on the main indices in the Turkish stock Market, in general. Industrial and Service sectors are affected positively by the number of corona virus cases in the world, but this impact is not statistically significant. Similarly, the number of the cases in the world has negative and insignificant impact only on the finance sector in Turkey. One of the reasons for why the results show an inconsiderable relation between the Turkish stock market and the outbreak in the world can be because our dataset includes all the countries in the world and most of these countries do not have significant economic or politic relations with Turkey. Comparing these results with the results in the column 2 indicate the

impact of the outbreak in European countries has higher impact on the Turkish stock market since Turkey has close relations with these countries.

6. CONCLUSION

Although there are some studies in the literature analyzing the effects of COVID-19 on various economies, this paper is the first that quantifies these effects empirically for the case of Turkey. Our results show that the outbreak has a negative impact on almost all sectors. On average, the main three sectors (industry, service, and finance) are affected almost equally, while differences are observed at the sub-sectoral level. In particular, metal products, machinery, sports, tourism, transportation, banking and insurance sectors are among the most hard-hit sectors. On the other hand, food, beverage, wholesale and retail trade are the less affected sectors due to high demand for these goods and the governmental support measures taken towards ensuring food availability in the country. These results suggest that the Turkish stock market has adjusted to some extent to the uncertainties caused by the outbreak, but the shock does not seem to be devastating in magnitude (at least for now). However, our research covers a limited time span. Hence, our results and implications are sensitive to the new information and data. Going forward, investors' reactions will likely change with future news in the number of cases and treatment to the virus. Therefore, further research incorporating new information and data is necessary on the topic to provide solid policy implications for policymakers and information for investors and businesses in their decision-making process.

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GENİŞLETİLMİŞ ÖZET

Giriş

Yeni Koronavirüs (KOVİD-19) salgını, yakın tarihte yaşanan bir çok emsali salgınlar da dahil olmak üzere dünya ülkelerinin daha önce karşılaşmadığı bir insani ve iktisadi bir krize neden olmuştur. Önde gelen uluslararası kuruluşlar KOVİD-19 salgınının yıkıcı etkileri konusunda uyarılar yayınlamıştır. Özellikle, Dünya Sağlık Örgütü (WHO) KOVİD-19 salgınına resmi olarak 11 Mart 2020'de pandemi (küresel salgın) olarak ilan etti. Ekonomik İşbirliği ve Kalkınma Örgütü (OECD) bu salgının ekonomik çalkantıları 2007-2009 küresel mali krizlerden daha büyük olarak ifade etmiştir (BBC Business News, 23 Mart 2020). Uluslararası Para Fonu (IMF) “koronavirüs pandemisi, Dünya'nın Büyük Buhran'dan bu yana deneyimlemediği ekonomik bir gerilemeyi kışkırttığını” (Reuters Business News, 9 Nisan 2020) ifade ederek salgının dünya ekonomileri üzerindeki yıkıcı etkilerinin tahmin edilenin çok üzerinde olabileceğini açıklamıştır.

KOVİD-19 salgınının bazı özellikleri dünya ekonomilerinde benzeri görülmemiş bir strese neden olmaktadır. Örneğin, KOVİD-19'un yaygın semptomlarının mevsimsel grip ile çok benzer olması, çok daha yüksek bir ölüm oranına sahip olması (grip için yüzde 0,1'e kıyasla yüzde 2'den fazla), aşı eksikliği ve kolayca bulaşıcı olması, hükümetlerin ve uluslararası örgütlerin, salgının kontrol altına alınması için aldığı önlemlerin süresini ve kapsamını belirlemesini zorlaştırıyor. Sonuç olarak KOVİD-19 salgını dünya ekonomilerinde belirsizliği ve riskten kaçınma oranını artırırken yatırım ortamındaki güveni kötüleştirip küresel finans piyasalarındaki kargaşayı derinleştirdi.

KOVİD-19 pandemisi, turizmden uluslararası ticarete, imalattan hizmet sektörüne, havayolu endüstrilerinden dünyadaki diğer birçok sanayiye kadar küresel ekonomi üzerinde yıkıcı bir etkiye sahiptir. Artan ekonomik gerilemeye rağmen, hububat ve diğer tarımsal emtialar için rapor edilen stoklar beklenen talebi aştığı için uluslararası gıda pazarlarındaki dengeler olumlu seyretmektedir (Gıda ve Tarım Örgütü-Pazar Monitörü, Nisan 2020). Bu nedenle, KOVİD-19 salgınının endüstriler arasında önemli ölçüde değişken bir etkiye sahip olması beklenmektedir.

Amaç ve Veri

Bu çalışmanın amacı, tüm dünyayı etkisine alarak ülkelerin ekonomik yapısını birçok yönden etkileyen KOVİD-19 salgınının Borsa İstanbul'da (BİST) işlem gören 28 sektör ve gösterge endeksleri üzerinde bir etkisinin olup olmadığını incelemektir. Araştırmanın modelinde, 02 Ocak 2020 - 15 Nisan 2020 tarihleri arasındaki günlük gözlemler kullanılarak, Dünya, Avrupa ve Türkiye için günlük raporlanan KOVİD-19 vaka sayıları, BİST'te işlem gören her bir sektöre ait kapanış fiyatları, piyasa volatilite endeksi (VIX) ve kredi temerrüt takasları (CDS) kullanılmıştır.

Yöntem

Dünya genelinde görülen KOVİD-19 salgınının Türkiye borsalarını nasıl etkilediğini araştıran bu ampirik çalışmada salgının etkileri üç aşamada incelenmiştir. İlk olarak Türkiye'de salgın nedeniyle meydana gelen vaka sayılarındaki artış ile İstanbul borsasında işlem gören sektörlerin hisse senetleri değeri arasındaki ilişki incelenmiştir. Daha sonrasında Türkiye'nin ekonomik ve politik olarak yakın ilişki içerisinde olduğu Avrupa ülkelerinde yaşanan salgının borsa üzerine etkisi incelenmiştir. Son olarak dünya genelindeki salgından Türkiye borsasının etkilenip etkilenmediği ampirik olarak incelenmiştir. Bu üç çalışma alanı için ayrı ayrı tahmin edilecek detayları aşağıda verilen ekonometrik model ile Türkiye'de, Avrupa'da ve dünya genelinde salgının ülke borsasını nasıl etkilediği kıyaslanabilecektir. Yapılan analizlerde kullanılan panel veri seti

salgının başlangıcından itibaren 75 günlük süreyi kapsamaktadır. Ekonometrik analizlerde sabit etkiler tahmin metodu kullanılmış olup 21 alt sektör ve 7 ana sektör indeksi analizlere dahil edilmiştir. Corona virüs salgınının İstanbul borsasında işlem gören sektörler üzerine etkisi aşağıdaki ekonometrik model ile tahmin edilmiştir.

$$\ln CI_{i,t} = \beta_0 + \beta_1 \ln NC_{t-1} + \beta_2 \ln CDS_t + \beta_3 \ln VIX_t + \alpha_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

Modelde bağımlı değişken (CI: kapanış indeksi) borsada işlem gören sektörlerin hisse senetlerinin değerini gösteren indeksler iken ana ilgi bağımsız değişkeni koronavirüs vaka sayısıdır (NC: vaka sayısı=number of cases). Modelde kontrol değişkenleri olarak ülke kredi risklerini açıklayan Kredi Temerrüt Takası indeksi (CDS index) ve dünya genelindeki piyasalarda korku ve endişeyi açıklayan korku indeksi (VIX index) kullanılmıştır. Bunların yanı sıra model sektör (α_i) ve zaman (τ_t) için kukla değişkenleri de içermektedir. Modelde kullanılan tüm bağımsız değişkenlerin bir gün gecikmeli değerleri kullanılmıştır çünkü vaka sayılarındaki değişmeye piyasalar bir gün gecikmeli olarak reaksiyon göstermektedir. Ek olarak, modeldeki tüm değişkenlerin doğal logaritmik formları kullanılmıştır.

Bulgular

İstanbul borsasında işlem gören 21 sektörün geneli için sabit etkiler regresyon modeli kullanılarak yapılan tahmin sonuçları Tablo 2'de verilmektedir. Sonuçlara göre koronavirüs salgınının borsayı olumsuz etkilediği gözlemlenmiş ve salgın dolayısıyla meydana gelen vaka sayısındaki %10'luk bir artışın borsayı yaklaşık olarak yüzde bir düşürdüğü ortaya çıkarılmıştır. Tabloda raporlanan sonuçlara göre VIX endeksinin Türkiye'deki salgınla pozitif ilişki içerisinde olduğu gözlemlenmiştir. Bunun bir nedeni Türkiye'nin salgında göstermiş olduğu başarıdan dolayı Türkiye'nin yatırımcılar açısından güvenilir bir liman olarak değerlendirilmesi olabilir. Kredi geri ödeme garantisi olarak bilinen CDS değişkeninin de Türkiye'deki salgınla pozitif bir ilişki içinde olduğu tabloda raporlanmıştır.

Salgın dolayısıyla Avrupa birliğine üye ülkelerde meydana gelen koronavirüs vaka sayısındaki artış da Türkiye borsasını negatif etkilemiştir. Fakat bu etki Türkiye'deki vaka sayısının borsa üzerine olan etkisinden daha azdır. Avrupa'daki vaka sayısındaki %10'luk bir artış borsayı yaklaşık olarak %0,6 düşürmektedir. Dünya genelinde meydana gelen koronavirüs vaka sayısındaki artışın ise Türkiye borsasını artırdığı gözlemlenmiştir. Fakat beklenmedik bu ilişki istatistiksel olarak kayda değer değildir.

Koronavirüs salgınının İstanbul borsasında işlem gören sektörler ve ana indeksler üzerine etkileri için yapılan ampirik çalışmanın analiz sonuçları Tablo 3'te raporlanmıştır. Sonuçlara göre; Türkiye'de koronavirüs vaka sayısındaki artış genel olarak sektörleri ve borsayı olumsuz etkilemiştir. Spesifik olarak vaka sayısındaki %10'luk bir artış borsada yüzde %1,5'luk bir düşüşe yol açmaktadır. Salgın dolayısıyla endüstriyel üretim ülkede durma noktasına geldiği için, sektörler içinde metal ürünler ve makine sektörü salgından olumsuz olarak en çok etkilenen sektör olmuştur. Spor, bankacılık ve sigortacılık sektörleri ise bu endüstileri takip etmektedir. Diğer yandan, ülkede yiyecek-içecek, toptan-perakende satış ve gayrimenkul yatırım sektörleri ise salgından en az etkilenen sektörler olmuştur. Genel olarak salgın en çok finans sektörünü etkilerken, endüstriyel üretim ve servis sektörleri onu takip etmiştir. İstanbul borsasında işlem gören toplam 21 sektör içerisinde kiralama ve faktöring, bilgi teknolojileri ve ahşap-kâğıt-baskı sektörleri salgından olumlu etkilenen sektörler olmuştur. Yapılan analizlerin sonuçlarına göre Avrupa'daki virüs salgınının İstanbul borsasına önemli derecede bir etkide bulunmadığı söylenebilir. Bu durum dünyadaki toplam vaka sayısı için de geçerlidir. Özetlemek gerekirse

İstanbul borsası Türkiye'deki vaka sayısından ciddi derecede etkilenirken, Avrupa'da ya da tüm dünyadaki koronavirüs vaka sayısından istatistiksel olarak etkilenmediği gözlemlenmiştir.

Sonuç

Literatürde KOVİD-19 ile alakalı bazı çalışmalar bulunmasına rağmen, salgının ekonomik etkileri üzerine Türkiye özelinde ampirik çalışma bulunmamaktadır. Bu çalışma KOVİD-19 virüsünün etkilerini inceleyen ilk çalışma olma özelliğini taşımaktadır. Bulgularımız salgının hemen hemen bütün sektörlerde negatif etkisi olduğunu göstermektedir. Ana sektörlerin (endüstri, finans, servis) ortalama olarak eşit etkilendiği görülmektedir. Ancak alt sektörlerde etki farklılık göstermektedir. Metal, makina, spor, turizm, sigorta sektörleri en çok etkilenen sektörler olmasına karşın gıda, toptancılık ve perakende satış en az etkilenen sektörlerdir. Gıda ürünlerine olan talep ve devletin gıda güvenliğini temin etmek için verdiği destekler bu farklılığın gerekçesi olabilir.

KOVİD-19'un etkisi olumsuz olmasına rağmen, yıkıcı bir etki görülmemektedir. Bu piyasaların iyi bir haberle hızlı bir toparlanma sürecine girebileceğinin sinyali olabilir. Ancak, bu bulgularımız yeni bilgi akışına göre değişiklik gösterebilir. Yatırımcı davranışlarının yeni bilgilerle değişeceği göz önünde bulundurulursa, bu yeni bilgileride analize ekleyerek yapılacak daha fazla çalışmaya ihtiyaç vardır.