

ECONOMICS AND BUSINESS ADMINISTRATION FACULTY

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FINANCE AND BANKING

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MASTER THESIS

<b>Akcijų Rinkos Reakcijos Skirtingais COVID-19 Pandemijos Etapais: Italijos ir Ispanijos Atvejai</b>	<b>Stock Market Reactions during Different Phases of the COVID-19 Pandemic: Cases of Italy and Spain</b>
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### Summary

The COVID-19 pandemic affected more than 46 million people around the world and death numbers are rising every day, because of lockdowns and quarantine establishments business, corporations and other profit seeking institutions are losing money. The spread of coronavirus has a severe impact all over the world and created an unpredictable level of uncertainty. The fast spread of coronavirus had negative impacts on financial markets all over the world, thus the stock market indexes was no exception either. This research aims to analyze and investigate the affect and relationship between COVID-19 confirmed cases and stock market indexes of Italy (FTSE MIB 40) and Spain (IBEX 35) during the period of 1<sup>st</sup> of March to 30th of November, 2020. In order to achieve more detailed results, the selected time frame is divided into three separate periods accordingly with pandemic spread. For conducting such research, it is necessary to validate if: the increase of confirmed COVID-19 cases have any connection with the stock exchange indexes mentioned above. The section on theoretical analysis supports information regarding the impact of the COVID-19 pandemic globally and on European level. Based on the previous research methods, the Simple Regression was chosen for the empirical research. This model was the most popular among others in research. The results of the study reveal that comparing the impact of COVID-19 on the FTSE MIB 40 and IBEX 35 indexes over the three selected periods, First Wave Period, Recovery Period, and Second Wave Period, suggests that Italy and Spain implemented appropriate instruments to manage the pandemic during the recovery period and properly prepare for the second wave of the pandemic in the fall, as stock index performance was significantly less affected by the newly confirmed cases of the COVID-19 virus in comparison with the Spring period.

**Keywords:** COVID-19, Pandemic, Stock market, Stock index, Financial markets

## Introduction

On 11 March 2020, the World Health Organization (WHO) officially declared the coronavirus (COVID-19) outbreak to be a global pandemic. According to the evidence currently available, the expansion of pandemic starting from Wuhan, China and in more than few months speeded across the world, paralyzing daily economic and social life. While the numbers of affected individuals are increasing and the global economic impacts are unclear, the financial markets are no exception either. During the year of 2020 many countries recorded a drop in the stock exchange indexes. Some of the countries like USA recorded highest plunge in stock index in the 21<sup>st</sup> century, whereas countries such as New Zealand didn't have such a rough year.

The COVID-19 pandemic and pandemic-induced lockdowns and quarantine establishments have inevitably affected individuals, businesses, and governments. At the same time, the spread of the COVID-19 pandemic had a dramatic impact on financial markets all over the world and caused an increased level of uncertainty; the stock markets were no exception either. Most of the studies on the impact of the COVID-19 pandemic on stock markets are based either on the analysis of a relatively short period (the beginning of pandemic) or a longer period, which, in turn, is very heterogeneous in terms of both the information available on the COVID-19 virus and the measures taken to contain the virus and address the consequences of the pandemic.

Researchers provide results with different perspectives and results which depend individually on country to country or different selected factors. However, COVID-19 pandemic outcomes have a negative effect in most studies. Unfortunately, at the time it is not clear how the pandemic will shift and effect our economies in near future. Thus, such studies assist to identify the most critical financial sectors and what kind of actions should be taken in order to stabilize or reduce the increasing financial crisis trough the global markets.

This research focus on two financial markets and emphasize that it is very important to assess the impact not only at the beginning of the pandemic but also in the subsequent periods and to compare the nature of this impact. Therefore, this research aims to investigate the impact of the COVID-19 pandemic on stock markets of two of the most severely affected European countries—Italy and Spain. To reach the aim of the research the simple regression model is selected. The results reveal that the stock market reaction to the spread of the COVID-19 pandemic differs depending on the country and which period is analyzed. The selected model results provide information that COVID-19 pandemic has positive statistically

significant impact on the indexes, however it varies during the different periods. Research results confirmed that the COVID-19 pandemic negatively affect the indexes and increased the volatility of stock market return. This research contributes to the literature by providing a comprehensive impact assessment both during the whole pre-vaccination period of the pandemic and during different stages of this period.

The research is design in three different periods during the COVID-19 pandemic. The Simple Regression Model is selected as a method for empirical research to achieve the desired results. This model was the most popular among other studies done by other researchers. Different studies in similar topic conclude with results that COVID-19 new confirmed cases are reliable for analyzing data regarding the pandemic, thus it was also considered for the selected study. Regarding the master's thesis structure, it consists of five parts: introduction, theoretical analysis, research methodology, results and conclusions of empirical research.

### **Purpose of the Study**

The study aims to investigate the impact of the COVID-19 on Italy (FTSE MIB 40) and Spain (IBEX 35) stock exchange indexes during the three periods: period 1 - 1<sup>st</sup> of March, 2020 to 31<sup>st</sup> of May, 2020, period – 1<sup>st</sup> of June to 31<sup>st</sup> of August, 2020, period 3 – 1<sup>st</sup> of September to 30<sup>th</sup> of November, 2020.

### **Research Objectives**

1. To investigate research methods and findings of academic studies regarding the impact of COVID-19 to financial markets;
2. Prepare the methodology for empirical research of this thesis and provide a detailed description of implementation;
3. Apply the selected methods and conduct the research;
4. Provide findings, conclusions, future recommendations and discuss limitations of the study.

### **Research Hypothesis**

H1. The COVID-19 confirmed cases have negative and significant effect to FTSE MIB 40 stock exchange index.

H2. The COVID-19 confirmed cases have a negative and significant effect to IBEX 35 stock exchange index.

**Research Methodology**

Based on prior studies, a Simple Regression model was chosen as a research method. The COVID-19 confirmed cases will be the independent variable. The dependent variables will be Italian FTSE MIB 40 and Spanish IBEX 35 stock exchange indexes. The model will be used in order to discover if COVID-19 has a negative or positive influence to stock exchange indexes.

**Structure of the Research**

The structure of the paper as follows: literature review, theoretical analysis of COVID-19 effects on financial markets, analysis of previously used methods in the similar research field, a description of research methodology, model application to current study.

## 1. Theoretical analysis of COVID-19 impact on the financial markets

The chapter will provide a review of scientific research papers and application of methods that are used by other authors. To be more specific, this section of the study will focus on financial market changes during the COVID-19 pandemic and investigate available academic literature which will assist in designing methodology for a current study.

### 1.1. Theoretical analysis of COVID-19 impact on the global financial markets

According to World Economic Forum (2020) released information regarding COVID-19 predictions, organization stated that “Globally, the corona virus shock is severe even compared to the Great Financial Crisis in 2007–08”. Various International Monetary organizations and funds stated that COVID-19 pandemic will have serious impact on global economy and financial markets.

Literature analysis disclose clear evidence that COVID-19 virus, had a major impact on the financial markets all around the world. On March 12 was stated that “It was a historic day on Wall Street. The Dow plunged 10% for its worst day since Black Monday in 1987. The 30-stock index fell 2,352 points — its largest point drop on record. Meanwhile the S&P 500 plunged 9% to close in bear market territory, thus officially ending the bull market that began in 2009 during the throes of the financial crisis.” (Pippa, Fitzgerald, & Imbert, 2020). The Dow and S&P from United States of America confirmed and backed up the rumors that “The Dow Jones, and S&P both of which take into account the share prices of a variety of companies in the US have dropped by over 20%”. (The Wall Street Journal, 2020) Couple days later S&P Global reported that, “It's now clear that the hit to global economic activity from the measures to slow the spread of the corona virus pandemic will be massive”. (S&P Global Report, 2020). Nuhu Sansa and Ali Hasan, investigated if there was an impact of the COVID-19 on the Financial Markets in the USA within the period of 1<sup>st</sup> of March 2020 to 25<sup>th</sup> of March 2020. Study applied the Simple regression in Double Log and Semi log linear models and New York Dow Jones stock exchange was used as a sample. The study regression results revealed that there was a “positive correlation between the COVID-19 confirmed cases and USA – New York Dow Jones Financial Stock Market from 1<sup>st</sup> March 2020 to 25<sup>th</sup> March 2020 in USA. The coefficient for the COVID - 19 Confirmed cases is 2.64% which means that for each additional for the COVID - 19 Confirmed cases the USA - New York Dow Jones Financial Stock Markets was impacted for the same amount as well”



Researchers Engelhardt, N., et al. investigated 64 national US stock markets and if the current drop in financial markets are affected by news or rational investor's expectation. In assistance sample regression and SIR models were used. According to findings researchers conclude that attention to the news has larger impact in comparison to rational investor's expectation. News attention regarding COVID-19 costed for the US stock market approximately 3.5 Trillion dollars until April 2020. Thus, their findings recommend investors to focus on the news, rather than rational expectations and forecasts.

Moreover, US Federal Reserve and bank of Canada reduced interest rates from 1.75% to 1.25%. (Yik, 2020). Felix E. Arcilla research revealed that a solid downfall took place from January 2020 to March 2020 "with an increasing trend in benchmark index S&P500 and DJI." S&P 500 dropped from 3,225.52 to 2,584.59 points which is approximately 20% decrease by the end of the first quarter, while, DJI has dropped by 23.20%. The fact of decreasing pattern in prices concluded that stock market crises developed all over the world. The negative % change in the first quarter guides to conclusion that indices have collapsed.

Table 1 *DJI and GSPC indices prices and % change of first quarter, 2020*

Indicies	2020		Jan		Feb		Mar		Q1	
	Price	Price	% change	Price	% change	Price	% change	Price	% change	
<b>DJI</b>	28,538	28,256	-0.99	25,409	-10.07	21,917	-13.74	21,917	-23.20	
<b>GSPC</b>	3,230	3,225	-0.16	2,954	-8.41	2,584	-12.51	2,584	-20.00	

Source: Yahoo finance, 2020

In addition, in the research of stock return predictability in United States of America in the time of COVID-19, Cetin, C. states that "stabilization of the stock market should be critical part of the policies as the economy recovers from the COVID-19 crisis." The analysis underline that investment grade bonds and high yield corporate bonds were the "primary risk factors across the equity market". Therefore, the research supports the unprecedented decision by the Federal Reserve to purchase both types of bonds.

Shanghai stock market liquidity and returns volatility related to COVID-19 pandemic was examined by Ftiti, Z., Ameer, H., & Louhichi, W. (2021). Researchers applied Forsberg and Ghysels (2007) method with two measures of volatility. The findings provide information, that COVID-19 crisis negatively impact the Shanghai stock market by "increase

price volatility and reducing the levels of liquidity.” According to the researcher’s knock-on effect was caused by unprepared healthcare system. The policies applied for lockdown in China led to a supply shock which directly harmed the financial market. In order to stabilize Shanghai stock market, it is important to focus on the health system and place it in “the heart of economic and political systems of a country”.

The correlation between stock markets and the significance of the COVID-19 pandemic was studied by O’Donnell, N., Shannon, D., & Sheehan, B. (2021). The study also examined the responses of equity index prices to COVID-19 confirmed cases. The indexes were taken from Interbank offered rates from China, Italy, Spain, UK, and USA. The findings of researchers confirmed that “equity index prices suffered a significant negative shock in conjunction with the growth of the pandemic.” It is important to learn the lesson from such rare pandemic, because there is a possibility that we will encounter similar “unusual disasters”. Therefore, the COVID-19 pandemic provides us with unique opportunity to identify the patterns and social behavior for the future preparations.

Moreover, in the study of the studies researchers Xiaoyun, W. & Han, L. used sample of 37 countries which were severely affected by the pandemics to estimate the impact on the transmission of monetary policy to financial markets. In the findings authors declare that during the 2020 COVID-19 pandemic period, “neither conventional nor unconventional monetary policies” had any significant effects on the financial markets, which include: exchange rate, governmental bond, CDS markets and stocks. However, unconventional monetary policies were more effective, rather than conventional policies, due to the fact that they can affect the stock, exchange rate and markets to some degree. In addition, the analyzed variables provided information that even with various levels of financial and industrialization development, there aren’t any major differences in monetary policy transmissions. In conclusion researchers also provide with three recommendations for policy implications: firstly, “central banks should implement more expansionary monetary policy” during pandemic period, because transmission of monetary policy to financial markets is weakened. Secondly, the policy implications for central banks should be done even if it is not at the highest level of pandemic crisis, “the short-term weakening effect of monetary policy on financial markets should be fully considered in the policy implementation”. Last but not least, unconventional monetary policy could be used as stimulus to financial markets, since it is slightly more effective than conventional monetary policy.

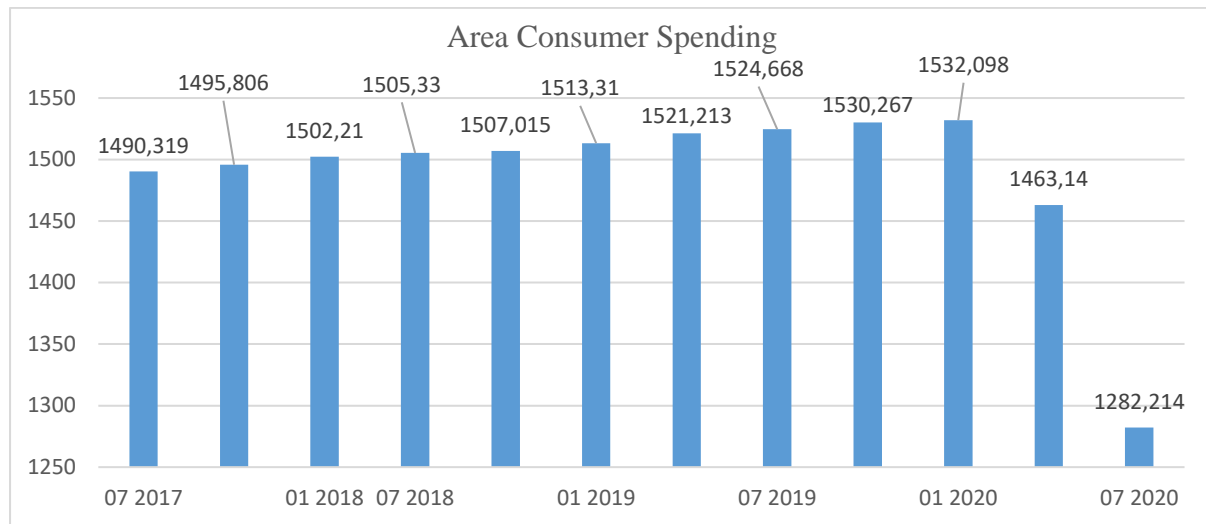
Cheong, C. in his research tried to answer if the financial markets overreacted to COVID-19 pandemic during the period of December 2019 to January 2020 and February 2020 to March 2020. According to the provided descriptive statistics, many selected sample countries financial markets reacted to COVID-19 spread during first period, except Malaysia and Thailand. Yet, during the February to March 2020 period all countries, had lower negative mean of returns. MSCI World Index recorded highs that were higher than first pandemic period in the Australia, Singapore, Thailand, and the United States of America. Thus, researcher states in conclusion that every country has different effects from pandemic, and it is important to understand that such phenomenon cannot be studied in a generalized way. The “global or regional samples” will not provide correct conclusions, instead the focus should be pointed to individual countries and their macro and micro level reactions to COVID-19 pandemic.

Applying the “ST-HAR” model in the research of COVID-19 impact on G7 stock market volatility during 2020, researchers Izzeldin, M, et. Al. used most recent data available from G7 countries stock markets. The aggregate volatility was assessed and in order to get more precise data volatility analysis was categorized in 10 business sectors. Therefore, to record the effects of the pandemic and associated market reactions, the smooth transition heterogeneous autoregressive model (ST-HAR) was applied on each volatility series. In results researchers state the following findings: “Our findings are that the Health Care and Consumer Services sectors were the most severely affected, with Telecommunications and Technology least affected.” Moreover, United Kingdom and United States of America financial markets were affected the most, yet with big response heterogeneity across the business sectors.

In one research method, authors applied APGARCH model to analyze non-linear behavior of financial markets of Asia, US, and Europe. The results of the findings provided important fact. Even though COVID-19 started in ASIA, specifically in China, nevertheless according to the findings USA and Europe financial markets were more effected by the COVID-19 as compared to Asian financial markets. (Shehzad, K. et al. 2020) Also it is important to mention, that Asia financial markets provide greater opportunities to diversify financial risks.

## 1.2. Theoretical aspects of COVID-19 impact on European financial markets

According to Eurostat statistic database, consumer spending in the Euro Area decreased from 1532.09 EUR Billion to 1463.141 EUR Billion in the first quarter of 2020 (Figure 1).



*Figure 1 Euro Area Consumer Spending*

*Source: Trading Economics, 2020*

Furthermore, after most of the Eurozone countries imposed strict quarantine and citizens were isolated in their houses, consumer spending decreased to 1282.21 EUR Billion in the second quarter. According to the graph regarding 2019 consumer spending, throughout the year the average sum of money was balancing above 1500 EUR Billion, however, the COVID-19 virus spread led to a decrease of 242.45 EUR Billion in consumer spending, comparing between 2019 and 2020 second quarters.

In addition, the Eurozone economy's gross domestic product (GDP) shrank by 11.8% in the second quarter, whereas in the second quarter of 2019 it was increasing by 0.1% (Figure 2).

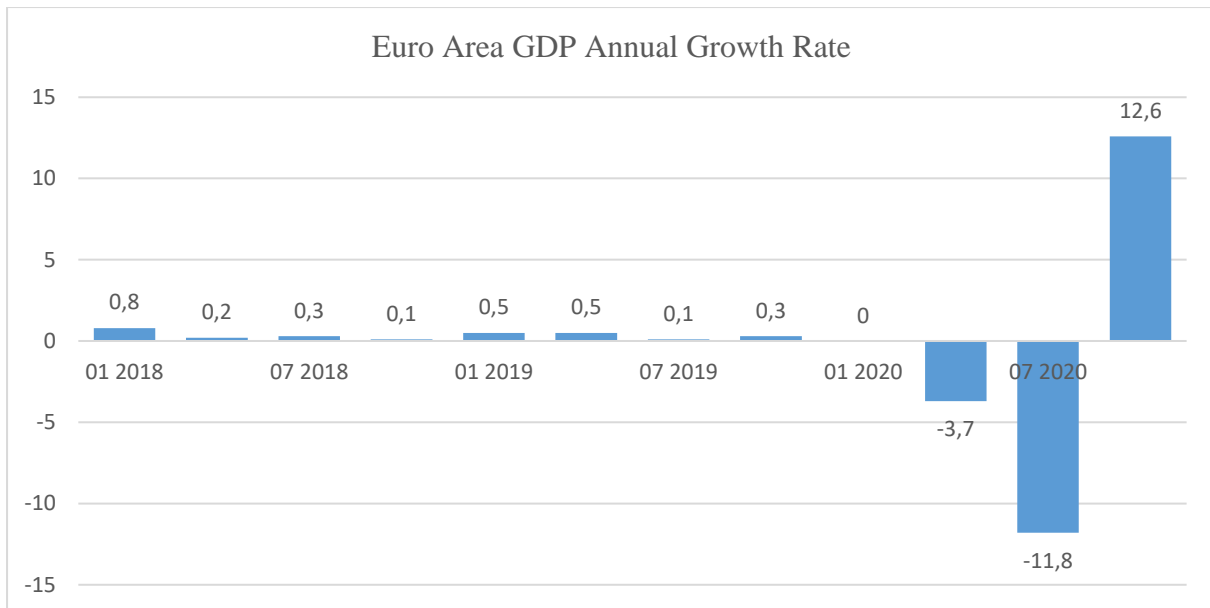


Figure 2 Euro Area GDP Annual Growth Rate

Source: Trading Economics, 2020

Such GDP contraction led to obscurity and fear of European Union future existence. Nevertheless, according to Eurostat in third quarter “Eurozone economy grew by 12.6 percent in the three months to September 2020, recovering from a record slump of 11.8 percent in the previous period and compared with early estimates of a 12.7 percent advance. It was the steepest pace of expansion since 1995” (Trading Economics, 2020).

Ashraf, B. from JiangXi University of Finance and Economics conducted a research to prove that Stock markets react to new COVID-19 cases, but not the fatalities. Researcher applied simple regression model to find the relationship between stock reactions to new cases or fatalities and Pearson correlations between main variables. According to the finding’s daily growth in COVID-19 confirmed cases has a strong negative correlation with stock market returns in 64 selected sample countries. However, the growth in deaths variable also has a negative result, yet stock market response to the number of deaths is relatively low. Thus, author’s findings suggest that stock markets price react strongly during the early days of confirmed cases and less when confirmed cases die later on.

The researchers Rui Dias, Paulo Monteiro Alexandre and Paula Alexandra Heliodoro advised that investors should carefully balance the portfolio during COVID-19 pandemic. Researchers analyzed G7 (Group of Seven) countries that included: USA, UK, France, Japan, Germany, Italy, and Canada. During the period from December 31 st, 2019 to

July 23 rd, 2020, most markets display structure breaks between February and March 2020, because of global pandemic disruption. Furthermore, the empirical findings of Wang. W., & Enilov. M. suggest that COVID-19 was able to establish a dominant short-term influence on the stock movement in financial markets and it appears that it has the most effect on largest advanced economies in the world.

In Volatility analysis that was conducted by Dyaong Zhang, Min Hu, Qiang Ji Top 10 countries with confirmed cases of COVID-19 were selected and statistically analyzed if confirmed cases have strong influence on stock markets.

The results in the table shows that the risk levels of the top 10 countries had increased, from an average of 0.0071 in February to 0.0196 in March. The increase in the risk level most likely was influenced by sentimental factors that have important role. The market sentiment in response to the outbreak can be strengthened with the help of social media, which then encourage trade activities and lead to extreme price movements. However, in February China had the highest level of standard deviation while in the march the lowest. Nevertheless, according to the table United States of America volatility increased the most, “with a level of standard deviation in March nearly four times higher than in February.” (Dyaong, Min, & Qiang. 2020).

Czech, K. et al. (2020) in the study of COVID-19 impact on the Visegrad Group Countries financial markets. The analysis is based on the Refinitiv Datastream data and the risk reversal strategy is applied in order to estimate the market perception of the risk associated with currency appreciation or depreciation, furthermore, TGARCH model was adopted to measure the impact of COVID-19 cases on the exchange rates and stock market volatility to Visegrad countries. The Visegrad member states such as Czechia, Slovakia, Hungary, Poland were hit by COVID-19 virus in the begging of March, 2020. The study stresses out that COVID-19 pandemic had negative impact on the Visegrad financial markets which in resulted to Czech koruna, Polish zloty and Hungarian forint depreciation against the euro currency. The TGARCH model study results confirm a negative correlation between pandemic spread and the value of Visegrad Group member states currencies which were mentioned above. The authors conclusion implies that during “COVID-19 pandemic, when the Visegrad currencies weakened and stock indices plunged, the volatility was higher.” (Czech, K. et, al. 2020).

According to the researchers Pardal, P. et, Al. (2020) in their study of integration Central European capital markets in the context of the global COVID-19 pandemic, the analysis aims to analyze financial integration in the stock market indexes from such countries

as Slovenia (SBITOP), Czech Republic (PX PRAGUE), Lithuania (OMX VILNIUS) and couple of others in the Central Europe region. For more precise analysis results several approaches were taken into account and two statistical tests for selected aim was carried out.

Firstly, the logarithmic rates of return results provided the result which indicated that instability experienced in the selected stock market indexes and especially in February and March 2020 months, when the first pandemic impact appeared.

In the second approach the descriptive, as well as the adherence and Jarque-Bera test has been analyzed. The analysis results stated that most return rates have negative daily averages, except Lithuanian stock market index (OMX Vilnius). In conclusion authors stated that with the assistance of econometric models, the COVID-19 pandemic had impact on the stock indexes of the capital markets of Central Europe. The degree of financial integration is significant in the chosen markets; thus, it negatively effects the efficiency of portfolio diversification strategies.

Mateus Tomal (2021) in his research of Real Estate Stock Returns and their volatility with assistance of GJR-GARCHX model, found out that Real Estate Stock Returns were not affected by COVID-19 pandemic first wave in Poland and only afterwards in second and third wave the negative effects were visible. The results also could be supported by the fact that government of Poland implemented tighter and stricter restrictions only in the second and third wave period. Therefore, the volatility of stock returns decreased, which suggest that market participants started limiting their actions in the stock market, because new confirmed cases and fatalities due to the COVID-19 virus also started increasing higher then compared to the first wave period.

In the research of “impact of COVID-19 on stock prices of listed companies in the Baltics” by Beatričė Mockaitytė. Author concluded that the size of economics declines because of COVID-19 pandemic depend on the industrial mix in the country. Estonia is very dependent on tourism and foreign investments; thus, it received the strongest hit. Yet Lithuania is more reliable on manufacturing industry which helped to recover from the first pandemic wave faster in Baltic region. Latvia’s stock price recovery after the first COVID-19 pandemic case is not proved to be efficient as in other Baltic countries. The implementation of welfare packages for citizens and companies have led to an increase in the returns which indicated how media and governmental actions could affect the stock price performance.

Chikri, H. et, al. (2020) used non-linear autoregressive distributed lag (NARDL) model in order to prove that financial markets are negatively impacted by the growth of COVID-19 virus. Research chose to analyze indexes which also included CAC40 index for France and Italy's FTSE\_MIB index. The NARDL model estimation for CAC40 are negatively significant which confirms that negative shocks are caused by the spread of the virus, the same results are also indicated for FTSE\_MIB index. Authors conclude that model results provide information that due to the virus both countries suffered from the decrease in the indexes.

Using the multifractional Brownian motion as a model of the price dynamics, Frezza, M., Bianchi, S., and Pianese, A. analyzed the influence of the COVID-19 pandemic on the efficiency of fifteen financial markets from Europe. The fractional Brownian motion model estimated the pattern before and after the two pandemic crashes. European markets recovery of efficiency lasted not for long and in accordance to the model the volatility is still too high to be compatible with market efficiency. Interesting fact is that "flattening is more pronounced for the European indexes and for the DJIA, whereas it is less evident for the S&P 500." Interpreting of the model it seems that economy in the Europe and world will fully recover only in the long run. The estimated contraction for the global economy is 3% in 2020.

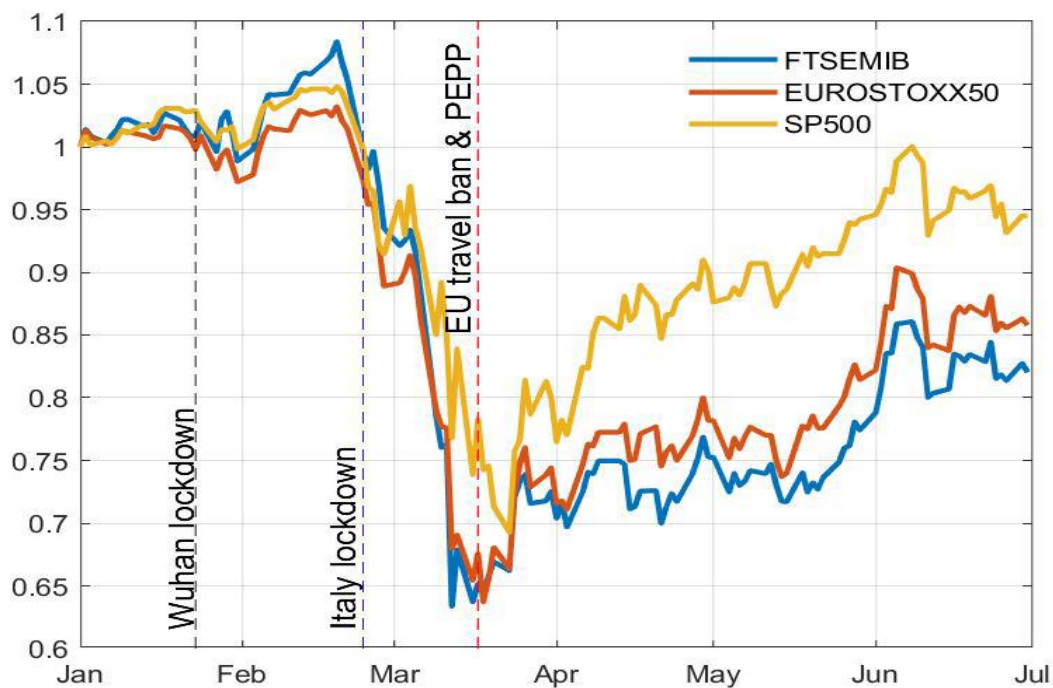
The study of panel analysis for European countries by Klose. J concluded that announcements of policy initiatives and regulation adjustments positive assisted some countries and stock prices increased by 1.6 percent. In addition, the increasing number of COVID-19 cases raised bond yields, "suggesting that investors anticipate future fiscal burdens associated with the pandemic." also announcements of national liquidity assistance programs and national fiscal policy add input in rising the bond yields. The research also stated that "purchase programs of the central bank are single most effect instrument during the Corona pandemic", because these announcements raised stock prices and reduced bond yields. In conclusion, the research states that country which are affected by increasing growth of COVID-19 cases could face an increase in bond yields on days of a fiscal policy announcement, whereas the same announcement in lower affected countries keeps yields unchanged.

### 1.3. Theoretical aspects of COVID-19 impact on Italy and Spain financial markets

According to Bloomberg, public debt is expected to reach 150% of GDP. Thus, the effects of public debt and low economic growth increased risks of recession. "In fact, Italy is expected to be one of the economies most severely hit in the Eurozone. The response of equity markets, which are forward looking, confirms the difficult economic Italian outlook.



(Borri, 2020) Figure number progression of S&P500 US equity markets, the Eurostoxx50 for Eurozone equity markets, and the FTSE MIB for the Italian equity market. The three equity indices data was collected from Bloomberg. It is clearly shown that even though the initial drop in the Italy equity market was similar to Eurozone, the recovery was weaker in Italy. (Borri, 2020). In fact, equity markets dropped, first, by roughly 35% in Italy and the rest of the Eurozone, and by 30% in the US. The intervention by the major central banks, which announced large asset purchase programmes like the Pandemic Emergency Purchase Program (PEPP) by the European Central Bank (ECB), helped to put a floor to the fall in equity markets. However, while the US equity market has gained back almost all of a lost ground, the Eurozone market and, especially, the Italian market, are still approximately 15% lower than their values at the beginning of the year. (Borri, 2020)

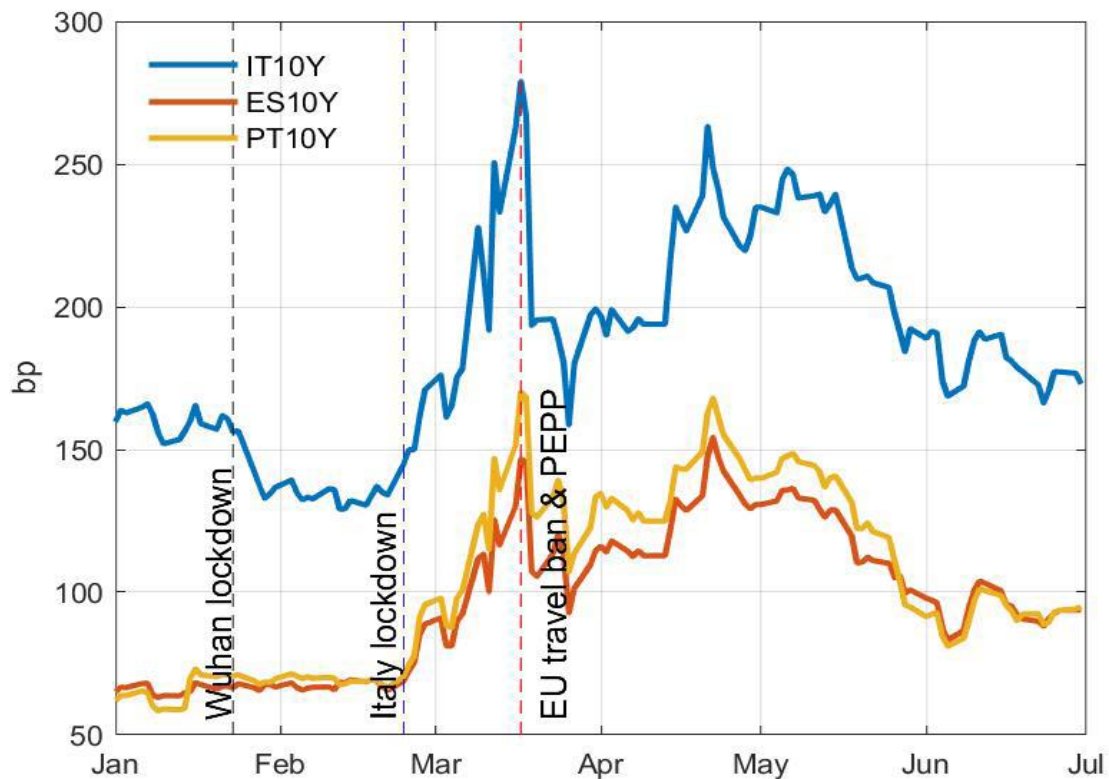


*Figure 3* Equity Markets around the Great Lockdown.

*Source:* Bloomberg, 2020

In the next figure the progression of government bond yields for Italy, Spain and Portugal data is provided. (Bloomberg, 2020) As in equity markets table, also for government bonds we first see a sudden increase in yields. For example, the yield on the 10-year Italian government bond increased from 150 to more than 250 basis points. We observe a similar increase in yields also for Spain and Portugal which, however, had lower yields before the

COVID-19 shock. Even so, it appears that the intervention by the European Central Bank (ECB), with the announcement of the Pandemic Emergency Purchase Programme (PEPP) asset purchase programme, was able to avoid the risk of a sovereign debt crisis.



*Figure 4* Government Bond Yields around the Great Lockdown.

*Source:* Bloomberg, 2020

According to Bonaccolto, Borri, Consiglio (2020) findings, there is evidence of an increase in the conversion risk for France and Italy since the beginning of January 2020. The risk involves one, or both, of these two countries to abandon the Euro for a new, undervalued, currency. (Bonaccolto., Borri., & Consiglio. 2020).

In conclusion, Italy was one of the first economy who was struck by the COVID-19 virus. Health crisis, the strict lock-down, and unsuspected virus spread for 4 months lead to economic and financial problems. Although the indicators are showing positive numbers in third quarter it is important to understand that the second lock-down begun and we still don't see any numbers regarding it. Thus, it will be necessary to update it after the 3 and 4 quarters of 2020.

Regarding Spain financial markets Henriquez, J. et al. stated that significant decrease was recorded since January 2020 of the IBEX 35 stock. It was “the lowest value being registered after the declaration of the State of Alarm”. However, in mid-June significant increase appeared due to the fact that credit loans for the tourist sector was made in mid-June. As it is known that tourism sector has an important role in the Spanish economy. In 2019 tourism sector generated around 12.3% of the total GDP. (Instituto Nacional de Estadística, 2020).

To be more familiar with the IBEX 35 stock index, Belen Nieto and Gonzalo Rubio analyzed and concluded relevant information regarding the index “the levels of the IBEX 35 and the Madrid Stock Exchange General Index (IGBM), comprise of 127 stocks, have fallen sharply and the volatility has spiked to levels last seen during the Great Recession.” (Nieto & Rubio, 2020) The rising uncertainty worldwide and locally strengthened an increase in risk aversion which formed the behavior of financial markets during first two quarters of 2020. Figure 6 provides information regarding the cumulative returns of the IBEX 35 and index of three sectors was formatted from January 2 to April 29. In the figure it is shown how cumulative returns started declining rapidly from the 24<sup>th</sup> of February forwards the biggest drop on the 12<sup>th</sup> of March.

Although, from March 20<sup>th</sup> the cumulative returns stabilize without major changes until April 29<sup>th</sup>. (Nieto & Rubio, 2020) All sectors have negative effect, yet the Spanish banks data display the worst drop.

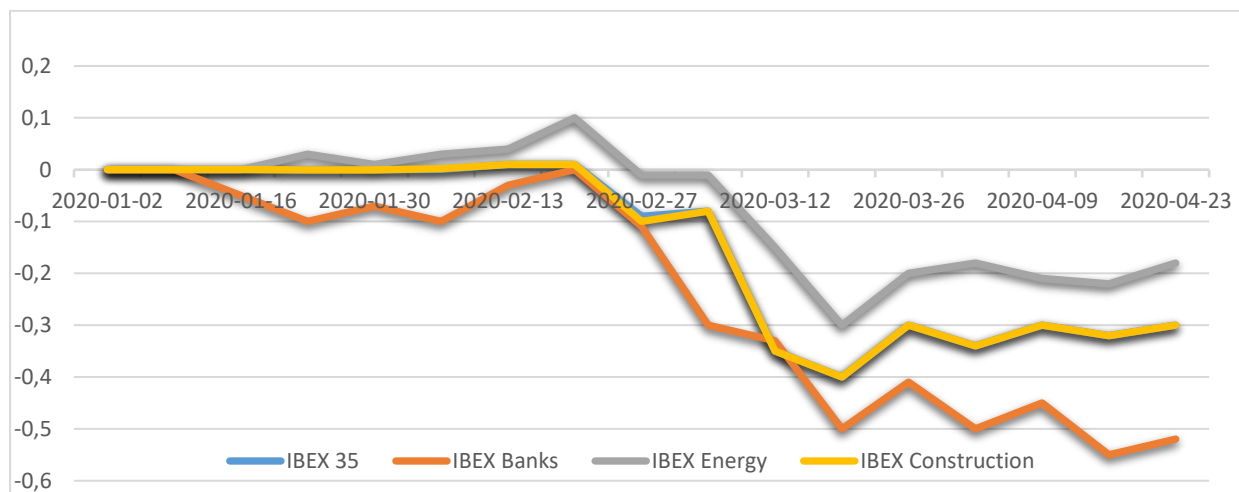


Figure 5 IBEX 35 cumulative returns from 2<sup>nd</sup> of January to 23<sup>rd</sup> of May, 2020

Source: Bolsa De Madrid, 2020

While the Energy sector present relatively the best performance during the period of two months. Nevertheless, Ahmar, A. and Boj del Val, E. (2020) with the help of SutteArima model found out that IBEX stock market begun to stabilize on 24<sup>th</sup> of March 2020 in around 6900 per share.

#### 1.4. Theoretical aspects of methodology used in previous similar studies

Purpose of this paragraph is to examine and structurally summarize the findings and the methods used in the similar study field by different authors. This will assist in the upcoming research to understand what the most efficient way could be to approach the chosen topic and to achieve the intended objectives.

Table 2 *Collected methodology from academic literature*

Research	Author	Model	Findings
The response of financial market indices to COVID-19 pandemic	Arcilla, F.	Simple linear regression	Significant and negative relationship between COVID-19 and stock indices
Global impact of COVID-19 on financial markets	Enilov, M.	Panel-Data model, cross-sectional dependence	Significant negative impact on stock market returns in G7 countries
Influence of COVID-19 on financial market	Chikri, h. & Moghar, A.	NARDL	New cases and deaths caused by COVID-19 negatively effects the values of the stock indices.
Financial markets under COVID-19 pandemic	Zhang, D. et al.	Simple linear regression	Increasing cases of COVID-19 is clearly linked to stock market decrease reactions
A panel analysis for European countries	Klose, J.	Panel-data	COVID-19 significantly effects 10-year bond yields.
Shaking Stability: COVID-19 Impact on the Visegrad Group Countries' Financial Markets	Czech, K. et al.	TGARCh model	Significant and negative link between the Visegrad stock market indices and the COVID-19 spread.
Impact of the COVID-19 on the financial markets: Evidence from G7	Heliodoro, P. et al.	Detrended Fluctuation Analysis & Detrended Cross-Correlation Analysis	Global pandemic has a significant negative impact on the adjustment of the analyzed financial markets.

THE IMPACT OF COVID-19 ON STOCK PRICES OF LISTED COMPANIES IN THE BALTICS	Mockaityte, B.	Ordinary Least Squares (OLS)	Significant stock price deviation in the Baltic States.
Impact of the COVID-19 on the financial markets: evidence from China and USA	Sansa, N. & Hasan, A.	Simple linear regression	Positive significant relationship between the COVID-19 confirmed cases and China and USA financial markets
Stock return predictability in the time of COVID-19	Ciner, C.	Lasso penalized regression	Investment grade and high yield corporate bonds are the primary risk factors across the equity market during the COVID-19 pandemic
SutteArima: Covid-19 and stock market in Spain	Ahmar, A. & Boj del Val, E.	Arima and SutteArima	Negative effects of COVID-19 to IBEX 35 stock exchange index
Stock market's reaction to COVID-19: cases or fatalities?	Ashraf, B.	Simple linear regression	Stock markets price in COVID-19 react higher of new confirmed cases raise and less of announcements of new fatalities

According to the table above 4 out of 10 research studies applied simple linear regression model to estimate the relationship between independent and dependent variables. The authors which used the simple regression method agree that there is a positive significant relationship between the COVID-19 pandemic and financial market indexes. In other words, authors conclude that virus has a negative influence on the financial markets. Chikri, h. & Moghar, A. used non-linear autoregressive distributed lag model (NARDL), authors state that is well suited for modeling the asymmetric impact of uncertainty in case of predicting COVID-19 effects on financial markets. Model helps to see immediate reaction of index prices to uncertainty shocks and characterize the long-run equilibrium relationship between uncertainty and index performance. NARDL results provided information that “COVID-19 cases has a direct negative impact on the financial market.” Furthermore, Enilov, M and Klose, J used Panel-data and cross-sectional dependence models. The calculations rejected the null hypothesis of no cross-sectional dependence and confirmed the existence of cross-sectional dependence. Which in result provided “significant evidence for unidirectional causality form COVID-19 to stock market returns at 5% significant level.” Heliodoro, P. et al. analyzed the dependency on non-stationary data series. The analysis focuses on the relationship of the data

series in the long run and the function of model is to examine the relationship between values at different times. According to the finding's asymmetries are negative in the chosen markets which are marked as levels of integration; thus it may jeopardize efficient portfolio diversification. Ahmar, A. & Boj del Val, E. applied Autoregressive integrated moving average (Arima) model to predict the trend history of the data. In results authors forecasted the closing price of IBEX 35 from 14 April to 16 April 2020. The forecast for closing prices were lower compared to the monthly trend which concluded that even with the calculated forecast the COVID-19 will negative effect for the financial markets in the future. Last but not least, Lasso penalized regression model was applied by Ciner, C. Researcher states that model can "simultaneously achieve both variable selection and estimation of uninformative variables". The exchange traded funds (ETFs) were chosen as the model predictors and in the model results it was stated that it was primary risk factor in the COVID-19 crisis.

To sum up the table provides the information regarding the other models and findings of similar studies. Summary in table shows that the Simple Regression model was most popular model among other models. Thus, the findings assist to construct a conclusion for the next chapter to select the most effective model for the selected study and identify the relation between the dependent and independent variables.

To conclude, the literature analysis was design of four theoretical aspects. In order, to understand the impact of COVID-19 pandemic to a specific country it is necessary to do research globally and analyses different studies from different world continents. Thus, in the current chapter the analysis begins from studies which covers global financial markets such as United States of America, China, Saudi Arabia, and other leading economy countries that have an impact on many world sectors. The results of studies provide the conclusions that financial markets were affected differently and unpredictably. Even though China was the first victim of COVID-19, in the longer run it didn't have higher negative effects on economical results as other Group of Seven country members.

The next theoretical analysis was narrowed down to analyze in more dept the European financial markets. Italy was the first country in Europe that was infected by the COVID-19 virus and research results show that it was affected most among other European countries. It is important to mention that Eastern Europe and Northern Europe had more time to prepare for pandemic, because the first virus infection was only found later in comparison

with Southern and Western European countries. Thus, the economic and financial results were less severe in comparison with such countries as Italy, Spain.

The third theoretical analysis was reduced to Southern Europe, more specifically to Italy and Spain. Both countries during the 2020 had the most severe economic and financial impacts related to COVID-19 pandemic. The research helped to understand that both countries were not prepared for such disaster, thus not only the financial sector was drastically affected, but all other sectors such as: public health, tourism, logistics, and many more were on the line of falling to pieces.

Finally, the fourth paragraph was developed in order to summarize and systematically add some of most related research in one table to clearly see the used methods and what kind of results were found in order to achieve the desired objectives for the selected study.

## 2. METHODOLOGY FOR RESEARCHING THE COVID-19 PANDEMIC IMPACT ON THE FTSE MIB 40 AND IBEX 35 STOCK EXCHANGE INDEXES

The study aims to investigate the impact of COVID-19 on Financial Markets in three period. The first period is dated from 1<sup>st</sup> of March to 31<sup>st</sup> of May 2020, second period is from 1<sup>st</sup> of June to 31<sup>st</sup> of August, 2020, and last but not least the third period is from 1<sup>st</sup> of September to 30<sup>th</sup> of November. The periods will be analyzed in two highly effected countries by COVID-19 pandemic which are Italy and Spain.

The design of three periods is selected, 1<sup>st</sup> period dates from 1<sup>st</sup> of March to 31<sup>st</sup> of May, 2020 were chosen due to the fact that in the beginning of March active cases of COVID-19 started rapidly rising in Italy and Spain, whereas in the end of May it stabilized to similar numbers as of beginning of the March. Thus, according to researchers it was cited as first wave of COVID-19 pandemic. During the summer both countries had stable and controlled situation without any drastic fluctuations, therefore the 2<sup>nd</sup> period from 1<sup>st</sup> of June to 31<sup>st</sup> of August, 2020 was establish as a recovery period. Last but not least, 3<sup>rd</sup> period from 1<sup>st</sup> of September to 30<sup>th</sup> of November was designed, because during this period the new confirmed cases raised to new records in both countries. Such increase led to believe that in third period second pandemic wave was defined.

1 <sup>st</sup> PERIOD			2 <sup>nd</sup> PERIOD			3 <sup>rd</sup> PERIOD		
March	April	May	June	July	August	September	October	November

The Italy and Spain were selected, because COVID-19 virus had tremendous impact on both countries during the 1<sup>st</sup> period (1<sup>st</sup> of March to 31<sup>st</sup> of May, 2020). Italian financial and health sectors were unprepared for such disaster. On the other hand, the uncontrolled spread of COVID-19 virus in Spain begun later on. However, in the long run both countries equalized in the total confirmed cases. That being the case, it is very interesting to analyze and compare how Italy and Spain stock exchange indexes reacted to the pandemic.

### 2.1. The research design and modeling strategy

In theoretical analysis research it was clear that one of the mostly used model regarding the COVID-19 effects to financial market is the simple regression model. Simple regression model was applied in the similar research studies investigated by following researchers: Sansa. N & Hasan, A.; Jarque, C. M., & Bera, A. K.; Klose, J. According to simple



regression model it can efficiently examine relationship between stock indices and COVID-19 confirmed cases. The time series data from Italy and Spain COVID-19 confirmed cases statistics report will be implied in the study as independent variable and FTSE MIB 40 and IBEX 35 were selected as dependent variables for the study. Such selected research design and modeling strategy will assist to analyze the selected objectives and provide necessary information to examine and develop the conclusion regarding the study topic.

## 2.2. The simple regression model

The simple regression model describes how strong the relation is between two variables by fitting a line to the observed data. Moreover, regression model provides estimation of how a dependent variable change as the independent variable changes in the same time. The FTSE MIB 40 and IBEX 35 will be dependent variables. The time series data from Italy and Spain COVID-19 confirmed cases statistics report will be implied in the study as independent variable.

The study used a Milano Indice di Borsa as a sample for Italy and Índice Bursátil Español as a sample for Spain. The FTSE MIB 40 (Milano Indice di Borsa) was selected because it is the national Italian stock exchange index which consists of the 40 top traded stock classes. Moreover, it is a volatile index that frequently sees large moves and double-digit annual changes. According to Avatrade FTSE MIB 40 includes powerful multi-national companies like ENI Group, STMicroelectronics, and Fiat Chrysler, along with domestic Italian companies. Thus, the index is a great estimate of the overall Italian economy. FTSE MIB 40 will be a dependent variable. Second dependent variable is IBEX 35 (Índice Bursátil Español) which represents 35 of the largest Spanish companies like Repsol (oil/gas), Santander (finance/banking) and many more. The companies are chosen based “on performance with the highest trading volume in Euros from the past six months”. (Avatrade, 2021) The IBEX 35 index is one of the indicators of the overall view of Spanish stock market condition.

Independent variable will be COVID-19 confirmed cases. It was selected following recommendations and findings of Ashraf, B. According to the author’s findings stock market price in COVID-19 pandemic decline as the number of confirmed cases increase in the country. Whereas stock market response in the COVID-19 growth in numbers of deaths is weaker. Moreover, in the analysis results it was mentioned that stock markets react strongly

during the early days of confirmed cases and between 40 to 60 days after the date of the initially confirmed cases.

The study implied the following equation in order to analyze the impact of the COVID-19 on the FTSE MIB 40 and IBEX 35 indexes:

$$1. Y_t = \alpha_0 + \beta_1 \text{CNF/C}_t + e_{1t} \dots \dots \dots (1)$$

Y is the natural log of Dependent Variable, CNF/C is COVID 19 Confirmed cases. The  $\alpha_0$  is constant, and  $\beta_1$ , is the coefficient parameter.

The study approach included descriptive and statistical analysis to investigate impact of the COVID-19 confirmed cases during the above-mentioned periods. Collected data will be properly organized and analyzed using quantitative method technique and application of “Excel” spreadsheets and with assistance of SPSS Statistics software package.

### 3. COVID-19 PANDEMIC IMPACT ON THE FTSE MIB 40 AND IBEX 35 STOCK EXCHANGE INDEXES EMPIRICAL RESEARCH RESULTS

The theoretical research part provided fundamental basis to develop research methodology and ultimately achieve the essential purpose of the thesis to accomplish an empirical research and to identify the impact of the COVID-19 on the FTSE MIB 40 and IBEX 35 indexes. Furthermore, the research methods will cover the descriptive statistics, modelling strategy and analyses of indexes in more detailed information. Afterwards, the selected variables with dataset will be inserted in the simple regression model. Lastly, all information which is involved with performed research and measurements that were taken into evaluation of the results will be explained in detail with their credibility and importance.

#### 3.1. The results of descriptive statistics

Italy was chosen as one of the research objectives, because COVID-19 pandemic had the biggest effects on countries economy and financial markets during first two quarters of 2020. By the end of December 2020 more than 2 220 361 (World meter, 2020) got sick with the virus and in results around 77 000 deaths took place. As it is seen from figure 7 below.

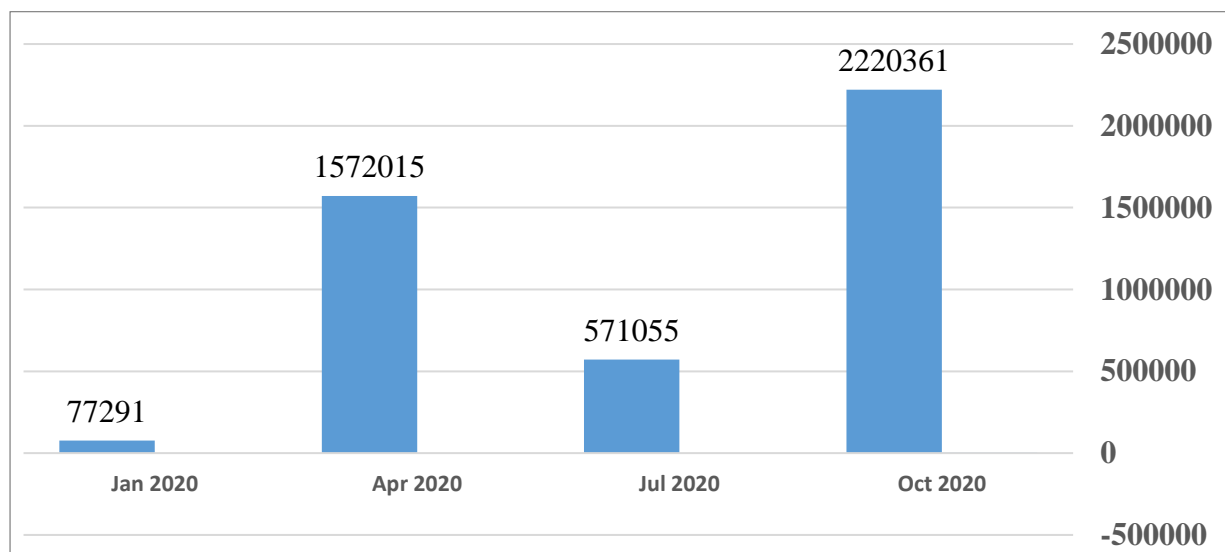


Figure 6 Coronavirus (COVID-19) active case, recoveries, deaths

Source: Statista, 2020

According to the Coronavirus cases in Italy graph below it is possible to conclude that pandemic effected the country by two waves up till now. The first wave spread from March

2020 to May 2020, the second one started from September 2020 and it is still ongoing after December 2020.

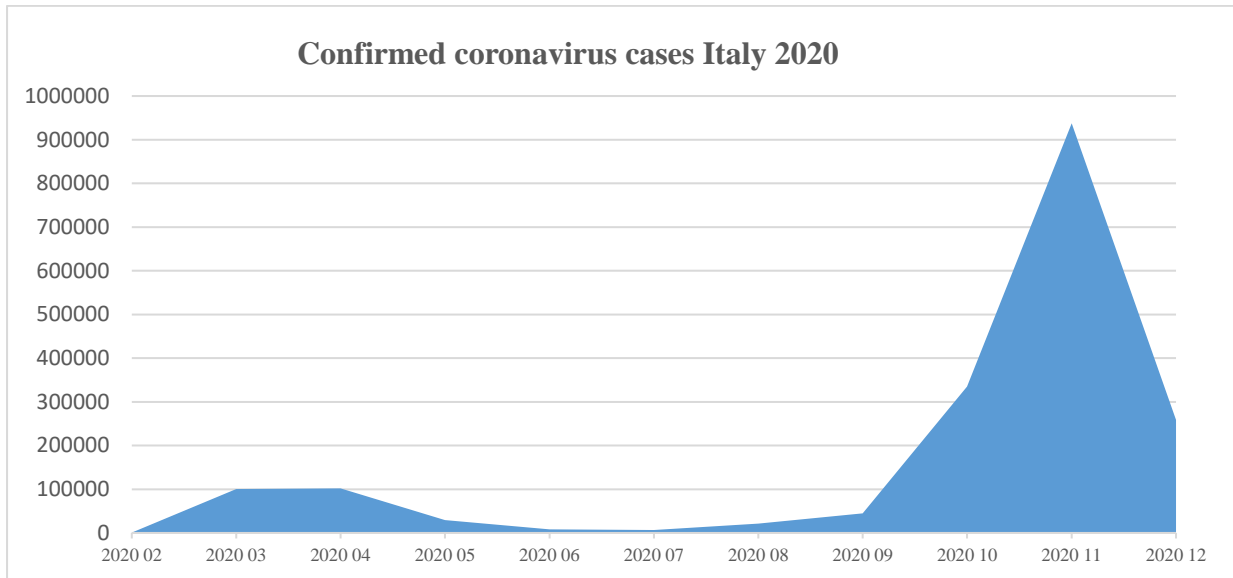


Figure 7 Italy confirmed COVID-19 cases

Source: Trading Economics, 2020

While country was in the lockdown, which did help to decrease the new cases, the quarantine had severe consequences for economic effect. The Gross Domestic Product (GDP) in Italy shrunk by 13% by the end of the second quarter and it was one of the largest drops in the history.

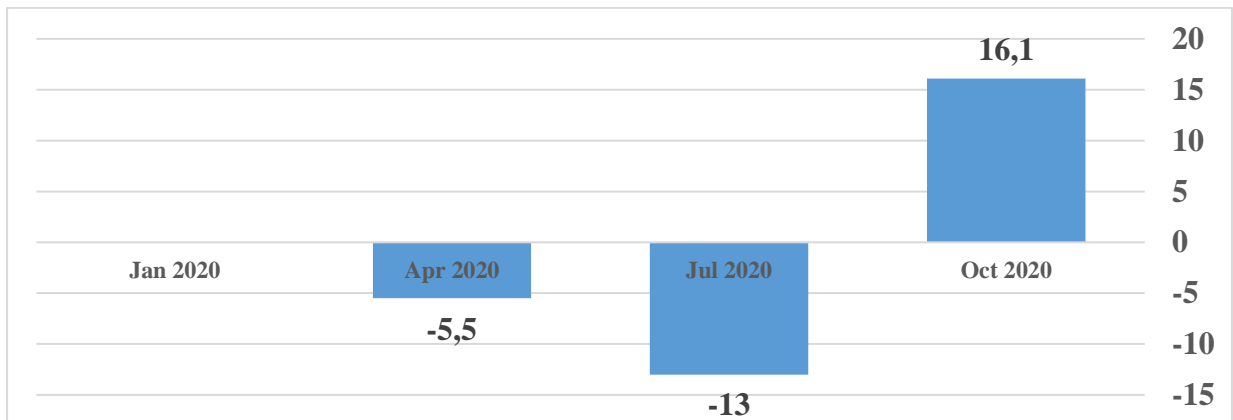


Figure 8 Italy GDP Growth Rate

Source: Trading Economics, 2020

Spain was the second most effected country in Europe by COVID-19 during first pandemic wave. According to table graph below there is more than 1 490 000 confirmed coronavirus cases in Spain up till November 19, 2020.

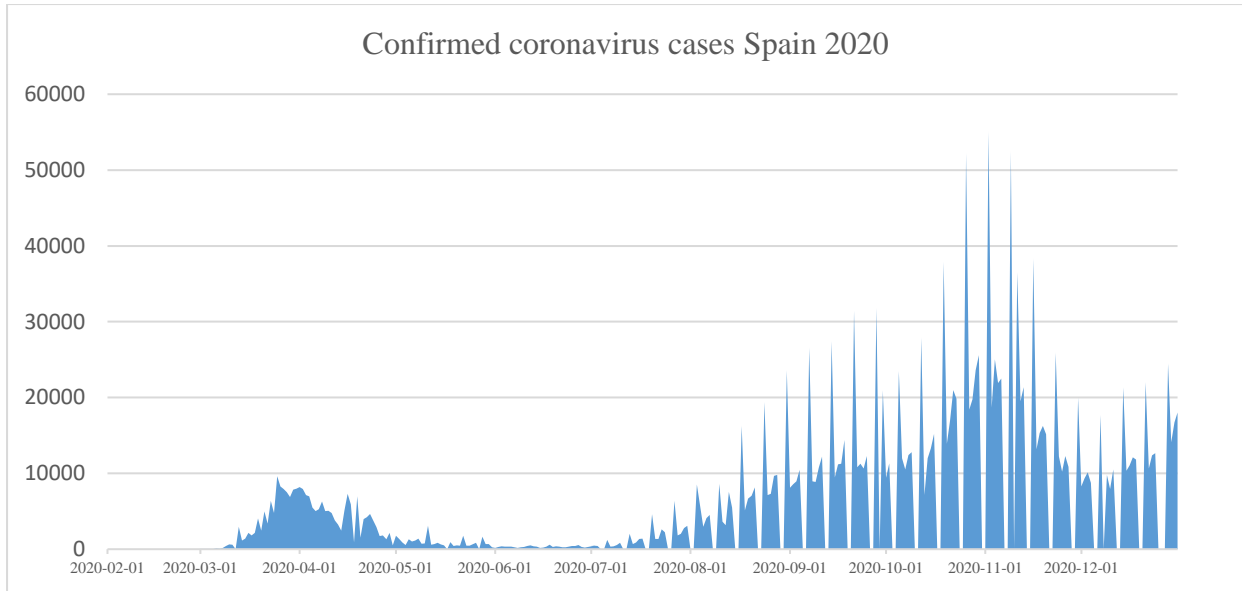


Figure 9 Confirmed coronavirus cases in Spain 2020

Source: Statista, 2020

During the first lockdown, the Gross Domestic Product (GDP) growth rate in Spain shrunk by 17.8% and it is 4.8% more than in Italy.

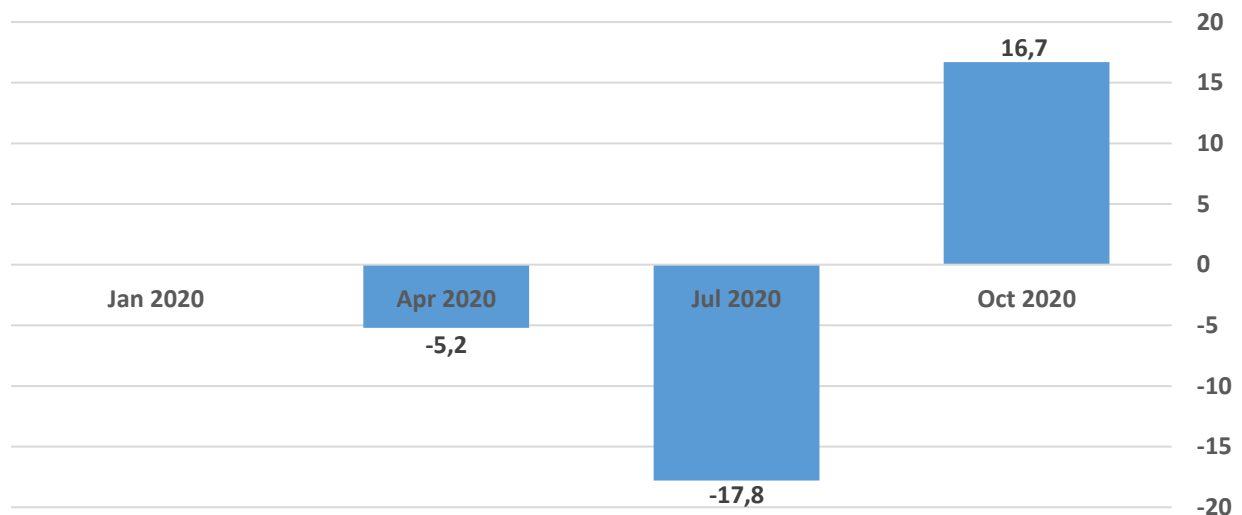


Figure 10 Spain GDP Growth Rate

Source: Trading Economics, 2020

However, in the third quarter the rate increased by 16.7%, in addition, the “consumer spending in Spain increased to 157529 EUR Million in the third quarter of 2020 from 130660 EUR Million in the second quarter of 2020” (Trading Economics, 2020) and consumer spending factor contributed positively to the gross domestic product, because exports increase more than imports. (Trading Economics, 2020)

### 3.2. Impact assessment results

In the impact assessment results the statistical analysis will be generated. As it was observed in the theoretical analysis chapter there were many strategies and methods applied in different research in order to measure and analyze the COVID-19 pandemic impact on the stock indexes. Nevertheless, the author chose to apply the most common method, which is the simple regression model. The regression results for the selected periods will be provided in the following research below.

#### 3.2.1. COVID-19 impact analysis on the 1st period (1st of March to 31st of May, 2020)

Table 3 Descriptive statistics of model variables – (period 1)

	CASESITALY	CASESSPAIN	FTSEMIB40	IBEX35
Mean	2440.339	2908.467	17381.8	6932.314
Median	2173.500	1796.5	17198.28	6763.05
Maximum	6203.000	9630.000	21946.03	8910.04
Minimum	300.0000	0.000	14894.44	6107.24
Std. Dev.	1713.125	2796.921	1469.406	600.1582
Skweness	0.509090	0.823574	1.553032	2.074667
Kurtosis	2.084999	2.335116	6.180629	6.94738
Jarque-Bera	4.840955	7.887916	51.05708	84.73018
Probability	0.088879	0.019371	0.000000	0.000000
Sum	151301.00	174508.0	1077671	429803.4
Sum Sq. Dev.	1.79E+08	4.62E+08	1.32E+08	2.20E+07
Observations	62	62	62	62

In the table 3 above the following statistical results are provided for 1<sup>st</sup> period, however in order for the comparison analysis to be effective the median and std. deviation will be analysed and compared in the second and third periods which will be discussed in the upcoming sub-sections.

Table 4 Linear regression model for FTSE MIB 40 (Period 1)

Dependent Variable: FTSEMIB40

Sample: 03/02/2020 5/29/2020

Included observations: 62

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18467.27	281.5468	65.59218	0.0000
CASESITALY	-0.444804	0.09468	-4.697982	0.0000
R-squared	0.268926	Mean dependent var		17381.8
Adjusted R-squared	0.256741	S.D. dependent var		1469.406
S.E. of regression	1266.811	Akaike info criterion		17.15812
Sum squared resid	96288590	Schwarz criterion		17.22674
Log likelihood	-529.9017	Hannan-Quinn criter.		17.18506
F-statistic	22.07104	Durbin-Watson stat		0.279614
Prob(F-statistic)	0.000016			

Table 5 Linear regression model for IBEX 35 (Period 1)

Dependent Variable: IBEX35

Sample: 03/02/2020 5/29/2020

Included observations: 62

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7144.007	108.6524	65.75101	0.0000
CASESSPAIN	-0.070528	0.027035	-2.608723	0.0115
R-squared	0.105013	Mean dependent var		6938.879
Adjusted R-squared	0.089583	S.D. dependent var		608.7206
S.E. of regression	580.8156	Akaike info criterion		15.59951
Sum squared resid	19566114	Schwarz criterion		15.66932
Log likelihood	-465.9853	Hannan-Quinn criter.		15.62682
F-statistic	6.805435	Durbin-Watson stat		0.211516
Prob(F-statistic)	0.01154			

The separate tables provide information for FTSE MIB 40 (Italy) and IBEX 35 (Spain) during the selected 1<sup>st</sup> period. As we can see from the tables, both indexes have negative coefficients. For FTSE MIB 40 it is -0.444804 and IBEX 35 -0.070528, moreover both probabilities are confirmed, thus it means that indexes had the negative impact during the chosen period. According to the official World Bank research and statements, both countries

were unprepared for such massive pandemic, thus the fast spread of COVID-19 and daily increase in new confirmed cases led to lockdown all across the Italy and Spain. According to the Mara Sanfelici, even though rapid actions of government of Italy were taken, the health crisis and lack of planning and communication resulted in policy framework chaos. The first gradual lockdown in Italy was in order on 23<sup>th</sup> of February, whereas in Spain only on 29<sup>th</sup> of March after the outbreak of the official death toll in Spain which surpassed that of mainland China. (BBC, 2020)

The implications of a lockdown brought uncertainty and reduced the spending's, therefore, as it was analyzed from the previous figures, the gross domestic product (GDP) drastically shrunk in both countries. This led to lower investment in stocks, capital or any other investment forms. According the New York Times, The FTSE MIB 40 Italy's stock index fell by 11% on 9<sup>th</sup> of March when the market reopened and IBEX 35 on March 12<sup>th</sup> the index fell by 14% and it was recorded as the highest drop in history for one day. (Camarero, J. 2020)

The research and statistical analysis provide conclusion in which it is clear that the COVID-19 impact, had tremendous effects not only on the gross domestic product for Italy and Spain, but also on the stock market and specifically on the selected ones which are FTSE MIB 40 and IBEX 35.

### 3.2.2. COVID-19 impact analysis on the 2<sup>nd</sup> period (1<sup>st</sup> of June to 31<sup>st</sup> of August, 2020)

Table 6 Descriptive statistics of model variables – (period 2)

	CASESITALY	CASESSPAIN	FTSEMIB40	IBEX35
Mean	376.4697	3341.303	19764.36	7287.762
Median	280	1357.5000	19804.31	7274.150
Maximum	1460.000	23572.000	20723.42	7896.100
Minimum	-148.000	159.00000	18523.71	6877.400
Std. Dev.	314.5741	4627.111	456.8712	221.7701
Skweness	1.915795	2.341469	-0.307149	0.483784
Kurtosis	6.510566	9.225986	2.982744	3.096617
Jarque-Bera	74.26419	166.9052	1.038563	2.600190
Probability	0.000000	0.000000	0.594948	0.272506
Sum	24847.00	220526.00	1304448	480992.3
Sum Sq. Dev.	6.43E+06	1.39E+09	1.36E+07	3.20E+06
Observations	66	66	66	66



As the descriptive statistics of model variables provide in table 6, the median for the FTSE MIB 40 in the 1<sup>st</sup> period was 17198.28 and in the 2<sup>nd</sup> 19804.31, thus it is a 13.16% increase, while in comparison with Spain IBEX 35 index median, in the 1<sup>st</sup> period was 6763.05 and in the 2<sup>nd</sup> 7274.15 with only 7.03% increase. Therefore, the second period compared to the first period shows that both medians for the indexes increased, unfortunately with quite a difference between them. Secondly, analyzing the standard deviation as a statistical measurement for market volatility provides a better understanding of the financial stability of the selected indexes. As it seems from table 3 above, the standard deviation for FTSE MIB 40 index in the 1<sup>st</sup> period was 1469.4, whereas in the 2<sup>nd</sup> it was only 456.87, that means that volatility indicator decreased by more than 3 times. While the IBEX 35 standard deviation in the 1<sup>st</sup> period was 600.16 and in the end of 2<sup>nd</sup> period it decreased to 221.77, decreased by more than two times. Therefore, the high decrease of the standard deviation in the end of the second period indicate low volatility and it means that without high fluctuations the selected indexes tend to be more stable and steadier.

Table 7 Linear regression model for FTSE MIB 40 (period 2)

Dependent Variable: FTSEMIB40

Sample: 6/01/2020 8/31/2020

Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19711.07	88.36438	223.0658	0.0000
CASESITALY	0.141545	0.180679	0.783405	0.4363
R-squared	0.009498	Mean dependent var		19764.36
Adjusted R-squared	-0.005978	S.D. dependent var		456.8712
S.E. of regression	458.2348	Akaike info criterion		15.12248
Sum squared resid	13438667	Schwarz criterion		15.18883
Log likelihood	-497.0417	Hannan-Quinn criter.		15.14869
F-statistic	0.613723	Durbin-Watson stat		0.455458
Prob(F-statistic)	0.436279			

Table 8 Linear regression model for IBEX 35 (period 2)

Dependent Variable: IBEX35

Sample: 6/01/2020 8/31/2020

Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7376.974	28.25452	261.0900	0.0000
CASESSPAIN	-0.026700	0.004975	-5.366421	0.0000
R-squared	0.310333	Mean dependent var		7287.762
Adjusted R-squared	0.299557	S.D. dependent var		221.7701
S.E. of regression	185.6048	Akaike info criterion		13.31495
Sum squared resid	22047.45	Schwarz criterion		13.38130
Log likelihood	-437.3934	Hannan-Quinn criter.		13.34117
F-statistic	28.79847	Durbin-Watson stat		0.676888
Prob(F-statistic)	0.000001			

As the linear regression model for FTSE MIB 40 and IBEX 35 results display the information, FTSE MIB 40 has positive coefficient of 0.141545 and IBEX 35 has a  $-0.026700$  which is greater than in the first period. The 2<sup>nd</sup> period was during the summer season in which the recovery and preparations for predicted second wave were implied and executed. Even though the FTSE MIB 40 is insignificant and is outside of 0.05%, nevertheless we can analyze the period from research and publicly available information. During the first period Italy had in total 231869 confirmed cases while in second period numbers drastically decreased to 36217, whereas in Spain the situation was a bit different, in first period total number of confirmed cases was 239434 and in 2<sup>nd</sup> period it was 223379 according to the World Bank statistics, therefore there is only a small difference, therefore in statistical analysis table there is still a minus sign next to coefficient. In Italy in comparison between two periods the confirmed cases decreased by 84.38%, while in Spain only by 6.71%. It is important also to research the chosen indexes. The median for the FTSE MIB 40 in the 1<sup>st</sup> period was 17198.28 and in the 2<sup>nd</sup> 19804.31, thus it is a 13.16% increase, while in comparison with Spain IBEX 35 index median, in the 1<sup>st</sup> period it was 6763.05 and in the 2<sup>nd</sup> 7274.15 with only 7.03% increase.

During the summer period in Italy, the health system was rebuilt from scratches. According to the BBC news the COVID-19 testing in Italy was so successful, that from the one of the most virus effected countries Italy managed to become one of the most successful examples compared to other countries during the June, July and August period. Italy was one of the first countries that implemented the regional lockdowns around the country, with such method government desired to prevent as much as possible the losses. According to Nino Cartabellotta, President of the GIMBE health foundation the mobile hospitals had a major impact on the improvements rather than just using the hospital buildings. Moreover, according to the Mario Draghi the Prime Minister of Italy, the country's vaccine rollout strategy was very efficient and with the help of public spaces the processes went very well. On the other hand, in Spain the COVID-19 pandemic came later than in Italy, therefore such factor could be also taken in consideration while comparing with Italy. Furthermore, the installments of mobile hospitals and virus controlling strategies also took more time in the later dates in comparison with Italy.

To conclude, Italy not only reduced its COVID-19 confirmed cases according to the World Bank data, but in comparison with IBEX 35, the FTSE MIB 40 index increased almost double, whereas in second period Spanish index was able to only increase by 7.03%. The successful implementation of the governmental strategies and policies brought effective results and the statistical analysis results also contributes to the evidence.

The third period was analyzed due to the fact that in the end of summer season both The Ministry of Health in Spain and The Ministry of Health in Italy governmental entities released public statements that one way or another the second wave of COVID-19 pandemic will take place in upcoming autumn months. Therefore, the third period was chosen to analyze how indexes were affected during the beginning and middle stages of second wave when COVID-19 confirmed cases increased.

### 3.2.3. COVID-19 impact analysis on the 3<sup>rd</sup> period (1<sup>st</sup> of September to 30<sup>th</sup> of November, 2020)

Table 9 Descriptive statistics of model variables – (period 3)

	CASESITALY	CASESSPAIN	FTSEMIB40	IBEX35
Mean	14215.66	18235.83	19824.86	7107.816
Median	8803.000	14389.00	19558.69	6936.200
Maximum	40902.00	55019.00	22352.46	8190.700
Minimum	975.0000	0.000000	17872.28	6411.800
Std. Dev.	13492.86	11236.47	1117.411	506.1344
Skweness	0.502783	1.479198	0.783920	0.996061
Kurtosis	1.674539	5.347677	2.870417	2.593250
Jarque-Bera	7.496692	38.63085	6.702894	11.19625
Probability	0.023557	0.000000	0.035034	0.003705
Sum	924018.0	1185329.00	1288616	462008.1
Sum Sq. Dev.	1.17E+10	8.08E+09	7.99E+07	1.64E+07
Observations	65	65	65	65

For the third measured period the standard deviation for FTSE MIB 40 is 1117.41 and for IBEX 35 is 506.13 as presented in the table 9. Appropriately, the standard deviation numbers are lesser than in the first period. As compared with the 1<sup>st</sup> period FTSE MIB 40 volatility indicator is lower by 23.96% and for IBEX 35 also lower by 15.67%, therefore looking into the descriptive statistics of two most knowable stock indexes in Italy and Spain it is possible to assume, that during the beginning and middle stages of second wave of COVID-19 pandemic, both markets are more stable and display lower volatility compared to the first wave results. Nevertheless, in comparison with the second period both standard deviation measurements increased, and it was expected, because as mentioned in the research before it is a recovery period, thus the favorable time for financial markets to stabilize and prepare for upcoming higher increases in new COVID-19 case during the second wave of pandemic.

Table 10 Linear regression model for FTSE MIB 40 – (period 3)

Dependent Variable: FTSEMIB40

Sample: 9/01/2020 11/30/2020

Included observations: 65

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19280.82	180.6886	106.7074	0.0000
CASESITALY	0.03827	0.009253	4.136059	0.0001
R-squared	0.213552	Mean dependent var		19824.86
Adjusted R-squared	0.201068	S.D. dependent var		1117.411
S.E. of regression	998.7755	Akaike info criterion		16.68122
Sum squared resid	62845810	Schwarz criterion		16.74813
Log likelihood	-540.1398	Hannan-Quinn criter.		16.70762
F-statistic	17.10698	Durbin-Watson stat		0.137294
Prob(F-statistic)	0.000107			

Table 11 Linear regression model for IBEX 35 – (period 3)

Dependent Variable: IBEX35

Sample: 9/01/2020 11/30/2020

Included observations: 65

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7141.772	121.1955	58.9277	0.0000
CASESSPAIN	-0.001862	0.00567	-0.328395	0.7437
R-squared	0.001709	Mean dependent var		7107.816
Adjusted R-squared	-0.014137	S.D. dependent var		506.1344
S.E. of regression	509.6994	Akaike info criterion		15.33581
Sum squared resid	16366992	Schwarz criterion		15.40271
Log likelihood	-496.4137	Hannan-Quinn criter.		15.36220
F-statistic	0.107843	Durbin-Watson stat		0.061497
Prob(F-statistic)	0.743702			

In the 3<sup>rd</sup> period linear regression model tables 10 & 11, FTSE MIB 40 index has positive coefficient of 0.038270 and IBEX 35 has a negative of -0.001862. Although the negative coefficient is reducing every period, it is still negative. However, IBEX 35 index

probability is higher than 0.05% and insignificant, whereas FTSE MIB 40 has 0.0001 probability, and it is significant. It is important to compare first and third periods, to examine how well countries learned and prepared regarding the stock indexes to the increase in confirmed cases. As it was mentioned above in the first period Italy in total had 231869 while in the third period it was 924018, thus it increased by 74.91% and the change in FTSE MIB 40 index was from median of 17198.28 to 19558.69, increase of 12.07%. Therefore, during the second wave the Italy stock index was not affected so drastically as in the first period, although confirmed cases increased more than triple times. Nevertheless, FTSE MIB 40 index decreased from 19804.31 in the second period to 19558.69 in the end of third period in November by 1.24%, which in the given circumstances is a very good indicator of Italy's financial system preparations before the second COVID-19 pandemic wave. Even though Spanish stock index IBEX 35 provided insignificant results according to linear regression model, the examined numbers from World Bank provide information that from the first period of 239434 confirmed cases it raised to 1185329 in the third period. The increase was 80.05%, although it was a similar to Italy's case of 74.91%. The IBEX 35 index median for the 1<sup>st</sup> period was 6763.05 and for the 3<sup>rd</sup> period 6936.2, with increase of 2.5%.

After analyzing and comparing the selected periods with assistance of statistical analysis it is possible to draw a conclusion. First of all, during the first period of March to May FTSE MIB 40 and IBEX 35 indexes displayed a high volatility according to the descriptive statistics of model variables table 3, moreover the medians were the lowest and both indexes had negative coefficients. During the second period of June to August everything stabilized, the volatility greatly decreased, for Italy more than three times, while for Spain a bit more than two times. Therefore, the decrease in standard deviation displayed a sign of low volatility which indicates that the indexes stabilized. Increase in medians and coefficients is also a positive factor for financial recovery. Nevertheless, the linear regression model provided higher probability, thus FTSE MIB 40 for second period was insignificant, however taking in to account the public available research, index improvements and reduction in the COVID-19 cases, and it is possible to conclude that from June to August the recovery period took place.

Probably the most important in the research was to analyze how Italy and Spain regarding the financial markets were prepared for the upcoming third period from September to November, because according to available data the presumptions of upcoming second COVID-19 pandemic wave developed. As the figures 8 & 10 demonstrate the highest confirmed cases in Italy and Spain were during the second pandemic wave. Yet, the gross

domestic product growth rate greatly increases in both countries, the standard deviation numbers also raise, but not as much as in the first wave period. The preparations for the second wave are successful, because as it is provided in the models the two largest and most liquid stock indexes display better performances than before. Medians and coefficients increased for both indexes in comparison with the 1<sup>st</sup> period, even though the confirmed cases raised. The effective strategies of virus testing's, mobile hospital instalment and successful regional lockdowns positively affected Italy's and Spain's financial market, as a result the greater performance of both indexes is displayed. Although, Spain provides higher volatility and negative coefficient rates, it is important to understand that Spain was affected by COVID-19 virus later, than Italy. Thus, the presumption is that the quarantine lockdown and other strategies were enforced later on in comparison with Italy and the descriptive statistics and linear regression model results display the consequences.

Regarding the limitations of the performed research and analysis for current and future studies in this or similar field. The selected study data and information is very recent, for this reason there is not so many studies done yet regarding the researched field. Therefore, the lack of quality research provided some limitations in comparing the selected research with other studies. Another research limitation is that the COVID-19 and the indexes scenario was developed on the assumption that is affected by daily confirmed cases with the virus. In fact, there also can be other factors such as mortality rates, unemployment due to the lockdown, travel bans, and etc.

## CONCLUSIONS

1. The comprehensive review of the relevant academic literature in theoretical analysis chapter enhances the paper. The academic literature findings revealed that COVID-19 pandemic had negative effect to financial markets in most countries around the globe. Sansa N. and Hasan A. study revealed that there was a positive significant relationship between the COVID-19 and USA and China Financial Markets. Similar study was conducted by Heliodoro, P. et al., global pandemic, new confirmed cases and travel bands had a negative effect on all country members of Group of Seven (G7) and in some countries the negative impact on financial impact was only displayed during the great depression times. Frezza, M., Bianchi, S., and Pianese, A. applied the multifractional Brownian motion as a model of the price dynamics in order to estimate contraction for the global economy and in results researchers reveal a 3% contraction in 2020.

2. Along these conclusions it seems that without any exceptions well-known stock exchange indexes faced a drop in price during the period of pandemic. Nevertheless, the timespan and situation of the negative effects depends on various factors and it is individual country to country. For this reason, in academic literature analysis researchers with performed studies prove that COVID-19 pandemic had negative effects on the global economy.

3. The empirical evidence from the previous research was analyzed to find the most suitable method to investigate the COVID-19 impact on the FTSE MIB 40 and IBEX 35 stock exchange indexes. Therefore, in theoretical analysis research simple regression model was the most selected method in the research among other studies. Thus, it was applied in the current study to identify the desired results. The dependent and independent variables were determined with the assistance of previous research findings. The dependent variable was selected according to the Ashraf, B. findings and recommendations. Ashraf, B. in his research concludes that in stock market price decrease appears during the increase of new COVID-19 confirmed cases. Whereas stock market responds weaker in the confirmed COVID-19 growth numbers of mortality. Furthermore, in the findings it was mentioned that stock markets react strongly during the early days of confirmed cases and between 40 to 60 days after the date of the initially confirmed cases. FTSE MIB 40 and IBEX 35 were selected as dependent variables, because both indexes consist of the largest and most liquid companies in the Italian and Spanish national stock exchange. For this reason, selected indexes are represented as indicators in order to analyze financial market for Italy and Spain. To have more detailed results three periods are



created in order to evaluate the stock index reactions during the different phases of COVID-19 pandemic cycles.

4. The empirical assessment study examined the FTSE MIB 40 and IBEX 35 indexes affection by Italy's and Spain's new confirmed COVID-19 cases during three specific periods. The descriptive statistics supported the selection in such order: 1<sup>st</sup> period was selected as a first pandemic wave time frame, later on as the graphs 8 & 10 display lower and stable new confirmed cases rate 2<sup>nd</sup> period from June to August was selected as recovery stage and the 3<sup>rd</sup> period shows an inclination in new confirmed cases growth, accordingly to the given circumstances it was selected as a second wave stage from September to November. The separation of the periods enhanced the research with the possibility to create a comparison between them.

5. In the case of Italy study demonstrated that during the first period FTSE MIB 40 index had a high volatility (highest from all three periods) with the negative coefficient and lowest median. IBEX 35 index during the 1<sup>st</sup> period had the highest volatility, lowest median with negative coefficient.

6. As for the second period for both indexes volatility decreased more than two times and it indicates that the financial market stabilized. Italy's coefficient moved from negative to positive and median increased. In Spain IBEX 35 index was affected by more severe reaction, due to the fact that the COVID-19 virus entered the country later and the strategic plans were taken in to effect afterwards, thus the volatility reduced, but not as much as in Italy, also the coefficient remains negative in regards of how the index is affected by the new confirmed case.

7. The third period analysis displayed greater results in comparison with first period and this is important to emphasize the results, such increase proves that governmental decisions and strategies during the 2<sup>nd</sup> recovery period, had a positive effect on the financial markets and both countries were better prepared for the second COVID-19 virus wave. Nevertheless, in all three periods the impact of COVID-19 pandemic to Italy's and Spain's financial index market is evident.

Recommendations from the author:

1. The study could continue further studies to accommodate more samples and longer period and take in to account the pandemic periods in which the beginning of vaccinations started and

compare it with previous periods before the vaccinations and see how indexes react to such factor. There is possibility also to take in consideration such factors as unemployment, mortality rates, and regional lockdowns or recovery rates. From the practical perspective, the study assists with the insights of how indexes shifted during the COVID-19 pandemic and how it reacted during specific periods of time.

2. For the future researchers or professionals in this or similar field, would be availability to retrospectively examine the effects and consequences of pandemic to selected FTSE MIB 40 and IBEX 35 indexes and in years to come create algorithms for future predictions for such unforeseen and unusual disasters.

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**Akcijų Rinkos Reakcijos Skirtingais COVID-19 Pandemijos Etapais:****Italijos ir Ispanijos Atvejai****Julius KVIKLIS****Magistro baigiamasis darbas****Finansų ir bankininkystės programa**

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**SANTRAUKA**

42 puslapių, 10 figūrų, 11 lentelių, 51 šaltiniai.

Pagrindinis magistro baigiamojo darbo tikslas – ištirti, kaip COVID-19 pandemija įtakojo Ispanijos ir Italijos pagrindinius akcijų indeksus 2020 metų laikotarpiu.

Magistro baigiamasis darbas sudarytas iš penkių dalių: įžangos, teorinės analizės, tyrimo metodologijos, empirinio tyrimo rezultatų ir išvadų.

Teorinės analizės skyriuje apžvelgiama informacija susijusi su COVID-19 pandemijos įtaka pasaulinėms finansų rinkoms. Remiantis šio skyriaus tyrimų metodais ir išvadomis, emperiniam tyrimui „The Simple Regression“ modelis buvo pasirinktas. Šis modelis buvo populiariausias tarp kitų mokslinių tyrimo. Taip pat laikotarpiai yra susikirstyti į tris skirtingus periodus dėl efektyvaus palyginimo ir tikslesnės analizės.

Tyrimo rezultatai atskleidžia, kad lyginant COVID-19 poveikį „FTSE MIB 40“ ir „IBEX 35“ indeksams per pasirinktus tris periodus „Pirmos bangos periodas“, „Atsigavimo periodas“, „Antros bangos periodas“ gali teigti, kad abi šalys įdiegė tinkamas priemones valdyti pandemiją per atsigavimo periodą, bet ir tinkamai pasiruošė pandemijos antrai plytymo bangai rudenį, nes akcijų indeksų rodikliai ženkliai mažiau buvo paveikti naujai patvirtintų susirgimų nuo COVID-19 viruso atvejų.

Remiantis magistro baigiamuoju darbu, mokslo žurnalų leidėjas „MDPI – Economies“ 2021 Gruodžio 22 dieną publikavo straipsnį.

## ANNEXES

Annex 1. The 1<sup>st</sup> period from 1<sup>st</sup> of March to 31<sup>st</sup> of May, 2020 confirmed cases and index data

Location	date	new_cases	IBEX 35 close	location	date	new_cases	FTSE MIB 40 close
Spain	2020-03-02	36	8741.46	Italy	2020-03-02	342	21,655.09
Spain	2020-03-03	45	8811.65	Italy	2020-03-03	466	21,748.20
Spain	2020-03-04	57	8910.04	Italy	2020-03-04	587	21,946.03
Spain	2020-03-05	37	8682.97	Italy	2020-03-05	769	21,554.88
Spain	2020-03-06	141	8375.56	Italy	2020-03-06	778	20,799.89
Spain	2020-03-09	400	7708.70	Italy	2020-03-09	1797	18,475.91
Spain	2020-03-10	622	7461.46	Italy	2020-03-10	977	17,870.18
Spain	2020-03-11	582	7436.35	Italy	2020-03-11	2313	17,928.64
Spain	2020-03-12	0	6390.86	Italy	2020-03-12	2651	14,894.44
Spain	2020-03-13	2955	6629.59	Italy	2020-03-13	2547	15,954.29
Spain	2020-03-16	2144	6107.24	Italy	2020-03-16	3233	14,980.34
Spain	2020-03-17	1806	6498.53	Italy	2020-03-17	3526	15,314.77
Spain	2020-03-18	2162	6274.77	Italy	2020-03-18	4207	15,120.48
Spain	2020-03-19	4053	6395.83	Italy	2020-03-19	5322	15,466.97
Spain	2020-03-20	2447	6443.31	Italy	2020-03-20	5986	15,731.85
Spain	2020-03-23	6368	6230.20	Italy	2020-03-23	4789	15,559.80
Spain	2020-03-24	4749	6717.30	Italy	2020-03-24	5249	16,948.60
Spain	2020-03-25	9630	6942.40	Italy	2020-03-25	5210	17,243.68
Spain	2020-03-26	8271	7,033.24	Italy	2020-03-26	6203	17,369.38
Spain	2020-03-27	7933	6,777.90	Italy	2020-03-27	5909	16,822.59
Spain	2020-03-30	7846	6,659.90	Italy	2020-03-30	4050	16,872.41
Spain	2020-03-31	7967	6,785.40	Italy	2020-03-31	4053	17,050.94
Spain	2020-04-01	8195	6,579.40	Italy	2020-04-01	4782	16,544.97
Spain	2020-04-02	7947	6,574.10	Italy	2020-04-02	4668	16,834.03
Spain	2020-04-03	7134	6,581.60	Italy	2020-04-03	4585	16,384.35
Spain	2020-04-06	5029	6,844.34	Italy	2020-04-06	3599	17,039.31
Spain	2020-04-07	5267	7,001.99	Italy	2020-04-07	3039	17,411.72
Spain	2020-04-08	6278	6,951.79	Italy	2020-04-08	3836	17,380.82
Spain	2020-04-09	5002	7,070.60	Italy	2020-04-09	4204	17,621.62
Spain	2020-04-10			Italy	2020-04-10		
Spain	2020.04.13			Italy	2020-04-13		
Spain	2020-04-14	2442	7,108.57	Italy	2020-04-14	2972	17,558.43
Spain	2020-04-15	5103	6,839.50	Italy	2020-04-15	2667	16,719.07
Spain	2020-04-16	7304	6,763.40	Italy	2020-04-16	3786	16,768.14
Spain	2020-04-17	5891	6,875.80	Italy	2020-04-17	3493	17,055.47
Spain	2020-04-20	1536	6,831.50	Italy	2020-04-20	2256	17,064.14
Spain	2020-04-21	3968	6,634.90	Italy	2020-04-21	2729	16,450.85

Spain	2020-04-22	4211	6,719.80	Italy	2020-04-22	3370	16,765.28
Spain	2020-04-23	4635	6,746.50	Italy	2020-04-23	2646	17,011.11
Spain	2020-04-24		6,613.90	Italy	2020-04-24	3021	16,858.89
Spain	2020-04-27	1831	6,731.78	Italy	2020-04-27	1739	17,380.21
Spain	2020-04-28	1308	6,836.44	Italy	2020-04-28	2091	17,677.15
Spain	2020-04-29	2144	7,055.66	Italy	2020-04-29	2086	18,067.29
Spain	2020-04-30	518	6,922.30	Italy	2020-04-30	1872	17,690.49
Spain	2020.05.01			Italy	2020-05-01		
Spain	2020-05-04	545	6,673.30	Italy	2020-05-04	1221	17,035.61
Spain	2020-05-05	1318	6,747.70	Italy	2020-05-05	1075	17,387.38
Spain	2020-05-06	996	6,671.70	Italy	2020-05-06	1444	17,159.31
Spain	2020-05-07	1122	6,730.90	Italy	2020-05-07	1401	17,245.04
Spain	2020-05-08	1410	6,783.10	Italy	2020-05-08	1327	17,439.30
Spain	2020-05-11	3086	6,672.20	Italy	2020-05-11	744	17,381.36
Spain	2020-05-12	594	6,762.70	Italy	2020-05-12	1402	17,559.32
Spain	2020-05-13	661	6,631.40	Italy	2020-05-13	888	17,183.44
Spain	2020-05-14	849	6,545.60	Italy	2020-05-14	992	16,867.76
Spain	2020-05-15	643	6,474.90	Italy	2020-05-15	789	16,852.35
Spain	2020-05-18	908	6,779.30	Italy	2020-05-18	451	17,401.45
Spain	2020-05-19	431	6,609.10	Italy	2020-05-19	813	17,034.54
Spain	2020-05-20	518	6,683.60	Italy	2020-05-20	665	17,213.11
Spain	2020-05-21	482	6,686.10	Italy	2020-05-21	642	17,087.06
Spain	2020-05-22	1787	6,697.50	Italy	2020-05-22	652	17,316.29
Spain	2020-05-25		6,856.80	Italy	2020-05-25	300	17,595.90
Spain	2020-05-26	859	7,003.91	Italy	2020-05-26	397	17,860.46
Spain	2020-05-27	0	7,174.50	Italy	2020-05-27	584	17,910.25
Spain	2020-05-28	1647	7,224.10	Italy	2020-05-28	593	18,351.16
Spain	2020-05-29	658	7,096.50	Italy	2020-05-29	516	18,197.56

Source: based on the World Bank and Yahoo Finance data.

Annex 2. The 2<sup>nd</sup> period from 1<sup>st</sup> of June to 31<sup>st</sup> of August, 2020 confirmed cases and index data

location	date	new_cases	IBEX 35 close	location	date	new_cases	FTSE MIB 40 close
Spain	2020-06-01	159	7,221.40	Italy	2020-06-01	200	18,523.71
Spain	2020-06-02	294	7,408.13	Italy	2020-06-02	318	18,971.09
Spain	2020-06-03	394	7,626.40	Italy	2020-06-03	321	19,641.81
Spain	2020-06-04	334	7,566.80	Italy	2020-06-04	177	19,634.03
Spain	2020-06-05	318	7,872.60	Italy	2020-06-05	518	20,187.51
Spain	2020-06-08	167	7,896.10	Italy	2020-06-08	280	20,231.38
Spain	2020-06-09	249	7,752.30	Italy	2020-06-09	283	19,930.20
Spain	2020-06-10	314	7,663.90	Italy	2020-06-10	202	19,758.01
Spain	2020-06-11	427	7,278.00	Italy	2020-06-11	379	18,806.86
Spain	2020-06-12	502	7,292.70	Italy	2020-06-12	163	18,888.16
Spain	2020-06-15	181	7,259.30	Italy	2020-06-15	301	18,969.29
Spain	2020-06-16	219	7,495.30	Italy	2020-06-16	210	19,625.63
Spain	2020-06-17	355	7,478.70	Italy	2020-06-17	328	19,585.89
Spain	2020-06-18	585	7,390.20	Italy	2020-06-18	331	19,485.76
Spain	2020-06-19	307	7,414.22	Italy	2020-06-19	-148	19,618.93
Spain	2020-06-22	232	7,345.70	Italy	2020-06-22	221	19,478.73
Spain	2020-06-23	248	7,438.40	Italy	2020-06-23	113	19,841.58
Spain	2020-06-24	334	7,195.50	Italy	2020-06-24	577	19,162.98
Spain	2020-06-25	400	7,270.30	Italy	2020-06-25	296	19,234.75
Spain	2020-06-26	419	7,178.40	Italy	2020-06-26	255	19,124.36
Spain	2020-06-29	200	7,278.10	Italy	2020-06-29	126	19,447.02
Spain	2020-06-30	301	7,231.43	Italy	2020-06-30	142	19,375.52
Spain	2020-07-01	388	7,227.40	Italy	2020-07-01	182	19,330.88
Spain	2020-07-02	444	7,498.60	Italy	2020-07-02	201	19,886.88
Spain	2020-07-03	442	7,403.50	Italy	2020-07-03	223	19,726.65
Spain	2020-07-06	1244	7,556.20	Italy	2020-07-06	208	20,031.86
Spain	2020-07-07	341	7,447.40	Italy	2020-07-07	137	20,012.68
Spain	2020-07-08	383	7,326.43	Italy	2020-07-08	193	19,899.53
Spain	2020-07-09	543	7,236.90	Italy	2020-07-09	214	19,505.95
Spain	2020-07-10	852	7,321.10	Italy	2020-07-10	276	19,767.60
Spain	2020-07-13	2045	7,426.90	Italy	2020-07-13	169	20,003.25
Spain	2020-07-14	666	7,352.00	Italy	2020-07-14	114	19,879.75
Spain	2020-07-15	875	7,487.60	Italy	2020-07-15	162	20,281.38
Spain	2020-07-16	1361	7,474.70	Italy	2020-07-16	230	20,356.09
Spain	2020-07-17	1400	7,440.40	Italy	2020-07-17	231	20,419.39
Spain	2020-07-20	4581	7,478.00	Italy	2020-07-20	190	20,621.48
Spain	2020-07-21	1358	7,494.50	Italy	2020-07-21	128	20,723.42
Spain	2020-07-22	1357	7,390.10	Italy	2020-07-22	280	20,598.78
Spain	2020-07-23	2615	7,384.90	Italy	2020-07-23	306	20,454.46
Spain	2020-07-24	2255	7,294.70	Italy	2020-07-24	252	20,075.27
Spain	2020-07-27	6361	7,170.60	Italy	2020-07-27	168	20,019.96
Spain	2020-07-28	1828	7,246.40	Italy	2020-07-28	202	19,902.63
Spain	2020-07-29	2031	7,206.20	Italy	2020-07-29	288	19,880.57
Spain	2020-07-30	2789	6,996.60	Italy	2020-07-30	382	19,228.47
Spain	2020-07-31	3092	6,877.40	Italy	2020-07-31	379	19,091.93
Spain	2020-08-03	8532	6,975.00	Italy	2020-08-03	159	19,379.79

Spain	2020-08-04	5760	7,021.60	Italy	2020-08-04	190	19,613.95
Spain	2020-08-05	2953	7,039.70	Italy	2020-08-05	384	19,740.20
Spain	2020-08-06	4088	6,957.90	Italy	2020-08-06	401	19,475.15
Spain	2020-08-07	4507	6,950.50	Italy	2020-08-07	552	19,516.43
Spain	2020-08-10	8618	7,053.90	Italy	2020-08-10	259	19,651.57
Spain	2020-08-11	3632	7,263.50	Italy	2020-08-11	412	20,209.11
Spain	2020-08-12	3172	7,296.00	Italy	2020-08-12	476	20,437.36
Spain	2020-08-13	7550	7,250.50	Italy	2020-08-13	522	20,257.31
Spain	2020-08-14	5479	7,154.30	Italy	2020-08-14	574	20,028.11
Spain	2020-08-17	16269	7,090.10	Italy	2020-08-17	320	19,950.32
Spain	2020-08-18	5114	7,043.50	Italy	2020-08-18	401	19,845.61
Spain	2020-08-19	6671	7,094.30	Italy	2020-08-19	642	20,055.40
Spain	2020-08-20	7039	6,993.30	Italy	2020-08-20	840	19,766.96
Spain	2020-08-21	8148	6,982.10	Italy	2020-08-21	947	19,695.43
Spain	2020-08-24	19382	7,109.10	Italy	2020-08-24	953	20,113.36
Spain	2020-08-25	7117	7,108.40	Italy	2020-08-25	876	20,030.05
Spain	2020-08-26	7296	7,123.00	Italy	2020-08-26	1366	20,137.29
Spain	2020-08-27	9658	7,090.70	Italy	2020-08-27	1409	19,847.38
Spain	2020-08-28	9779	7,133.00	Italy	2020-08-28	1460	19,841.01
Spain	2020-08-31	23572	6,969.47	Italy	2020-08-31	996	19,633.69

Source: based on the World Bank and Yahoo Finance data.

Annex 3. The 3<sup>rd</sup> period from 1<sup>st</sup> of September to 30<sup>th</sup> of November, 2020 confirmed cases and index data

location	date	new_cases	IBEX 35 close	location	date	new_cases	FTSE MIB 40 close
Spain	2020-09-01	8115	6,956.89	Italy	2020-09-01	975	19,595.02
Spain	2020-09-02	8581	6,996.85	Italy	2020-09-02	1326	19,858.21
Spain	2020-09-03	8959	7,006.02	Italy	2020-09-03	1397	19,551.48
Spain	2020-09-04	10476	6,989.71	Italy	2020-09-04	1732	19,391.25
Spain	2020-09-07	26560	7,080.66	Italy	2020-09-07	1150	19,738.01
Spain	2020-09-08	8964	6,955.00	Italy	2020-09-08	1369	19,380.18
Spain	2020-09-09	8866	7,020.90	Italy	2020-09-09	1430	19,771.32
Spain	2020-09-10	10764	6,999.20	Italy	2020-09-10	1597	19,820.22
Spain	2020-09-11	12183	6,943.20	Italy	2020-09-11	1616	19,820.75
Spain	2020-09-14	27404	6,951.10	Italy	2020-09-14	1008	19,793.80
Spain	2020-09-15	9437	7,036.00	Italy	2020-09-15	1229	19,956.95
Spain	2020-09-16	11193	7,110.80	Italy	2020-09-16	1452	19,963.99
Spain	2020-09-17	11291	7,086.20	Italy	2020-09-17	1583	19,739.73
Spain	2020-09-18	14389	6,929.76	Italy	2020-09-18	1907	19,524.94
Spain	2020-09-21	31428	6,692.30	Italy	2020-09-21	1350	18,793.35
Spain	2020-09-22	10799	6,648.60	Italy	2020-09-22	1391	18,895.59
Spain	2020-09-23	11289	6,654.20	Italy	2020-09-23	1640	18,929.89
Spain	2020-09-24	10653	6,643.40	Italy	2020-09-24	1786	18,906.83
Spain	2020-09-25	12272	6,628.30	Italy	2020-09-25	1912	18,698.36
Spain	2020-09-28	31785	6,791.50	Italy	2020-09-28	1494	19,160.10
Spain	2020-09-29	0	6,713.60	Italy	2020-09-29	1647	19,061.18
Spain	2020-09-30	20922	6,716.60	Italy	2020-09-30	1850	19,015.27
Spain	2020-10-01	9419	6,730.70	Italy	2020-10-01	2548	19,061.50
Spain	2020-10-02	11325	6,754.50	Italy	2020-10-02	2499	19,064.31
Spain	2020-10-05	23480	6,837.90	Italy	2020-10-05	2257	19,265.51
Spain	2020-10-06	11998	6,936.20	Italy	2020-10-06	2677	19,429.81
Spain	2020-10-07	10491	6,910.10	Italy	2020-10-07	3677	19,435.08
Spain	2020-10-08	12423	6,992.80	Italy	2020-10-08	4458	19,582.43
Spain	2020-10-09	12788	6,950.90	Italy	2020-10-09	5372	19,595.38
Spain	2020-10-12	27856	6,951.00	Italy	2020-10-12	4619	19,718.77
Spain	2020-10-13	7118	6,875.20	Italy	2020-10-13	5898	19,558.69
Spain	2020-10-14	11970	6,916.60	Italy	2020-10-14	7332	19,607.73
Spain	2020-10-15	13318	6,816.80	Italy	2020-10-15	8803	19,065.44
Spain	2020-10-16	15186	6,849.67	Italy	2020-10-16	10009	19,389.68
Spain	2020-10-19	37889	6,860.20	Italy	2020-10-19	9337	19,374.21
Spain	2020-10-20	13873	6,927.30	Italy	2020-10-20	10871	19,482.13
Spain	2020-10-21	16973	6,811.49	Italy	2020-10-21	15199	19,085.95
Spain	2020-10-22	20986	6,796.60	Italy	2020-10-22	16078	19,076.95
Spain	2020-10-23	19851	6,893.40	Italy	2020-10-23	19143	19,285.41

Spain	2020-10-26	52188	6,796.90	Italy	2020-10-26	17007	18,945.14
Spain	2020-10-27	18418	6,651.30	Italy	2020-10-27	21989	18,654.95
Spain	2020-10-28	19765	6,474.40	Italy	2020-10-28	24988	17,897.79
Spain	2020-10-29	23580	6,411.80	Italy	2020-10-29	26829	17,872.28
Spain	2020-10-30	25595	6,452.20	Italy	2020-10-30	31079	17,943.11
Spain	2020-11-02	55019	6,585.60	Italy	2020-11-02	22253	18,400.03
Spain	2020-11-03	18669	6,751.60	Italy	2020-11-03	28241	18,986.24
Spain	2020-11-04	25042	6,781.90	Italy	2020-11-04	30548	19,358.28
Spain	2020-11-05	21908	6,924.20	Italy	2020-11-05	34502	19,731.38
Spain	2020-11-06	22516	6,870.40	Italy	2020-11-06	37802	19,681.68
Spain	2020-11-09	52386	7,459.40	Italy	2020-11-09	25269	20,750.18
Spain	2020-11-10	0	7,711.40	Italy	2020-11-10	35090	20,851.58
Spain	2020-11-11	36491	7,793.70	Italy	2020-11-11	32961	20,993.02
Spain	2020-11-12	19511	7,726.00	Italy	2020-11-12	37977	20,817.73
Spain	2020-11-13	21371	7,783.70	Italy	2020-11-13	40902	20,903.58
Spain	2020-11-16	38273	7,986.16	Italy	2020-11-16	27352	21,317.01
Spain	2020-11-17	13159	7,934.30	Italy	2020-11-17	32191	21,435.11
Spain	2020-11-18	15318	7,981.50	Italy	2020-11-18	34280	21,622.66
Spain	2020-11-19	16233	7,930.20	Italy	2020-11-19	36176	21,536.24
Spain	2020-11-20	15156	7,977.90	Italy	2020-11-20	37239	21,706.96
Spain	2020-11-23	25886	7,981.20	Italy	2020-11-23	22927	21,701.79
Spain	2020-11-24	12228	8,143.20	Italy	2020-11-24	23227	22,145.06
Spain	2020-11-25	10222	8,164.70	Italy	2020-11-25	25852	22,303.58
Spain	2020-11-26	12289	8,104.60	Italy	2020-11-26	29001	22,201.44
Spain	2020-11-27	10853	8,190.70	Italy	2020-11-27	28342	22,352.46
Spain	2020-11-30	19979	8,076.95	Italy	2020-11-30	16376	22,060.98

Source: based on the World Bank and Yahoo Finance data.