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A Comparison of Stock Market Performance of Large-Scale corporations in the wake of Covid-19

A Study of Russian Stock Market

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Description

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Abstract

Oil production takes a significant share of Russian GDP, hence, may represent the oil production dependency to its economy and stock market. For the past decade, Russian oil production volumes were growing. However, the literature was lacking the solid justification of Russian oil production dependency and its aftermaths to Russian stock market. During the first quarter of 2020 rapid coronavirus pandemic development simultaneously developed with the oil price war between two significant suppliers on international oil market, Russia, and Saudi Arabia. The following events could exacerbate the development of Russian stock market. This thesis is aimed to elaborate the relative influence of several stock performance approximates, including oil and Covid-19, and compare their impact to the one during pre-Covid-19 period.

For the current research was gathered the stock market data of 6 Russian large-scale corporations during the pre-Covid-19 period (2018-2019) and during ongoing Covid-19 crisis period (2020-2021). Each corporation represents the leading entity in their operating sector. For each stock were calculated five stock performance indicators such as Return, Risk, Beta, Expected Return and Cumulative Abnormal Return. In the current study, these stock performance indicators are utilized as dependent variables. For the sample of independent variables were chosen oil international market prices, Covid-19 derived proxies, Russian Ruble-USD exchange rate price and Moscow Stock Exchange index (MOEX) price. The research is implemented by utilizing Multivariate Linear Regression as initial analytical model. In addition, the study applies Principal Component Analysis for the Robustness Check purposes. The study found that Covid-19 both favorably and unfavorably affects stock performance of Russian large-scale corporations. Oil market prices support and diminish stock performance during both pre-Covid-19 and ongoing Covid-19 periods. Similarly, the Moscow Stock Exchange also favorably and unfavorably determines stock performance during pre-Covid-19 period. However, during the ongoing pandemic period dependent variables are affected only favorably by Moscow Stock Exchange index. The Ruble-USD exchange rate appreciation also does both supportively and adversely determines stock performance during pre-Covid-19 period. During ongoing pandemic period, the exchange rate lost its power to impact the dependent variables. Oil market prices more extensively impacted dependent variables in comparison to Covid-19 approximates. The study becomes the pioneer to recognize Covid-19 supportive effect on stock market performance.

Keywords/tags (subjects)

Russian stock market, Covid-19, oil prices, Ruble-USD exchange rate, Multivariate Linear Regression, Principal Component Analysis

Miscellaneous (Confidential information)

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1 Introduction

This chapter presents the description of the research trajectory and the motivation for conducting this study. In addition, this chapter includes the research objectives, which the author is aimed to achieve and the research structure.

1.1 Research motivation

In 2020, the world has experienced the noticeable disruptions in common life, including stuck trade chains, falling employment rates and significant issues in other spheres because of the rapid pandemic development. The coronavirus inflamed in the late 2019 in China and kept spreading not only within Chinese region but also extended to the entire world (Wu et al., 2020). During the mid-February 2020 the official media briefing by World Health Organization (hereafter denoted as WHO) was held where the name of the rapidly developing pandemic was stated – Covid-19 (World Health Organization, 2020a). Moreover, the Director of WHO mentioned, that during mid-February 2020 the virus has already expanded to twenty-four countries. The virus spread did not stop, and one month later another WHO briefing was held, on which Covid-19 was officially declared as a pandemic (World Health Organization, 2020b). By that moment of time, the virus was detected in 114 countries.

With the rising daily cases of the pandemic, the Governments of world countries were forced to take the safety measures towards slowing down the rapid growth of the virus. Russia was not an exception. Due to the several lockdown periods, Russia could notice the vulnerability of the employment (Kartseva & Kuznetsova, 2020; Simola, 2020; World Bank, 2020a). Moreover, the overall fear of the pandemic in Russia was growing exponentially. The official statistics data about the coronavirus cases and death was lower than the one presented by the empirical evidence of citizens (Kallio, 2021). This phenomenon boosted the mass fear among the citizens. Also, the empirical evidence drew an attention to the decrease of the real incomes of the average Russian citizen. Also, the above-mentioned study noted, that the dropped real incomes were followed by the increased inflation and vulnerabilities in Russian Ruble-US Dollar exchange rate (hereafter denoted as Ruble). Based on that, the investor sentiment on Russian stock market could have been worsened because of the pandemic fear and its overall implications to the Russian economy.

The overall presence of COVID-19 is relatively new to the world of finance research because it started approximately three years ago. Majorly, the studies are done based on the short-term analysis of pandemic impact on the economies and stock markets with the consideration of only the first several months of the virus development. However, the author proposes the importance of considering the long-term perspective, since it may provide the opportunity to compare the well-balanced time periods with higher number of observations. Moreover, the revied by the author literature was lacking for the evidence about the COVID-19 influence on the Russian stock market.

In addition to the COVID-19 impact, there is a chance that Russia was quite vulnerable to the oil shocks which took place during March 2020, because previous studies revealed that Russia has the dependency on the oil prices regarding its influence on GDP and national currency (Nyangarika et al., 2019; Rautava, 2004). For a long period, Russia maintains its leading position on the international energy market with one of the largest oil and natural gas resources in the world (BP, 2021; International Energy Organization, 2022). Statistical databases provide the empirical evidence of the significant share of oil production in the Russian GDP (Statista, 2021b). In turn, this oil production dependency may represent the long-term vulnerability to the Russian economy in case of the disturbances on the international energy market. The Russian national currency can be also dependent on the international prices of oil because oil barrels on markets are mostly traded in USD currency. Although some research papers presented the empirical evidence about Russian dependency on the oil production, some research results were controversial, and they are dated with the previous decade (Bhar & Nikolova, 2010).

The study is aimed to research if such large determinants as coronavirus and oil prices could provoke the combined worsening effect on the development of Russian stock market. In addition, this research defines the virus widespread not only as the time period but also as the determinant, measured by different proxies. This thesis also elaborates other determinants-proxies, which could impact stock performance of chosen for the sample stocks during pandemic period. Besides, for the comparison aims, this thesis strives to analyze the pre-Covid-19 period to examine the relative power of chosen proxies. The study addresses the controversial topic of Russian vulnerability of its

stock market against oil market prices with the detailed market study in the wake of Covid-19 crisis period. Results of this study might be used in the risk management purposes during the investment process in Russian stock market.

1.2 Research objectives

The author has set the three major research objectives for this study:

1. to trail the affection patterns of international oil financial instruments and other determinants on stocks of Russian country-scale companies,

2. to analyze the affection patterns of Ruble-USD exchange rate and international oil financial instruments on stocks of Russian country-scale companies of pre-pandemic and ongoing pandemic samples,

3. to study the affection pattern of Covid-19 on stocks of Russian country-scale companies.

1.3 Research structure

The first chapter presents the introductory information of the research, including the motivation to conduct this research, background information about the topic, the possible application of the research results, the objectives of the study and the structure of the conducted thesis. The second chapter represents the literature review, which discusses the oil- and stock-market-related studies, the topic of Russian oil production dependency, and the Covid-19 aftermaths on the world economies and their stock markets. Especially, the author elaborates the topic of oil price formation both before and during the Covid-19 pandemic. The latter also includes the literature review related to the event which majorly impacted the oil price formation in 2020. In addition, the literature review covers the description of Expected Return phenomena, which is used in the study as the stock performance indicator. The third chapter includes the information about dependent and independent variables, the time span, which is covered in the research, the data collection process, the sources of data and the analysis methods used for this study. This thesis uses two analysis techniques, the first is Multivariate Linear Regression Model, and the second one is Principal Component Analysis. The fourth chapter observes the results of the performed analysis techniques. The “Results” chapter is followed by the “Discussion, conclusions and limitations” chapter, which elaborates in detail the derived outcomes of the study and concludes the research.

2 Literature review

In this chapter, the research studies the earlier published literature which is relevant to the thesis conducted by the author. It is worth mentioning, that the literature review aims to study the impact of oil on different economies, Russian dependency on oil production and stock market disruptions which were caused by the COVID-19 pandemic.

The initial purpose of conducting literature review for the academic research is to show the author's competence in the particular subject area and to provide a helpful advice about possible methodologies to use and study suggestions for the conducted research (Randolph, 2009). Besides, the mentioned above study summarizes that literature review helps to keep in line with the previously studied conclusions and correlations, which in turn, simplifies the comparison process of the given results with the one which are already available.

2.1 Russian economy glimpse in the wake of pandemic

In this sub-chapter, the study introduces the pandemic aftermath on the Russian economy during the wake of the COVID-19. Due to the global rapid pandemic development of the COVID-19 the substantial number of world economies has faced the threat of rapidly developing and disrupting financial stability virus (Jones et al., 2021). Russia was among this list, economy was not able to adjust its everyday normal performance to the remote one because of the frequent lockdowns (Simola, 2020). The compelled lockdowns leaded the Russian economy to GDP decrease. The transfer of general economy activity was not enough smoothly sustaining the same level of performance. PSBank (2020) reported that the majority of small- and medium enterprises in Russia were not able to adapt their everyday operations to the online format. Moreover, PSBank noted that some SMEs were suffering from insufficient demand on their services which became the reason to shorten their workforce. As it was stated by the World Bank (2020a), the Russian unemployment rate and total amount of officially unemployed people in May 2020 has increased 1,6% and 176% respectively comparing to the same month statistics in 2019. Moreover, the 44th issue of the World Bank (2020b) about Russian economy development reported 8% decrease in the GDP in the second quartile of 2020 on year-on-year basis.

The lockdown period existence on the time span 30th March – 11th May 2020 in Russia has been already mentioned. During this period people tended to come outside their homes with the exceptional need, for example, to purchase necessity products, medicine, and facemasks. There could be noticed lesser amount of people outside comparing to the non-COVID times. It is probable that cars have been used less frequently, because the need in cars usage has decreased significantly. The International Energy Agency (2020a) forecasted the decline in the Russian gasoline demand in March by 10%, in April by 40% and in May by 40% in 2020. The forecasted fuel consumption decrease is not the only one factor to support the lower demand on oil products. According to the International Energy Agency (2020b), the oil demand (in million barrels per day) in Russia in the second quartile 2020 (3,09 mb/d) has decreased by 11,7% compared to the second quartile in 2019 (3,50 mb/d). In addition, the Russian oil demand has decreased by 12,46% in the second quartile of 2020 (3,09 mb/d) compared to the first one. Since Russian market possesses the significant oil demand and dependency on oil production revenues, such huge decline in the oil demand could be one of the factors boosting the Russian GDP negative growth.

2.2 Oil price formation before the COVID-19 era

So far, this study has focused on the issue of oil and COVID-19 impact on the Russian stock performance. However, it is important to study the previous oil price formation factors, because in 2020 happened several events which could impact the commodity price fluctuations. Some of the oil price formation factors may translate the impact on the economy performance through the oil price fluctuations. Later this research investigates the significance of oil prices to Russian economy.

To start, there are many oil price determinants which may significantly impact the oil price formation. One of such determinants might be the operating decisions to widen or shorten the supply of oil on international arena by Organization of Petroleum Exporting Countries (hereafter denoted as OPEC) and other key market suppliers, such as Russia, China or USA. The research by Roumasset et al. (1983) proposed that operating decision about oil production by OPEC could be a reason of emerging of their power to regulate the international oil supply market. In addition, Hamilton (2011) observed the Arab embargo of 1973 which concerned the oil supplies. Other researchers proposed that this event became of the reasons of the growing trend of the oil market prices and depression of the US demand during several years following 1973 (Jang & Beruvides,

2020). The cuts in the OPEC supply were followed by the gasoline shortage in US region (Hamilton, 2011). Later, the oil price was also two times increased by the Persian Gulf counties, which worsened the stagflation phenomenon. Hamilton (2011) stated that oil production of other countries could offset only the minor part of the decreased by OPEC. Roumasset et al. (1983) also discussed the growing tendency of the oil prices for 1974 and 1979 years as the outcome in the supply change. Moreover, Roumasset et al. analyzed oil market prices after Arab embargo event and suggested that monopolization aspect of OPEC oil supply was one of the reasons of oil relative overpricing tendency. Together these studies indicate the significant importance of the OPEC decisions on the global market. These days, OPEC holds the significant share of global oil supply which reaches approximately 40% (Statista, 2021c). The large share of oil supplies on international market is one of the reasons why operating decisions of OPEC are quite influential on oil market prices (Chai et al., 2011).

Some studies showed the significant interaction between oil price and production. The comprehensive data analysis by Jang & Beruvides (2020) provided the evidence about interconnection between Brent oil market price and production in various countries (including members of OPEC, Russia, China, US, and Canada). Although the oil demand influence was not proved by the abovementioned study, the negative interconnection between oil production of Kuwait, China and Iran with the Brent oil market price was found. Also, the mentioned above research found the positive significant relationship between changes of oil production in Russia, Saudi Arabia and Iraq and oil prices. Besides, Liu et al. (2016) contribute to the discussion with the suggestion about the oil production effect on the down sloping West Texas Intermediate (hereafter denoted as WTI) oil market prices. It was pointed out by the researchers that the paired effects of decreasing demand of China and growing supplies by significant oil producers Russia and Saudi Arabia supported the decreasing trajectory of West Texas Intermediate price (p. 372)

At the same time, some researchers suspected that the demand factors may play the role as well, especially regarding the demand from China and US on oil (Liu et al., 2016). In comparison to multiple regions, Asian region holds the significant share of world oil demand (Statista, 2021a). Hamilton (2011, p. 18) stated that in the beginning of “a new industrial age” (1997-2010) multiple events have happened, which impacted the oil price formation. Firstly, the Asian fiscal crisis is worth mentioning. Hamilton suspected that the oil lowest price level since 1972 took place in

1998. This phenomenon happened after the financial disturbances in East Asian countries. Secondly, Hamilton noticed that oil prices followed the revival almost simultaneously with the recovery of Asian crisis in 1999. In other words, the economy of Asian region developing, and down sloping trends have happened concurrently with the oil price fluctuations. This evidence brings into the discussion the assumption about the significant position of Asian region demand in the oil price formation. Also, Hamilton (2011) observed the worldwide growth trajectory of oil demand by 3% (2004-2005) with an increase in Chinese oil consumption by 840 000 barrels a day on the time span 2005-2007. It is worth pointing out, that in oil production by Saudi Arabia significantly shrank in 2007 in comparison to 2005. Hamilton (2009, 2011) concluded that the large growing tendency of oil market prices was irreversible, considering quite low elasticity on the oil demand on the long-term perspective.

In addition to supply-demand mechanism, the current study also aims to consider USD exchange rate as the determinant of global oil prices. Although USD Index tends to be shortly introduced among the factors influencing oil prices, the short glance on this variable is crucial because USD currency is still being the one of the key determinants impacting the oil market (Chai et al., 2011). Moreover, as it was earlier mentioned in this research, oil barrels are denominated in USD currency on international markets, hence, these financial instruments may possess the interconnection between each other. In the research of Chai et al. (2011) it was found that the USD index is positively interconnected with oil prices. In the same vein, another study found, that USD index was the major impact factor influencing the oil market prices among other variables (Jang & Beruvides, 2020). The researchers provided the evidence about the negative influence of the USD index on the Brent. More precisely, there was detected 3,68% decline tendency in the Brent oil market prices after the 1% change in USD index.

2.3 Russian oil dependency before COVID-19

Earlier this research mentioned that fluctuations of oil prices on international markets may impact economy performance of Russia. That is why the literature review includes the observation of previously studied oil prices impact on stability of Russian economy. Although this topic is still lacking for the broad literature, some studies are worth mentioning.

Russian Federation holds 6,2% of the worldwide proved oil reserves and it is being the third hugest oil suppliers on the international oil market (BP, 2021; International Energy Organization, 2022). In addition, Statista (2021b) reported the data about oil production share in Russian GDP (2010-2019). Based on that data the average of 8,67% is set, which means that oil production holds the significant share in the Russian GDP. Considering the lacking investment flow into the new oil fields exploration and prominent level of oil production, Russia raised its positioning in the world oil production ranking up to the eighth place in 2007 (Bhar & Nikolova, 2010; Eder et al., 2017). Comparing to 2007, Russian oil production is following the growing trend.

The strength of national currency is dependent on major list of determinants, including the exchange rate with an international one. At the same time, most oil financial instruments which are traded on international markets are denominated in USD currency. Consequently, the appreciation and depreciation of Ruble against USD might be caused by the international oil market prices. Nyangarika et al. (2019) proposed Russian dependency on oil prices. Moreover, the mentioned research found that Ruble is positively interconnected with oil prices. The key finding of the above study is that any 1% increase in oil prices relate to the 1,66% strengthening trend of the Ruble. Moreover, Nyangarika et al. pointed out that the more is growing the oil market price, the lower is becoming the USD exchange rate against the Russian national currency.

In this sub-chapter was mentioned that Russia is the major player on international oil supply market and Russian oil production holds a noticeable share of Russian GDP. That is why its economy may possess certain dependency of the GDP on the oil prices. Earlier, Rautava J. (2004) conducted the study and suspected the positive influence of oil price changes on Russian GDP. According to the mentioned above research, on the long-term perspective the 10% oil price growing (down sloping) tendency is interconnected with the 2,2% increase (decrease) in the numbers of Russian GDP. Moreover, study presented the positive relationship between the oil market prices and Russian real Governmental revenues.

2.4 Oil prices in the wake of Covid-19 (2020)

This sub-chapter studies the phenomena of oil prices in the wake of Covid-19. There is a chance that during this year the oil prices have been impacted because of the significant determinants such as Covid-19 and disturbances on oil market which were caused by the conflict of interest between Russia and Saudi Arabia. These phenomimes could also reflect on the Russian stock market performance. Moreover, this sub-chapter holds an importance for the current research because the key study period of the stock performance analysis starts in 2020.

To begin with, Gharib et al. (2021) conducted the research which aimed to detect whether oil price bubbles took place in 2020. Researchers in the mentioned above study suspected an oil price bubble on the time span March-April 2020, which occurred with the price booming behavior. As oil price variables were chosen WTI and Brent oil market prices. Gharib et al. also mentioned that such occurrence of the oil price bubbles could be explained with the decreasing industrial activity, which was the cause of the shrinkage of demand on oil. Moreover, the negative price bubbles have been detected with 85% drop in oil prices on the time span January-April 2020. Previously, Fantazzini (2016) analyzed WTI and Brent oil financial instruments and concluded that the negative bubble leaded to the downturns in oil market prices.

The research also aims to consider two major factors which took place in 2020. They could determine international oil market. On the one hand, this determinant could be COVID-19. The study by Ali et al. (2020) analyzed the coronavirus impact on West Texas Intermediate oil financial instrument. The data time span for this research was chosen to be starting from the 1st of January to 20th March 2020. The researchers in the mentioned above study pointed out that WTI oil has undergone the largest instability among other studied instruments, but the cause factors of such huge volatility have not been studied except COVID-19 deaths. The Bivariate Regression table from the same research showed that WTI return, and volatility were insignificantly determined by coronavirus deaths. However, study by Hammoudeh et al. (2022) found the interconnection between surges of pandemic shocks and decreased oil price returns. The study was performed with MF-VAR model covering the 20-year time span (2000-2020) including WTI and Brent oil futures analysis. As the pandemic proxies were chosen COVID-19 and Ebola components of the World Pandemic Uncertainty Index. Narayan (2022) also contributed to the discussion about the huge oil price volatility during the first two quarters of 2020. Researcher has found that Covid-19 contributed to the oil

market inefficiency. The study by Narayan also brought the evidence, that the virus widespread was the influence factor of at least 8%-increased oil price clustering on the time span January-June 2020. In addition, study suspected that virus had a chance to continuously worsen the price clustering on the oil market on the maximum level of 30%. Earlier, Narayan (2020) found that Covid-19 pandemic predicts oil prices.

On the other hand, the major factor to impact the oil prices in 2020 could be the conflict of interest between Russia and Saudi Arabia. Ma et al. (2021) conducted a study and brought several evidence, one of them was about the impact of first negative news about the oil price war start. The researchers noted that the outbreak of the conflict, which was caused by rejected Saudi Arabian proposal to decrease the oil production, exacerbated the pessimistic investor sentiment. The utilized models presented the statistically significant evidence that negative news about the conflict negatively impacted shortly traded oil futures. The results showed the significant decrease in performance of shortly traded futures. Moreover, the same study found that the large negative returns were experienced until the 15th day when the market was active after Saudi Arabian announcement to increase an oil production. The negative news have made the lesser footprint on "third-, sixth-deferred" futures than on the "nearby" futures, because the average returns were declining in the lesser degree (p. 8). Regarding the spot market performance, study reported that CAARs have decreased more extensively than oil futures. Another interesting evidence from the mentioned above study was that both futures and spot Abnormal returns of WTI and Brent have experienced continuous declines starting from the date of Russian refusal and ending with the 15th open market day after Saudi Arabian announcement.

2.5 Stock performance approximates

So far, the study reviewed the list of possible impact factors on the oil price formation and other disturbances of 2020 which could reflect on the Russian economy and stock market performance. This sub-chapter presents the literature review of the impact of various stock performance indicators on the various geographical stock markets, including the Russian one. The following review is important for the current study utilizes similar determinants. Among such are COVID-19, oil prices, national currency exchange rate and stock index influence.

2.5.1 Oil prices

Along with Russian oil production dependency on its economy, Russian stock market might be also dependent on this energy source. On the Russian stock exchange are listed such giants of the Russia energy producers as Rosneft (ROSN), Gazprom (GAZP), Tatneft (TATN), Surgutneftegas (SNGS) and others.

In 2010, Fedorova and Pankratov conducted their research in which they reported that oil was the most powerful independent variable to provide significant impact on performance of Russian market. More specifically, Russian stock market was positively determined by the oil price factor. The researchers used EGARCH model and considered the complete equation model of influence factors on the Russian stock market. Among other studied impact factors were included the USD-Ruble exchange rate, Net Capital Movement (in Russia), GDP of the case country, the EUR-USD ratio and price of the Russian stock market index. The gradation of the impact factors on the Russian stock market from the strongest to weakest is represented below on the Table 1.

Table 1 Determinants of Russian stock market

Rank of impact (from strongest to weakest)	**Determinant**
1	Brent market price
2	USD-Ruble price
3	Euro-USD price
4	Net Capital movement coming into the Russian Federation
5	Russian GDP

One more research with EGARCH model analysis of Russian equity market and oil price nexus brought several evidences (Bhar & Nikolova, 2010). In particular, the mentioned above study stated that Russian stock market was positively affected by West Texas Intermediate oil

instrument. Moreover, there was brought the evidence about positive influence of “oil price past innovations” on market prices (p. 181). Bhar and Nikolova explained this phenomenon with the fact of large share of oil production corporations on Russian stock market and Russian historical dominance on international oil market. Another researcher stated that with the control of other variables, oil price growth trajectory was the cause of expected return growth of Russian stock market (Balashova, 2018). In addition, Mikhaylov (2018) studied the reaction of the Russian index caused by the Brent oil price variations. He suggested that investors are quite reactive on the growing tendency of Brent oil market price. Similarly, earlier it was suggested that investors should consider the large amount of Russian oil sector vulnerabilities (Bhar & Nikolova, 2010). The observed studies constitute the evidence of significant impact of oil prices during the pre-pandemic period.

In 2022 was posted the comprehensive study regarding the analysis of oil-stock market nexus of Russian, Canadian, USA, Chinese and Venezuela markets (Ali et al., 2022). The mentioned above study included analyzed the pre-pandemic and during-pandemic periods. Their study was performed by utilizing wavelet-based analysis method and Granger Causality test. For the Russian market representative researchers took the RTS index, for the oil price movements – the WTI and Brent oil futures. Ali et al. found that oil futures price positively affected Russian stock index returns during the pre-pandemic period. In the same vein, authors highlighted the evidence of oil futures price positive impact on Russian stock market returns during the pandemic period. More precisely, it was detected on the time span January 2019 - March 2020 and proved with the Granger Causality test. Moreover, Ali et al. have summarized that strong positive nexus between oil prices and stock performance existed on the time span March-May 2020. Hence, the downturns of stock market returns were interconnected with the drops in oil prices. The wavelet analysis of Covid-19 period oil-stock nexus (on the time span March 2020-March 2021) presented the positive interconnection between oil prices and Russian stock index returns.

2.5.2 Exchange rate

As it was mentioned in the previous sub-chapters, the oil market price and the USD exchange rates might be interconnected between each other, because mostly oil futures are traded on the inter-

national markets in the USD currency. In addition, Russian economy have certain factors of dependency on the oil production. That is why, there might emerge the risk that USD-RUB exchange rate influenced the Russian stock market.

Fedorova and Pankratov (2010) found that USD-Ruble exchange rate provided the second largest impact on the Russian stock market. The above-mentioned study reported that Russian stock market was negatively affected by USD-Ruble exchange rate, meaning that with the increased value of the USD, the Russian stock index return followed the decreasing trajectory. It also can be interpreted as positive relationship between Ruble appreciation and Russian stock index performance. Likewise, Balashova (2018) pointed out that Russian stock market index was also positively affected by the appreciation of Ruble against USD (with the control of other variables). Moreover, Mikhaylov (2018) suggested that investors take into account the possible exchange rate exposure which may lead to the partial or complete loss of their profits.

2.5.3 Stock index

Sharpe in his diagonal model proposed, that the performance of the security has the interconnection with the specific parameters and the value of “some index” which was defined as “the stock market as a whole” or “the Gross National Product” (Sharpe, 1963, p. 281).

Based on Sharpe and Lintner works have been developed the model of the asset valuation which is known as CAPM (Fama & French, 2004). According to the interpretation by Fama and French of CAPM model studies, the expected return on the particular asset is also dependent on the risk premium which is multiplied by the market beta. At the same time, authors stated that the market beta of the particular asset is “the covariance of its return with the market return divided by the variance of the market return” (p. 28). This means that the expected return of the chosen asset is dependent on its return interconnection with the market one. Consequently, it is summarized that the beta factor, or in other words market index, influences the expected returns of the security. Similarly, Sharpe (1964) noted, that the primary risk which takes its origin from the instability in the economy is going to remain all the time. Taken together, these theoretical studies support the notion of index impact on the stock performance, but it is also worth to consider the empirical evidence.

In addition to the theoretical evidence, the study reviews the empirical evidence examples of the beta impact on the stock performance. The researchers Teplova and Shutova (2011) performed the analysis of CAPM models including different beta coefficients based on the Russian stock market. They used the observations of stocks listed on MICEX Moscow stock exchange during two periods: the economically normal period on the time span of 2004 to 2007 and the economically crisis period of the time span from 2008 to 2009. It was concluded that the CAPM model presented relatively low R squared statistics in the regression between beta and performance-related dependent variable on both periods, which means that beta factor could relatively explain the response variable. The second model which was used in this research provided larger R squared statistic for the regressions of pre-crisis data, but the explanatory power of the model for the crisis period did not grow. At the same time, authors mentioned that among both the traditional and extended CAPM models, none of them was statistically significant for the crisis period.

Other studies were conducted based on the analysis of other geographical stock markets. Astuty (2017) studied several factors which made an impact on equity prices. For this research were chosen the companies which are listed on LQ45 stock index, which represents the Indonesian stock index of the most forty-five liquid equities. Astuty reported the significant adverse relationship between the beta factor and the equity price. The systematic risk was explained as the whole market uncertainty translated to the firm performance. In addition, one more research elaborated the agricultural sector of Indonesian stock market (Hutauruk et al., 2014). Similarly, beta was found to be negatively associated with returns on Indonesian stock market. However, the study of German stock market brought the evidence of the direct association between beta and return (Elsas et al., 2003). In addition, the research by Tang and Shum (2003) found both direct and indirect relationship between beta and stock returns based on the analysis of multiple international markets.

By summarizing the results of the mentioned above studies, this sub-chapter reviewed the evidence that the higher covariance of the equity price with the market index price was associated with both growing and declining equity performance. The reviewed literature provides the contradictory evidence, of both favorable and unfavorable impact of market on the stock performance.

2.5.4 COVID-19

It is also important to bring into the discussion the evidence of the coronavirus impact on the stock markets. Thus far, the virus widespread has been found to be the considerable determinant for the stock returns (Liu et al., 2021; Naidu & Ranjeeni, 2021; Rao et al., 2021).

The first evidence is delivered from the Australian stock market. Naidu and Ranjeeni (2021) suggested that overall stock returns in Australia have experienced the negative impact because of the Covid-19 cases growth. It was pointed out that the stocks of the various sectors have been impacted differently by the new pandemic. The returns have been changing both at the date of the Covid-19 new confirmed cases and time after the new pandemic cases growth tendency. Although the effect was different, Naidu and Ranjeeni concluded that stock returns on the Australian market were negatively affected by the pandemic-related fear. For example, healthcare, industrial, real estate, and non-essential goods sectors have experienced the instability in the stock returns on the time span from 1 to 10 days after the confirmed cases growth trajectory. Moreover, the researchers found that stocks of the essential goods sector have been influenced mostly on the -1 to +1 and 0-to-+1-time spans after the event day. Likewise, Naidu and Ranjeeni brought the evidence that the stocks of the financial sector corporations have been influenced the same day of the cases growth confirmation. In addition, authors of the above-mentioned study suggested that energy sector stocks have experienced significantly negative effects resulting in 9% decline in the stock returns on the tenth trading day after the Covid-19 cases growth day. The impact on stocks of corporations of different sizes is worth mentioning as well. Naidu and Ranjeeni reported that the stock returns of small- and medium-sized companies have been influenced on the time span from 1 to 10 days after the event day, but the stock of large-scale corporations experienced the shorter period – from 1 to 5 trading days. Small-sized firms have experienced more apparent aftermaths rather than larger-sized firms.

Other studies about the evidence about Covid-19 affection pattern on Chinese stock market. Liu et al. (2021) proposed that Coronavirus pandemic was one of the cause factors of declining trajectory of stock returns. Moreover, they mentioned that Covid-19 exacerbated the risks for the strong market crashes and drops of stock returns. The data in the research from Liu et al. covers several first months of Covid-19 until March 31 of 2020. It was concluded that the pandemic caused fear possesses a potential to boost the risk of the stock market crashes, even considering the fact of

insignificant amounts of the confirmed cases. In the same vein, Al-Awadhi et al. (2020) concluded that Covid-19 disturbed the stability and performance of Chinese stock market. They elaborated the time span starting from mid-January and ending mid-March in 2020. Concisely, it was concluded that Covid-19 growing new disease cases and deaths have unfavorably impacted the stock returns. The researchers from the mentioned above study took into the consideration both types of stocks which are traded in China: the one which are traded primarily by Chinese inhabitants in the national currency and the other which are traded in USD including foreign investors. It was reported that the USD traded stocks have experienced the worse stock returns comparing to the national traded stocks. Another evidence brought by the mentioned above research was the fact that large market capitalization stocks have experienced the worse stock returns comparing to the one with the smaller market cap.

Also, Rao et al. (2021) conducted the research of short-term stock returns during the lockdown in India. More precisely, the researchers chose the time period March-November 2020. The study revealed that stock market returns were negatively affected by Covid-19. In this research has been also mentioned that the pharmacological stocks have been performing better, than others.

So far, the studies about the new pandemic impact on stock markets are majorly based on the short-term period analysis. New studies on the topic of Covid-19 impact on stock markets are still emerging. However, all the studies reviewed in this thesis provide the evidence of Covid-19 negative impact on the stock performance.

2.6 Research hypotheses

Based on the done literature review were developed the research hypotheses for this thesis which are presented below.

The stock performance hypotheses related to the pre-Covid-19 period:

> *H_1: Russian stock market index favorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.*

H_2: Russian stock market index unfavorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.

H_3: Oil price favorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.

H_4: Ruble – USD exchange rate appreciation favorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.

The stock performance hypotheses related to the Covid-19 period:

H_5: Russian stock market index favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.

H_6: Russian stock market index unfavorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.

H_7: The Covid-19 infection cases unfavorably impacts the performance of stocks of Russian country-scale companies.

H_8: The Covid-19 mortality rate unfavorably impacts the performance of stocks of Russian country-scale companies.

H_9: Oil price favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.

H_{10}: Ruble – USD exchange rate appreciation favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.

3 Methodology

In this chapter is presented the chosen methodology for the study. The main research tool which is going to be used in the data analysis was chosen to be the IBM SPSS statistics program with Multivariate Linear Regression and Principal Component Analysis.

3.1 Description of Variables

For the current study, is chosen a sample of six stocks listed on Moscow Stock Exchange (MOEX), which were issued by large-cap Russian companies. Each stock represents the corporation from the separate sector. Table 2 summarizes the decomposition of Sample Stock labeling, where Stock 1 represents the airline business sector ("Aeroflot"), Stock 2 – oil production sector ("Rosneft"), Stock 3 – insurance sector ("Rosgosstrakh"), Stock 4– the telecommunications sector ("Rostelecom"), Stock 5 – the IT sector ("Yandex") and Stock 6 as the representative of the banking sector ("SBER"). The sample stocks chosen to test the hypothesis are being one of the largest representatives of their business sectors. Moreover, Stock 1 and Stock 6 are State-owned and are being a country-scale corporations.

Table 2 Stock pool

Label	Definition
Stock 1	The country-scale provider of air logistics, owned by State; representative of airline sector in Russia
Stock 2	Major oil producer with international presence; representative of oil sector in Russia
Stock 3	Major provider of insurance services; representative of insurance sector in Russia
Stock 4	Largest telecommunication and digital service provider; representative of telecommunications sector in Russia
Stock 5	The most efficient and successful IT company in Russia; representative of IT sector in Russia
Stock 6	Country-scale bank, owned by State; representative of the banking sector in Russia

The data pool represents the collection of data for two different periods. The first period is defined as “pre-COVID” and covers the time span from 01.01.2018 to 01.03.2020 with 522 trading day observations. The second period is defined as “COVID” and covers the time period from 06.03.2020 to 31.12.2021 with 462 trading days observations. In the following research, the author also gathered the data of 2017 year with 252 trading day observations to perform “Rolling period” calculations. This method is performed by using the particular constant amount of the latest values for calculation of each date value in the sample (Inoue et al., 2017). In the current research, the values which are dated with 2017 year are used as the basement year for calculation of data values in the following years. Each dependent variable value is calculated by observation of the current trading day value and the trading day values of the one following year. The example calculation of “Daily Stock Return” with “Rolling period” method is presented below in the equation:

$$Daily\ Stock\ Return\ x_n = AVERAGE(x_n; x_{n-255})$$

The key purpose of the “Rolling Period” method is to cover the investment sentiment analysis of both pre-pandemic and during-pandemic periods. The analysis of the various rolling values may provide the trends of consistent investors’ sentiments over the various date windows both including the pre-pandemic and ongoing pandemic periods. It is also suggested that “Rolling Period” method may help to avoid the forecasting uncertainty and provide the precise information about the volatility of particular date observation (Andreou & Ghysels, 2002; Inoue et al., 2017).

By the conduction of calculations, there were created five dependent variables for each stock. The chosen for the current study dependent variables are presented in Table 3. Among such there are: Daily Stock Return (Return), Daily Stock Risk (Risk), Beta Factor (Beta), Expected Return (CAPM) and Cumulative Abnormal Return (CAR). Considering the number of six stock in the data pool, the total number of dependent variables is thirty.

Table 3 Dependent variables

Variable	Label	Definition	Formula
1. Return	Return	Daily Stock Return	$R_i = \frac{P_{t_2} - P_{t_1}}{P_{t_1}}$
2. Risk	Risk	Daily Stock Risk	$\sigma = \sqrt{\frac{\sum(x_t - \mu)^2}{n}}$
3. Beta	Beta	The coefficient of stock and market interconnection/movement	$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)}$
4. Capital Asset Pricing Model	CAPM	The Expected / Required rate of return of the particular stock	$E(R_i) = R_f + \beta_i + (R_m - R_f)$
5. Cumulative Abnormal Return	CAR	The Excess return for the given stock; the degree of over- or under-performance	$CAR = E(R_i) - R_i$

For the determinants are chosen the following variables: the Moscow Stock Exchange Market Index, the COVID-19 new infection, recovery and death cases per day, Covid-19 recovery and Mortality ratios, WTI Futures price (in USD currency), WTI Spot price (in USD currency), USD/RUB exchange rate (in RUB currency) closing price and RUB/USD exchange rate (in USD currency) closing price. The independent variables are presented and described by Table 4.

Table 4 Independent Variables

Variable	Label	Definition/Formula
1. Market Performance	MKT	Nat. logarithm of MOEX price (Russian stock market index)
2. Daily COVID new cases	CVD1	Nat. logarithm of Covid-19 new cases
3. Daily COVID recovery rate	CVD2	$Recovery\ rate = \frac{Covid19\ new\ recovery\ cases}{Covid19\ new\ infection\ cases}$
4. Daily COVID mortality rate	CVD3	$Mortality\ rate\ = \frac{Covid19\ new\ death\ cases}{Covid19\ new\ infection\ cases}$
5. Daily new COVID recoveries	CVD4	Nat. logarithm of Covid-19 new recoveries
6. Daily new COVID deaths	CVD5	Nat. logarithm of Covid-19 new deaths
7. WTI Futures	OIL1	Nat. logarithm of West Texas Intermediate Futures price
8. WTI Spot	OIL2	Nat. logarithm of West Texas Intermediate Spot price
9. USD-RUB rate	ER1	Nat. logarithm of USD-RUB rate
10. RUB-USD rate	ER2	Nat. logarithm of RUB-USD rate

3.2 Data Collection

The financial data for this research, including the Russian 10-year bond yield, was obtained from the website investing.com. There is a significant reason this source is chosen as a data source rather than collecting the data from the official source of Moscow Stock Exchange. The official data provided by MOEX is the premium service which requires the fee payment. In addition, on the Moscow Stock Exchange is listed the considerable number of derivatives with different codes. The

detailed information about these derivatives was not possible to obtain. There was a considerable risk to choose the financial instrument with the delay or other specification, which is not related to the current research. The information about peculiarities of the financial instrument is available only for the premium service users. That is why, the decision to choose Moscow Stock Exchange as a source of information for the current thesis would possess the risk to compare the financial instruments of the various technical aspects. In such case, the research would have lost partly the objectivity.

The data related to the Covid-19 pandemics in Russia is provided by the Russian Federal Service of Supervision "Roskomnadzor" and displayed on the Yandex DataLens and Statista websites. This study uses data of Covid-19 daily cases on the time span 6th of March 2020 till the 13th of March 2020 which is displayed on Statista (2022). The first virus case in Russia was registered much earlier but to avoid covering the substantial number of missing zero values in the data analysis the study covers the Covid-19 daily cases starting from 6th March. Starting from the 16th of March data values of everyday pandemic cases, recoveries and deaths are obtained from "Yandex DataLens website" (*Coronavirus: dashboard*, 2022). Until 15th of March there were no registered cases of Covid-19 recovery. The first death case due to Covid-19 in Russia was registered on 25th of March. The main purpose of taking the data from two data sources about the Covid-19 is to assemble the complete decomposition of values throughout the sample of trading days. Moreover, Statista marked "Yandex DataLens" website as the source-provider of information about new Covid-19 infection cases (Statista, 2022).

Not all the chosen stocks among the sample were traded on the same daily basis. That is why, if the trading day is missing at least one value of any stock, the data values for the trading day among the list of all stocks are deleted. Besides, during the data collection process multiple dates are noticed when some stocks have been traded but the rest not. Because of that fact, all the stock values for the trading day are deleted, if at least one stock is not traded during the particular day. Regarding the independent variables, the values of trading days have been matched to the main data set of the trading days of the sample stocks. This means that the missing values of any determinant are added to the data set. The missing values are calculated by taking the average number of the day before and day after closing prices values. If the sample of determinants includes trading days when the sample stocks are not traded, the values of these extra trading days of the determinants are subtracted from the sample.

3.3 Data Analysis

For the following research are chosen several analytical techniques such as Ordinary Least Squares (OLS), Multivariate Linear Regression (MLR) and Principal Component Analysis (PCA). The key motivation to choose MLR technique is to figure out the relative power of each explanatory variable which affects multiple response variables at a time. In comparison to Multiple Linear Regression which assumes only one response variable, the Multivariate Linear Regression model allows to use multiple response variables at a time (Eck, 2018; Hanrahan et al., 2005). It was suggested by Eck (2018), that the research with multiple response variables which is performed by regressing them one by one is unable to present the evidence about relationship with other responses. The current thesis analyses the stock performance indicators of the multiple equities at a time and assumes that during the crisis period investors are quite reactive on the performance of the particular asset while taking a decision to trade another one. That is why, the MLR model represents the useful opportunity for this research. The Multivariate Linear Regression analysis between dependent and independent variables is performed in Statistical Package for the Social Sciences (SPSS) analytical program.

In the current study, Principal Component Analysis is used for the Robustness Check. This analytical tool helps to combine the most crucial data from the sample of explanatory variables and integrate it in the components which are used in the regression analysis (Abdi & Williams, 2010). This study uses multiple explanatory variables, whilst some of them are by nature quite similar with each other, for example, WTI Futures and WTI Spot or Exchange rate variables. Principal Component analysis may help to avoid performing unnecessary regressions with quite similar explanatory variables by combining them in one factor. The presented below Table 5 and Table 6 summarize the Principal Components which are extracted from the list of independent variables of pre-Covid-19 (2018-2019) and Covid-19 (2020-2021) samples. The extraction of Principal Components is performed in “SPSS” program. The regression analysis between extracted Principal Components and response variables is presented in Robustness Check sub-chapter. It is worth mentioning, that analysis of interaction between derived principal components and dependent variables is performed by utilizing Ordinary Least Square method (OLS).

Table 5 Rotated Component Matrix (pre-Covid-19 period)

Rotated Component Matrix (pre-Covid-19 period)			
Variables	*Z1*	*Z2*	*Z3*
ER2	-.989		
ER1	.989		
OIL2		.972	
OIL1		.972	
MKT			.963

Where MKT – the nat. logarithm of MOEX index price, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 522

Table 6 Rotated Component Matrix (Covid-19 period)

Rotated Component Matrix (Covid-19 period)				
Variables	*Z1*	*Z2*	*Z3*	*Z4*
OIL2	.938			
MKT	.869	.418		
OIL1	.857			
CVD3	.725			.527
CVD1		.952		
CVD4	.304	.867		.361
CVD5	.505	.810		
ER2			.992	
ER1			-.991	
CVD2				.921

Where MKT – the nat. logarithm of MOEX index price, CVD1 – the nat. logarithm of Covid-19 new cases, CVD2 – the Covid-19 daily recovery rate, CVD3 – the Covid-19 daily mortality rate, CVD4 – the nat. logarithm of Covid-19 new recoveries, CVD5 – the nat. logarithm of Covid-19 new deaths, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 462

4 Results

Chapter number four presents the results derived from the analysis models. The first sub-chapter contains the analysis of descriptive statistics, the second sub-chapter summarizes the results of Multivariate Linear Regression for the pre-Covid-19 period, the third sub-chapter contains the results derived from the mentioned above MLR model for the Covid-19 period, and the fourth sub-chapter summarizes the Robustness check results.

4.1 Descriptive statistics

The following Tables 7 and 8 present the descriptive statistics for dependent and independent variables during pre-Covid-19 and Covid-19 periods. Regarding the dependent variables, the mean value of Return has grown for all stocks in Covid-19 period in comparison to the pre-Covid-19 one. The highest number of Return among all stocks is 0,00436 during the Covid-19 period. Similarly, the Risk of most stocks grew during the Covid-19 period. Stock 3 reached the highest value of Risk 4,59%. All stocks, apart from Stocks 5 and 6, possessed the larger Beta coefficients during the Covid-19. It is worth mentioning that during the pre-Covid-19 period the minimum Beta coefficient of Stock 3 was -0.287 but the mean value of Beta significantly rose by 613% during pandemic. The mean CAPM statistics demonstrates the declining trend for all stocks except Stocks 5 and 6 during the ongoing Covid-19 period. The mean CAR statistics have shown higher numbers for all stocks apart from Stocks 5 and 6 for Covid-19 period in comparison to pre-pandemic one. Although stocks were majorly underperforming with average of mean CAR -1,12%, the coefficient is growing during the pandemic period. It is worth pointing out that Stocks 5 and 6 showed decreased Beta coefficients but grown CAPM and decreased CAR during the Covid-19 period. Regarding these stock performance indicators, Stocks 5 and 6 show the adverse behavior in comparison to others in the sample during the ongoing pandemic.

Table 7 Descriptive statistics (pre-Covid-19 period)

Descriptive Statistics (pre-Covid-19 period)

Variables	*Stocks*	*Range*	*Minimum*	*Maximum*	*Mean*	*St. Dev.*
Return	1	0,00329	-0,00262	0,00067	-0,00089	0,00084
	2	0,00318	-0,00127	0,00191	0,00062	0,00069
	3	0,00475	-0,00356	0,00119	-0,00150	0,00137
	4	0,00204	-0,00111	0,00093	0,00022	0,00047
	5	0,00312	-0,00041	0,00271	0,00100	0,00073
	6	0,00326	-0,00094	0,00232	0,00070	0,00078
Risk	1	0,00858	0,01163	0,02021	0,01739	0,00230
	2	0,00513	0,01100	0,01613	0,01403	0,00142
	3	0,02331	0,01887	0,04218	0,03100	0,00866
	4	0,00292	0,00887	0,01180	0,01030	0,00081
	5	0,00483	0,01882	0,02365	0,02145	0,00135
	6	0,01044	0,01284	0,02328	0,01865	0,00335
Beta	1	0,46387	0,26324	0,72711	0,46716	0,11187
	2	0,29684	0,81906	1,11590	0,94742	0,06023
	3	0,97917	-0,28709	0,69208	0,09754	0,21702
	4	0,24926	0,20837	0,45763	0,30780	0,05099
	5	0,42433	0,66372	1,08806	0,88940	0,10914
	6	0,52801	1,20142	1,72943	1,51894	0,15500
CAPM	1	0,03862	0,01950	0,05812	0,04078	0,00806
	2	0,02043	-0,00828	0,01214	0,00447	0,00422
	3	0,08104	0,01989	0,10093	0,06923	0,01743
	4	0,02668	0,03906	0,06574	0,05305	0,00598
	5	0,02715	-0,00544	0,02172	0,00859	0,00775
	6	0,04811	-0,05976	-0,01165	-0,03990	0,01511
CAR	1	0,03944	-0,05970	-0,02026	-0,04167	0,00842
	2	0,01944	-0,01183	0,00761	-0,00385	0,00413
	3	0,08481	-0,10379	-0,01898	-0,07073	0,01828
	4	0,02520	-0,06519	-0,03999	-0,05283	0,00573
	5	0,02542	-0,02032	0,00511	-0,00759	0,00722
	6	0,04684	0,01286	0,05971	0,04060	0,01459
Determinants	MKT	0,43177	7,64534	8,07711	7,82952	0,09740
	OIL1	0,58590	3,75021	4,33611	4,10205	0,10960
	OIL2	0,59177	3,74408	4,33585	4,10211	0,11071
	ER1	0,23626	4,02022	4,25648	4,15302	0,05031
	ER2	0,23713	-4,25451	-4,01738	-4,15315	0,05034

Where MKT – the nat. logarithm of MOEX index price, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 522

Regarding the dynamics of independent variables, Market index (MKT) shows the grown value by 3,49% during the ongoing pandemic period. During the crisis period oil proxies experienced the down sloping tendency in comparison to pre-COVID period, as WTI Futures (OIL1) and WTI Spot (OIL2) decreased by 4,5% and 8,34% respectively. Table 8 contains zero values for several independent variables during the Covid-19 period. All Covid-19-related independent variables have zeros in their mininum value because in the current research the Covid-19 denominated period starts in January 2020. However, the first Covid-19 cases in Russia took place in early February 2020. Moreover, during the outbreak of oil price war between Russia and Saudi Arabia WTI Futures price was negative during one trading day. That is why OIL1 possesses zero in its minimum value. It also worth mentioning that USD value against Russian Ruble has grown by 3,60% during the crisis period.

Table 8 Descriptive statistics (Covid-19 period)

Descriptive Statistics (Covid-19 period)

Variable	*Stocks*	*Range*	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Return	1	0,00313	-0,00220	0,00092	-0,00069	0,00061
	2	0,00564	-0,00191	0,00373	0,00080	0,00105
	3	0,00637	-0,00201	0,00436	0,00150	0,00112
	4	0,00264	-0,00050	0,00214	0,00055	0,00053
	5	0,00410	-0,00043	0,00367	0,00182	0,00104
	6	0,00345	-0,00085	0,00260	0,00077	0,00089
Risk	1	0,01590	0,01064	0,02655	0,02040	0,00496
	2	0,01463	0,01253	0,02716	0,02128	0,00476
	3	0,02552	0,02037	0,04589	0,03490	0,00433
	4	0,00715	0,00985	0,01701	0,01385	0,00290
	5	0,00950	0,01632	0,02583	0,02129	0,00260
	6	0,00996	0,01345	0,02341	0,01901	0,00308
Beta	1	0,66409	0,40495	1,06904	0,86790	0,17450
	2	0,51723	0,89367	1,41090	1,20627	0,19782
	3	0,93486	0,12806	1,06292	0,69557	0,16338
	4	0,34031	0,24296	0,58326	0,43901	0,06398
	5	0,24386	0,50430	0,74816	0,66548	0,04196
	6	0,18715	1,00636	1,19351	1,08995	0,03131

CAPM	1	0,05481	-0,00365	0,05116	0,01073	0,01403
	2	0,03659	-0,02782	0,00877	-0,01180	0,01265
	3	0,07913	-0,00586	0,07327	0,02202	0,01422
	4	0,03220	0,02805	0,06025	0,03845	0,00865
	5	0,02644	0,01515	0,04159	0,02321	0,00537
	6	0,01746	-0,01606	0,00141	-0,00536	0,00289
CAR	1	0,05413	-0,05159	0,00254	-0,01142	0,01370
	2	0,03393	-0,00719	0,02675	0,01261	0,01187
	3	0,07867	-0,07309	0,00557	-0,02053	0,01413
	4	0,03321	-0,06050	-0,02729	-0,03791	0,00891
	5	0,02662	-0,04055	-0,01392	-0,02138	0,00588
	6	0,01558	0,00060	0,01618	0,00613	0,00288
Determinants	MKT	0,70777	7,65569	8,36346	8,10308	0,16078
	CVD1	10,61543	0,00000	10,61543	9,26337	1,34704
	CVD2	2,04072	0,00000	2,04072	0,88916	0,39014
	CVD3	0,05133	0,00000	0,05133	0,02779	0,01207
	CVD4	10,69106	0,00000	10,69106	8,95745	1,93846
	CVD5	7,13409	0,00000	7,13409	5,62498	1,46289
	OIL1	4,43853	0,00000	4,43853	3,91758	0,42677
	OIL2	2,38781	2,05284	4,44065	3,76004	0,61771
	ER1	0,17044	4,22239	4,39283	4,30337	0,02960
	ER2	0,17091	-4,39491	-4,22400	-4,30540	0,02961

Where MKT - the nat. logarithm of MOEX index price, CVD1 – the nat. logarithm of Covid-19 new cases, CVD2 – the Covid-19 daily recovery rate, CVD3 – the Covid-19 daily mortality rate, CVD4 – the nat. logarithm of Covid-19 new recoveries, CVD5 – the nat. logarithm of Covid-19 new deaths, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 462

4.2 Pre-COVID-19 period (2018-2019)

This sub-chapter presents the regression results for pre-Covid-19 period. The following Table 9 summarizes the details of the multivariate phenomena between the dependent variables and chosen independent variables. The Moscow Stock Exchange index (MKT) insignificantly determines Return and Risk of chosen stocks. The absolute values of coefficients in these regressions do not exceed 0,024. In the same vein, the Market index provides the insignificant influence on CAPM and CAR variables of all stocks. The absolute values of coefficients are larger than the one with Return and Risk nexuses, but they do not exceed 0,095. However, the MOEX index apparently negatively determines the Beta of all Stocks apart Stock 3.

The WTI Futures (OIL1) insignificantly influences stock Return. Similarly, this determinant insignificantly determines the stock Risk except for Stock 3. In the nexus between Stock 3 and OIL1 is noticed significant positive relationship with the regression coefficient 0,141. The following regressions between WTI Futures (OIL1) with Beta, Expected Return (CAPM) and Cumulative Abnormal Return (CAR) present some interesting findings. Firstly, OIL1 determinant influences significantly and positively Beta of Stocks 1, 5 and 6. The regressions with Beta of Stocks 5 and 6 show the highest coefficient 2,025. Secondly, this determinant negatively affects the Expected Return (CAPM) of both Stocks 5 and 6. Finally, Cumulative Abnormal Return of Stocks 5 and 6 is positively affected by WTI Futures (OIL1). Besides, there is a positive nexus between OIL1 and Expected Return (CAPM) of Stock 3 but negative one with Cumulative Abnormal Return (CAR) of the same stock. The connections between OIL1 determinant with both Expected Return (CAPM) and Cumulative Abnormal Return (CAR) of Stock 4 are insignificant.

Regarding the WTI Spot price (OIL2), it does not significantly affect both Return and Risk, apart from negative nexus with Risk of Stock 3. As well as in case of regressions between WTI Futures (OIL1) and Beta, Expected Return (CAPM) and Cumulative Abnormal Return (CAR), the regressions with WTI Spot (OIL2) also present interesting findings. Firstly, the WTI Spot (OIL2) negatively affects Beta of Stocks 1, 5 and 6 but positively Beta of Stock 3. Secondly, it positively determines Expected Return of Stocks 5 and 6 but negatively Expected Return (CAPM) of Stock 3. Finally, WTI Spot (OIL2) positively affects Cumulative Abnormal Return (CAR) of Stock 3 but negatively CAR of Stocks 5 and 6. These results are adverse in comparison to regressions with OIL1. However, it is similar to OIL1 independent variable, that both Expected Return (CAPM) and Cumulative Abnormal Return (CAR) of Stock 4 are insignificantly affected by WTI Spot (OIL2).

Table 9 Multivariate Linear Regression Matrix (pre-Covid-19 period)

Multivariate Linear Regression Matrix (pre-Covid-19 period)								
	Stocks	*Intercept*	*MKT*	*OIL1*	*OIL2*	*ER1*	*ER2*	R^2
Return	1	.025***	.004***	-.003	.000	-.014	-.003	.653
	2	-.035***	-.002***	.004	-.003	.003	-.007	.624
	3	.029***	-.002***	-.022***	.028***	.002	.011	.539
	4	-.043***	.003***	-.002	.002	.012*	.006	.822

	5	.040***	.000	-.004	.006**	.002	.012	.714
	6	.026***	.001***	-.010***	.013***	-.018	-.007	.678
Risk	1	.210***	-.024***	.025***	-.029***	-.029	-.031	.879
	2	.046***	-.012***	.023***	-.025***	-.022	-.038	.747
	3	-.170***	-.003	.141***	-.175***	-.047	-.135	.594
	4	.032***	-.004***	-.008	.010**	.012	.013	.501
	5	.128***	-.010***	.051***	-.057***	-.05	-.049	.506
	6	-.009	-.023***	.040***	-.040***	.005	-.044	.790
Beta	1	12,643***	-.949***	.747*	-1,052**	-4,974**	-4,132**	.745
	2	6,684***	-.455***	.320	-.331	-1,783*	-1,27	.814
	3	-5,908***	.141	-1,952	2,811*	11,319	1.988	.183
	4	4,810***	-.355***	.027	-.020	-.468	-.046	.745
	5	.520	-.342***	1,983***	-2,418***	-3,416	-4,579*	.555
	6	-.302	-.926***	2,025***	-1,951***	1,906	-.206	.667
CAPM	1	-.834***	.037***	-.019	.042	.387**	.269*	.711
	2	-.407***	.029***	-.018	.018	.122*	.078	.824
	3	.505***	-.053***	.243**	-.310**	-.841	-.902	.233
	4	-.259***	-.015***	.046**	-.048**	.042	-.062	.762
	5	.001	.019***	-.158***	.194***	.264	.335*	.556
	6	.121**	.095***	-.191***	.187***	-.15	.064	.719
CAR	1	.860***	-.033***	.016	-.043	-.401**	-.272*	.706
	2	.372***	-.031***	.022	-.021	-.119*	-.085	.820
	3	-.476***	.051***	-.266**	.338***	.843	.913	.251
	4	.215***	.017***	-.048**	.050**	-.03	.069	.753
	5	.039	-.019***	.153***	-.188***	-.263	-.322*	.527
	6	-.094*	-.093***	.180***	-.174***	.132	-.071	.721

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where MKT – the nat. logarithm of MOEX index price, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 522

The USD/RUB exchange rate variable (ER1) insignificantly affects Return and Risk of the chosen for the sample stocks. However, it significantly and negatively determines Beta of Stocks 1 and 2. Besides, Expected Return (CAPM) of Stocks 1 and 2 is positively affected by USD/RUB exchange rate (ER1). In contrast, Cumulative Abnormal Return of the same stocks is negatively determined by ER1 variable. Regarding the second exchange rate variable, it is similar to ER1 that the RUB/USD (ER2) insignificantly influences Return and Risk. It negatively affects Beta of Stock 1 and Beta of Stock 5. The Expected Return (CAPM) of Stocks 1 and 5 is positively influenced by RUB/USD exchange rate variable (ER2). Finally, ER2 negatively affects Cumulative Abnormal Return of Stocks 1

and 5. The detailed study on the results is presented in the "Discussion, conclusions and limitations" chapter.

4.3 COVID-19 period (2020-2021)

This sub-chapter provides the information about the multivariate linear regression results for Covid-19 period. The presented below Table 10 contains the coefficients of regressions between dependent and independent variables. The Moscow Stock Exchange index (MKT) insignificantly affects Return and Risk during the ongoing pandemic period, as the regression coefficients are relatively low, and their absolute number does not exceed 0,023. Similarly, the Moscow Stock Exchange index (MKT) does not significantly affect Expected Return (CAPM) and Cumulative Abnormal Return (CAR). The absolute values of the coefficients here do not exceed the number of 0,075. In contrast, Moscow Stock Exchange Index (MKT) significantly and negatively influences Beta of all stocks, where the largest coefficients are represented in the regression with Beta of Stocks 1 and 2.

Table 10 Multivariate Linear Regression Matrix (Covid-19 period)

Multivariate Linear Regression Matrix (Covid-19 period)

	Stocks	*Intercept*	*MKT*	*CVD1*	*CVD2*	*CVD3*	*CVD4*	*CVD5*	*OIL1*	*OIL2*	*ER1*	*ER2*	R^2
Return	1	-.009	.004***	.000	.000***	.021***	.000*	.000***	.000	-.001***	-.009	-.003	.609
	2	-.025***	.003***	.000	-.001***	.054***	.000***	.000***	.000**	.000	.010	.010	.876
	3	-.012	.005***	-.001***	-.002***	.015*	.001***	-.001***	-.001***	.000*	-.014	-.009	.385
	4	.014**	-.002***	.000***	-.001***	.040***	.001***	-.001***	-.001***	.001***	.003	.002	.444
	5	.013	-.005***	-.001***	-.002***	.026***	.002***	-.002***	-.001***	.002***	.004	-.002	.615
	6	-.041***	.005***	.000***	-.001***	.026***	.000***	.000***	.000	.000	.009	.008	.875
Risk	1	.337***	-.033***	-.001	-.002***	.068**	.006***	-.006***	-.005***	.006***	-.053	-.037	.707
	2	.281***	-.029***	.000	.002**	-.053**	.003***	-.004***	-.004***	.004***	-.052	-.042	.781
	3	.082	.008	-.001	-.003**	-.041	.003***	-.003**	-.005***	.004***	-.027	-.002	.129
	4	.168***	-.018***	.000	.000	-.021*	.002***	-.002***	-.002***	.002***	-.016	-.012	.861
	5	.146***	-.016***	-.001***	-.002***	.068***	.003***	-.003***	-.002***	.002***	-.020	-.020	.842
	6	.227***	-.023***	.001***	.002***	-.009	.002***	-.002***	-.003***	.004***	-.039	-.030	.755
Beta	1	11,285***	-.979***	-.016	-.117***	2,370**	.181***	-.189***	-.187***	.189***	-1,66	-1,002	.635
	2	1.741***	-1,115***	-.008	.060**	-2,482***	.121***	-.112***	-.120***	.122***	-1,935	-1,737	.824
	3	8,951***	-.673***	-.060***	-.029	-4,147***	.098***	-.058***	-.116***	.098***	-1,394	-.797	.741
	4	3,510***	-.430***	-.001	.008	-1,002***	.036***	-.030***	-.046***	.071***	.615	.570	.735
	5	1,969***	-.259***	.009*	-.008	2,057***	.008	-.010	-.002	-.014*	-.033	-.195	.593

	6	2,112***	-.125***	.023***	.074***	-1,014***	-.042***	.027***	.011	.028***	-.627	-.584	.271
CAPM	1	-.814***	.075***	.003	.013***	-.273***	-.016***	.016***	.015***	-.014***	.130	.076	.609
	2	-.580***	.073***	.000	-.005***	.140**	-.006***	.007***	.007***	-.008***	.101	.100	.812
	3	-.719***	.060***	.006***	.007***	.213***	-.011***	.007***	.011***	-.008***	.109	.055	.702
	4	-.488***	.052***	.003***	.006***	.004	-.009***	.006***	.007***	-.007***	.031	.004	.754
	5	-.245***	.032***	.001*	.004***	-.167***	-.005***	.003***	.003***	-.001	.060	.058	.728
	6	-.058	.010***	-.002***	-.008***	.112***	.005***	-.003***	-.002**	-.002**	.034	.037	.307
CAR	1	.805***	-.071***	-.003	-.013***	.295***	.016***	-.016***	-.015***	.013***	-.139	-.079	.602
	2	.555***	-.070***	.000	.004***	-.086	.006***	-.007***	-.007***	.009***	-.091	-.090	.784
	3	.707***	-.055***	-.007***	-.009***	-.198**	.012***	-.008***	-.012***	.009***	-.123	-.064	.647
	4	.502***	-.054***	-.003***	-.007***	.036	.010***	-.007***	-.008***	.008***	-.028	-.002	.746
	5	.259***	-.037***	-.002***	-.006***	.193***	.007***	-.005***	-.004***	.002***	-.056	-.059	.744
	6	.017	-.005	.002***	.007***	-.086***	-.004***	.003***	.002***	.002***	-.026	-.029	.352

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where MKT – the nat. logarithm of MOEX index price, CVD1 – the nat. logarithm of Covid-19 new cases, CVD2 – the Covid-19 daily recovery rate, CVD3 – the Covid-19 daily mortality rate, CVD4 – the nat. logarithm of Covid-19 new recoveries, CVD5 – the nat. logarithm of Covid-19 new deaths, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 462

New Daily Covid-19 cases variable (CVD1) insignificantly influences all stock performance indicators because of the major statistical insignificance and apparently low regression coefficients. The Daily Covid-19 recovery rate (CVD2) does not significantly influence Return and Risk dependent variables. However, it significantly and negatively influences only Beta of Stock 1. The Expected Return (CAPM) and Cumulative Abnormal Return (CAR) are insignificantly affected by Daily Covid-19 recovery rate (CVD2). Another Covid-19 variable, Daily Mortality Rate (CVD3), insignificantly determines Return and Risk. However, Beta is significantly affected by this determinant. In particular, Mortality Rate (CVD3) significantly and negatively influences Beta of Stocks 2, 3, 4 and 6 but positively Beta of Stocks 1 and 5. Besides, Expected Return (CAPM) of Stocks 2, 3 and 6 is significantly and positively affected by Mortality Rate (CVD3). In contrast, CVD3 significantly and negatively determines Expected Return of Stocks 1 and 5. Regarding the Mortality Rate (CVD3) association with Cumulative Abnormal Return (CAR), it significantly and negatively affects CAR of Stock 3 but positively Stocks 1 and 5. The Covid-19 daily new recoveries (CVD4) does not significantly affect Return and Risk dependent variables. Similarly, CVD4 independent variable does not significantly influence Expected Return (CAPM) and Cumulative Abnormal Return (CAR) of all stocks. However, Beta of Stocks 1, 2 and 3 is positively determined by this Covid-19 proxy. The final proxy among the list of Covid-19 variables, new daily deaths (CVD5), insignificantly affects Return, Risk, CAPM and CAR

of all stocks, as well as CVD4 variable. New daily Covid-19 deaths proxy negatively determines Beta of Stocks 1 and 2.

Regarding Oil determinants, WTI Futures (OIL1) insignificantly affects Return, Risk, CAPM and CAR of all stocks. The absolute values of regression coefficients here do not exceed the number 0,015. However, Beta of Stocks 1, 2 and 3 is negatively affected by OIL1. The second Oil independent variable, WTI Spot (OIL2), does not significantly determine Return, Risk, CAPM and CAR. In the regressions between this determinant and mentioned dependent variables the absolute values of coefficients do not exceed the number 0,014. In contrast to OIL1 proxy, OIL2 positively affects Beta of Stock 1, 2 and 3.

Finally, the regressions between both Exchange Rate determinants and all the chosen for the analysis dependent variables present statistically insignificant regression coefficients, hence, both Exchange Rate determinants insignificantly affect dependent variables. The detailed study on the results is presented in the "Discussion, conclusions and limitations" chapter.

4.4 Robustness check

For the Robustness check purposes author chose Principal Component Analysis to evaluate the already available results by utilizing another analysis technique. The following sub-chapter presents the regression results between Principal Components derived from the explanatory variables sample and response variables. The key purpose to conduct the Robustness check is to assess the reliability of the already provided results of the research with help of other method (Neumayer & Plümper, 2017). As it was suggested in the above-mentioned study, Robustness Check provides the opportunity to decrease the level of the results vulnerability, because there is a high chance that the initial research model is not perfect, and it may deliver some uncertainty to a researcher.

4.4.1 Pre-COVID-19 period

The following Table 11 shows the Linear Regression results with Principal Components during pre-Covivd-19 period. The first factor, Exchange rate (Z1), does not significantly affect all stock performance indicators among the list of sample stocks. However, the regressions with another compo-

nent, OIL (Z2), present statistically significant results. The Oil factor significantly and positively determines Return of Stocks 2, 3, 5 and 6 but factor possesses negative relationship with Return of Stocks 1 and 4. Besides, it negatively affects Risk of Stocks 1, 2, 3, 5 and 6 but positively Risk of Stock 4. Also, Beta of Stocks 1, 5 and 6 is negatively affected by Oil component. In contrast, Beta of Stocks 2, 3 and 4 is positively affected by the same component. At the same time, Oil factor positively affects Expected Return (CAPM) of Stocks 1, 5 and 6 but negatively affects CAPM of Stocks 2, 3 and 4. Finally, Cumulative Abnormal Return (CAR) of Stocks 1, 5 and 6 is negatively determined by Oil component, but CAR of Stocks 2, 3 and 4 - positively.

Table 11 Linear regression matrix with Principal components (pre-Covid period)

Linear Regression matrix with Principal Components (pre-Covid period)				
	Stocks	*Z1*	*Z2*	*Z3*
Return	1	-.022	-.211***	.392***
	2	.007	.100**	-.229***
	3	.009	.557***	-.186***
	4	.036	-.200***	.584***
	5	.004	.435***	-.095**
	6	-.025	.510***	.117***
Risk	1	-.021	-.202***	-1.007***
	2	-.024	-.284***	-.753***
	3	-.013	-.586***	.012
	4	.024	.359***	-.464***
	5	-.065**	-.518***	-.714***
	6	.000	-.191***	-.598***
Beta	1	-.061**	-.214***	-.853***
	2	-.041	.080***	-.766***
	3	.070*	.428***	.067
	4	-.013	.117***	-.708***
	5	-.046	-.591***	-.261***
	6	.012	-.130***	-.529***
CAPM	1	.065	.139***	.497***
	2	.040	-.109***	.700***
	3	-.067*	-.481***	-.281***
	4	.009	-.259***	-.171***
	5	.051	.651***	.202***
	6	-.010	.160***	.556***
CAR	1	-.064	-.155***	-.437***
	2	-.040	.128***	-.752***
	3	.064	.500***	.254***

4	-.006	.254***	.227***
5	-.054	-.655***	-.227***
6	.009	-.138***	-.570***

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where Z1 – Exchange rate component, Z2 – Oil component, Z3 – Market component

The last component in the pre-Covid-19 period, Market component (Z3), is regressed with response variables. The Return of Stocks 1, 4 and 6 is positively affected by Market factor, while Return of Stocks 2, 3 and 5 possesses negative response in the regression with Market factor. Besides, this factor negatively affects Risk of all stocks, apart from Stock 3. In the same vein, Beta of all stocks apart from Stock 3 is negatively determined by Market component. In case of regressions with Risk and Beta of Stock 3, the results are statistically insignificant. The regression results of Market component with Expected Return (CAPM) and Cumulative Abnormal Return (CAR) present some interesting findings. Market component (Z3) positively affects CAPM of Stocks 1, 2, 5 and 6 but negatively affects CAPM of Stocks 3 and 4. In contrast, CAR of Stocks 1, 2, 5 and 6 is negatively determined by Market Factor, while CAR of Stocks 3 and 4 possesses positive relationship with Market component.

4.4.2 COVID-19 period

The following Table 12 summarizes the Linear Regression results between Principal Components and response variables during ongoing Covid-19 period. The regression between Return and Oil component (Z1) shows that Return is positively affected in case of Stocks 1, 2, 3 and 6 but negatively in case of Stocks 4 and 5. In contrast, Stock Risk of all stocks is negatively affected by the same component, except for Risk of Stock 3 where the regression coefficient is positive. The following regressions between Z1 component and Beta, Expected Return (CAPM) and Cumulative Abnormal Return (CAR) present interesting findings. Firstly, Beta of all Stocks is negatively affected by Oil component, apart from Beta of Stock 6 where the regression coefficient is positive. Secondly, it positively affects CAPM of all Stocks, apart from CAPM of Stock 6 which possesses negative coefficient. Finally, the regression coefficient in the relationship between CAR and Oil component were negative in case of all Stocks, apart from Stock 6 which positively interacts with Z1.

The next component Z2, Daily Covid-19 cases, significantly and positively affects only Return of Stocks 2 and 3. Similarly, Risk of Stocks 2, 3 and 6 positively interacts with Z2 component. The following interactions between Daily Covid-19 cases component with Beta, Expected Return (CAPM)

and Cumulative Abnormal Return (CAR) also present some interesting findings. Firstly, Beta of Stocks 3 and 6 is negatively affected by the mentioned above component. Secondly, it positively affects CAPM of Stocks 3 and 6 but negatively CAPM of Stocks 4 and 5. Finally, CAR of Stocks 3 and 6 is negatively determined by Z2, while CAR of Stocks 4 and 5 positively responses on Z2.

The second Covid-19 component Z4, Daily Recovery rate, significantly and negatively determines Return of Stocks 3 and 6 but negatively Return of Stocks 4 and 5. Besides, it positively affects Risk of all Stocks, except for Risk of Stock 3 which negatively responses on Z4. Similarly, Recovery rate component positively determines Beta of all Stocks, except for Beta of Stock 3 (the interconnection is relative). In the opposite, CAPM of all Stocks apart from Stock 3 is negatively affected by Z4 (the relationship between CAPM of Stock 3 and Z4 is relative). Finally, Covid-19 recovery rate component significantly and positively affects CAR of Stocks 1, 2, 4 and 5.

The regression coefficients in the interconnections between Z3 component (Exchange rate) and chosen for the analysis response variables are majorly statistically insignificant. The Robustness Check results are studied in the “Discussion, conclusions and limitations” chapter.

Table 12 Linear regression matrix with Principal components (Covid-19 period)

Linear Regression matrix with Principal Components (Covid-19 period)					
	Stocks	*Z1*	*Z2*	*Z3*	*Z4*
Return	1	.278***	.047	-.059	-.048
	2	.781***	.130***	-.008	-.029
	3	.426***	.225***	-.028	-.212***
	4	-.115**	-.021	.056	.221***
	5	-.145***	.087	.070	.206***
	6	.873***	.029	-.018	-.157***
Risk	1	-.678***	.077*	.041	.274***
	2	-.783***	.136***	.033	.316***
	3	.158***	.170***	-.002	-.104**
	4	-.822***	.040	.041	.245***
	5	-.765***	-.057	.043	.260***
	6	-.705***	.108**	.032	.325***
Beta	1	-.676***	.038	.034	.129***
	2	-.808***	-.004	.032	.277***
	3	-.674***	-.162***	.034	.063*
	4	-.651***	.018	.066*	.157***

	5	-.731***	.076*	.025	.278***
	6	.174***	-.317***	-.037	.169***
CAPM	1	.658***	-.011	-.034	-.112***
	2	.760***	.088**	-.030	-.258***
	3	.671***	.135***	-.038	-.066*
	4	.779***	-.110***	-.057*	-.186***
	5	.848***	-.147***	-.032	-.265***
	6	-.189***	.344***	.034	-.128**
CAR	1	-.661***	.013	.032	.113***
	2	-.740***	-.082**	.031	.272***
	3	-.642***	-.118***	.036	.049
	4	-.763***	.105**	.059*	.194***
	5	-.800***	.149***	.042	.278***
	6	.459***	-.336***	-.040	.080*

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where Z1 – Oil component, Z2 – Daily Covid-19 cases component, Z3 – Exchange rate component, Z4 – Daily Covid-19 Recovery rate component

5 Discussion, conclusions and limitations

This chapter presents the explanation of the current research results, summarizes the testification of the set hypotheses, concludes the research and presents limitations of the study.

5.1 Pre-COVID-19 period

This sub-chapter discusses the results presented in Tables 9 and 11, which are related to the pre-COVID period. Firstly, the Multivariate Linear Regression (MLR) does not present significant results regarding Market Index (MKT) affection on Return of the chosen stock pool. In contrast, the regression of Return with Principal component of Market Index (Z3) presents significant. Return of Stocks 1, 4 and 6 is positively correlated with Z3 component. This correlation can be explained by the fact that these Stocks are being the components of the Market index which is used as the explanatory variable. However, Return of Stocks 2 and 3 is negatively affected by Market index component (Z3). The matter of negative correlation with Return of Stock 2 can be explained by the nature of operational field of organization. Stock 2 represents the oil production sector, hence, other factors, for example international oil prices, may affect its performance in the broader scale. Regarding the negative reaction of Return of Stock 3, this stock represents the insurance corporation,

which services are being the necessity for most citizens. That is why the overall market performance and investor sentiment might not highly reflect of this stock. Moreover, Stock 3 is the only stock in the pool which possesses the negative Beta coefficient in its minimum value.

Moving to the next stock performance indicator, Multivariate Linear Regression model (MLR) does not present the significant interconnections between Stock Risk and Market Index (MKT) independent variable. However, Simple Linear Regression between Risk and Market index Principal Component (Z3) shows the significant and negative affection on risk of all stock except for Stock 3. A possible justification might be that the chosen Market index includes chosen for the sample stocks and when the overall market performance grows, the Risk of each stock follows the negative trend. However, the regression coefficient between Z3 and Risk of Stock 3 is statistically insignificant. Stock 3 is not being the component of the picked Market Index and it is possible that this phenomenon was a consequence of statistically insignificant regression result. The regression results with Beta, demonstrate the negative affection of the Market Component (Z3) performed both by MLR and PCA methods. It is worth mentioning that the regression result with Beta of Stock 3 was statistically insignificant, as in case with Risk. This tendency might be explained in the same vein as the reaction of Risk response variables on Z3 component.

The regression results between Stock CAPM and CAR with the Market index present quite interesting patterns. Although MLR model presents insignificant results, Z3 component significantly affects the above-mentioned stock performance indicators. Concisely, the regression results follow the reverse pattern. In both cases of CAPM and CAR Stocks 3 and 4 do not follow the reaction of majority of the stocks in the sample. The possible reason CAPM of these Stocks was negatively affected by Z3 might be that the mean Beta statistics of these Stocks is relatively low in comparison to others in the sample and stocks does not follow the market trends as others do. It was already mentioned that Beta of Stock 3 was the lowest one in the sample. In addition to that, the author notices that Beta of Stock 4 is the second lowest. That is why, the CAPM and CAR stock performance indicators of these Stocks reacted contrarily in comparison to others in the sample. For example, CAR of Stock 3 and 4 tends to grow with the growing value of Market index but rest stocks in the sample react oppositely.

Although it is not possible to synthesize the derived results about Market index affection into an unambiguous conclusion, the study states that Russian Stock Market index (MOEX) does significantly determine both favorably and unfavorably chosen for the analysis stock performance indicators. Regarding Return, Risk and Beta reaction on Market index, most of the sample stocks support the statement about favorable influence of MOEX index the stock performance. In case of CAPM and CAR, the majority of stock reactions support unfavorable determination by Market index, because Expected Return tends to grow, whilst Cumulative Abnormal Return follows the declining trend. This shows the underperformance of the stocks in the sample. Overall, the results discussed above do not reject the following hypothesis:

> *H_1: Russian stock market index favorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.*

> *H_2: Russian stock market index unfavorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.*

Further, the author would like to discuss the regression results between Oil-related independent variables with the stock performance indicators. The MLR results between Stock Return and oil-related determinants are insignificant but Simple Linear Regression with the derived Oil component (Z2) presents apparent associations. The possible suggestion for the positive interconnection with Return of Stocks 2, 5 and 6 might be that these corporations hold noticeable share of their investment securities in form of international oil instruments. Moreover, Stock 2 represents an oil production sector, hence, increased oil prices may positively reflect on the stock return. In case of negative response of Return of Stock 1, the possible rise in the oil prices might reflect on the higher plane fuel, hence, this would present higher operating cost to the corporation and higher risk for the investors.

The pattern of major negative relationship between Stock Risk and Oil component (Z2) shows that Russian stocks are quite reactive on the prices of oil instruments and oil favorably impacts the Stock Risk. However, it is hardly possible to combine the results of the regressions between Beta and oil-related explanatory variables into the one transparent pattern. Firstly, the response of the dependent variables on OIL1 and OIL2 in MLR is contradictory. There is an apparent reaction of

Stocks 1, 5 and 6 but Beta of these stocks is adversely affected by OIL1 and OIL2 independent variables. Secondly, the regression with the principal component of Oil (Z2) presents quite scattered results with positive reaction of Beta of Stock 3 and 4 but the negative one in case of Beta of Stock 1, 5 and 6. Quite similar pattern is noticeable in case of CAPM. Here, the MLR regressions between OIL1 and OIL2 explanatory variables with CAPM present opposite results. Similarly, the Z2 factor affects CAPM in the pattern similar to the OIL2 in MLR model, which means that CAPM of Stocks 5 and 6 was negatively affected by Z2 component. The regression results between CAR and oil-related explanatory variables and Z2 are inverse in comparison to the observed between Oil independent variables and CAPM. It is worth mentioning that affection pattern of Z2 oil component on CAR follows the affection pattern of OIL2 on the same stock performance indicator.

Overall, the regression results with Oil-related variables show that Stocks are affected by the prices of oil instruments differently. The MLR regression results between OIL1 and OIL2 with CAPM and CAR present inverse results. Moreover, Z2 oil component both favorably and unfavorably affects stock performance based on observation of CAPM and CAR reactions. Although the results does not present the unambiguous conclusion regarding Oil prices impact on the stock performance indicators, it is possible to derive several conclusions. Firstly, the reaction of Return and Risk of the chosen stock sample is the evidence of boosting effect of oil prices on the stock performance, which is in line with the results by Fedorova and Pankratov (2010) and with Bhar and Nikolova (2010). The current research approves the mentioned below hypothesis:

> *H_3: Oil price favorably impacts the performance of stocks of Russian country-scale companies before the Covid-19 period.*

Secondly, the reaction of Beta some stocks in the sample on Oil determinants makes this research to consider not only the positive but also negative impact of oil prices on the Russian stock performance. Moreover, with the growing value of oil prices, the excess return of several stocks in the sample is declining, which also demonstrates unfavorable influence of oil prices on the stock performance.

Discussing the final dependent variable, Exchange rate, the MLR model also does not present an unambiguous conclusion. The significant regression results between stock performance indicators

and Exchange rate determinant are presented in the nexuses between ER1 and ER2 with Beta, CAPM and CAR of Stock 1, 2 and 5. Both exchange rate determinants negatively affect Beta of these stocks, which might indicate the sensitivity of these corporations to the exchange rate of national currency. In case of Stock 1 which represents the flight sector, the exchange rate might be especially important, as the corporation receives share of net sales which is denominated in the international currency. In the same vein, Stock 2, and Stock 5, which represent oil production and banking sectors, constantly operate with the international currency. The regression results are quite controversial, because with both growing value of USD against Ruble and growing value of Ruble against USD Beta of stocks is declining. In this case, both favorable and unfavorable influence can be considered. Moreover, CAR is negatively affected by both Exchange rate variables, which also delivers the controversial aspect into the discussion. However, the author must consider favorable influence of Ruble depreciation against USD on the chosen response variables, based on the Beta and CAR reaction in the current research. The research cannot reject the following hypotheses:

> *H_4: Ruble – USD exchange rate appreciation favorably impacts the performance of stocks of Russian country-scale companies before Covid-19 period.*

5.2 Covid-19 period

The following sub-chapter presents the analysis of Tables 10 and 12, which contain the results of linear regressions for the Covid-19 period. The Principal Component Analysis did not include the Market Index. Based on the Multivariate Linear Regression results, Market index significantly and negatively determines Beta of all Stocks in the sample during the Covid-19 period, which means the favorable impact on the stock performance. Although only one stock performance indicator is significantly affected by Market Index, the current research cannot disprove the following hypothesis:

> *H_5: Russian stock market index favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.*

However, the following hypothesis is disproved based on the mentioned above results:

H_6: Russian stock market index unfavorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.

The following paragraphs discuss the Covid-19 affection on the stock performance. The Multivariate Linear Regression does not present the significant results in the interconnections between stock performance dependent variables and Covid-19 daily cases (CVD1). However, some independent variables were affected by the principal component of Covid-19 daily cases (Z2). Unexpectedly, this determinant positively affects Return of Stocks 2 and 3. Moreover, Z2 negatively determines Beta of Stocks 3 and 6, which corresponds to the decline tendency of beta during the Covid-19 daily cases growth. Moreover, Expected Return (CAPM) of Stocks 4 and 5 follows the decline tendency with daily cases growth, whilst Cumulative Abnormal Return (CAR) is growing. The reviewed literature presented the evidence of unexceptional worsening influence of Covid-19 on the stock market. Contrarily, these results deliver the evidence of favorable impact of Covid-19 on the stock performance. However, The Risk of Stocks 2, 3 and 6 positively reacted on the Covid-19 cases component which corresponds to growing risk tendency with Covid-19 daily cases growth. This evidence is in line with the reviewed in this study literature. Also, CAPM and CAR reaction on Z2 component present significant evidence of Covid-19 daily cases unfavorable effect on stock performance. The Expected Return of Stock 3 and 6 grows, while Abnormal Return declines as a response on Z2. The presented results constitute the contradictory evidence of both supportive and discouraging effect of Covid-19 on stock performance.

The Multivariate Linear Regression does not present the significant results in the regressions between Daily Recovery Rate (CVD2) and stock performance indicators. However, the Principal Component of Recovery Rate (Z4) significantly affects the dependent variables. It affects the Return both negatively and positively. The positive regression coefficient in the regressions between the Recovery rate (Z4) and Return of Stocks 4 and 5 delivers the evidence of favorable influence of recoveries on the stock performance. In contrast, the reactions of Return of Stocks 3 and 6 on this principal component bring the evidence of unfavorable impact of virus recoveries. In case of Stock 3, this phenomenon might be explained with the fact that during the lockdown period citizens have higher demand on insurance service, hence, the growing recoveries may indicate lesser necessity in lockdowns and lower demand on insurance services.

Another interesting evidence is examined in the regression results between Covid-19 recoveries and Beta. Beta is positively affected both by the Recovery Rate component (Z4) and Covid-19 new recoveries (CVD4). This, in fact, corresponds to unfavorable impact of Covid-19 recoveries on stock performance. In the same vein, Z4 majorly unfavorably impacts Risk, as with the growth of recoveries, the risk of stocks follows the growing trend. However, CAR mostly positively responses on Z4, which means that the Recovery Rate supports the growing trend of Abnormal Return, hence, provides supportive effect on the stock performance. The evidence of Covid-19 recoveries impact on stock performance is contradictory because the independent variables derived from Covid-19 recoveries affect both favorably and unfavorably stock performance indicators.

The Daily Mortality Rate (CVD3) independent variable affection on the stock performance is quite scattered. The MLR model shows that Beta and CAR are affected both favorably and unfavorably. The evidence of growing Beta of Stocks 1 and 5 as the response on growing Covid-19 mortality rate (CVD3) supports worsening effect of virus on the stock performance. However, Daily Covid-19 Mortality rate inversely impacts Beta of Stocks 2, 3, 4 and 6, which brings an evidence of Mortality rate supportive effect on stock performance. In addition, the Daily death cases (CVD5) mostly negatively affects Beta, which also becomes the additional argument to the phenomena of Covid-19 favorable influence on the stock performance. At the same time, CAR of Stocks 1 and 5 follows the growing trajectory as the response of the Mortality Rate (CVD3) growth. However, CAR of Stocks 3 and 6 is unfavorably affected by CVD3. Overall, the reaction of stock performance indicators on Covid-19 deaths presents disputable results, as independent variables derived from Covid-19 deaths affect both favorably and unfavorably stock performance indicators.

Although the current study presents the evidence of unfavorable impact of Covid-19 on the stock performance, it also contains the contradictory results of supportive effect of Covid-19. This thesis does not disprove the following hypotheses:

> *H_7: The Covid-19 infection cases unfavorably impacts the performance of stocks of Russian country-scale companies.*
>
> *H_8: The Covid-19 mortality rate unfavorably impacts the performance of stocks of Russian country-scale companies.*

The Multivariate Linear Regression results show that the Oil independent variables (OIL1 and OIL2) inversely affect Beta during the Covid-19 period in comparison to the pre-crisis period. The CAPM and CAR are affected insignificantly during the crisis period, which means that OIL1 and OIL2 explanatory variables lost their power to explain these stock performance indicators. During the pre-Covid-19 period the Oil Principal Component (Z1) followed the affection pattern of WTI Spot price (OIL2) determinant. During the crisis period, the result is inverse because Oil Principal Component (Z1) follows the affection pattern of WTI Futures price (OIL1) independent variable. The Oil Principal Component (Z1) also majorly positively affects Return and negatively determines Risk, meaning the supportive effect on the stock performance. This result is in line with the affection of Oil component during the pre-Covid period. Moreover, it significantly and negatively affects Beta, which also supports an evidence of oil favorable impact on stock performance. However, CAR responses negatively on the principal component of oil (Z1) whilst CAPM is positively affected. This means that with the oil price growth, Expected Return is growing but Cumulative Abnormal Return declines. Overall, the discussed results cannot help to derive the apparent conclusion regarding Oil influence on stock performance during the Covid-19 period. Some indicators, like Return, Risk and Beta constitute the fact that oil supports the growth of stock performance. The current study does not disprove the following hypothesis:

> *H_9: Oil price favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.*

Nonetheless, the Expected return is growing, while Abnormal return follows the down sloping trajectory with the oil price growth, which also brings the contradictory aspect to the results.

Regarding the exchange rate affection on the response variables, both methods of MLR and Simple Linear Regression with Principal Components show insignificant results. In comparison to the pre-crisis period, the power of Exchange rate to affect the response variables was significantly diminished to zero. The current research disproves the following hypothesis:

> *H_{10}: Ruble – USD exchange rate appreciation favorably impacts the performance of stocks of Russian country-scale companies during the Covid-19 period.*

5.3 Conclusion & Limitations

To conclude the following study, the literature was lacking the broad evidence of Russian oil production dependency and the comprehensive evidence of oil-related vulnerabilities of its stock market. This thesis provides in-depth analysis of recent Russian stock market response on international oil price instabilities which took place during Spring 2020 and enlarges the evidence about oil significant influence. Moreover, Covid-19 aftermaths on the Russian stock market were not studied in the reviewed in this thesis literature, which also supports the importance of the conducted study. In addition, the study provides an evidence of stock market response on the combined shocks of Covid-19 and oil price war between major world-wide energy suppliers. In comparison to earlier published literature, the current research is based on well-balanced data pools with similar numbers of observations and covers more comprehensive time period of 4 years.

The research brought the evidence of both favorable and unfavorable impact of Moscow Stock exchange on the stock performance during the pre-Covid-19 and favorable effect during ongoing Covid-19 periods. Findings for the pre-Covid-19 period are robust with Principal Component Analysis. Regarding the oil impact, the study proves that international oil market prices both favorably and unfavorably influence stock performance during both pre-crisis and ongoing crisis periods. The findings are robust with PCA. The chosen stock performance indicators response differently on oil market financial instruments. The WTI Futures and Spot inversely influence stock performance indicators. In addition, the impact pattern is reversed during the Covid-19 period. The Covid-19 proxies both supported and worsened the performance of stocks of Russian country-scale corporations. This study becomes the pioneer to recognize the favorable effect of Covid-19 on chosen stock performance indicators. Among the Covid-19 derived independent variables, Covid-19 daily death cases, mortality and recovery rate both supportively and adversely affected chosen for the analysis stock performance indicators. The daily Covid-19 cases did significantly impact both favorably and unfavorably stock performance indicators. The evidence contradicts the reviewed literature.

This study also aimed to compare the relative effect of oil prices and Covid-19 proxies. Based on the Robustness Check testing, chosen for the analysis oil financial instruments more extensively impacted stock performance indicators in comparison to Covid-19 proxies. Regarding, Ruble-USD exchange rate appreciation impact, the dependent variables were both favorably and unfavorably

determined by this stock performance proxy during pre-Covid-19 period. The study also considered USD-Ruble exchange rate and it impacted dependent variables with similar pattern. That is why, in the current research the evidence of Ruble-USD appreciation impact on stock performance is disputable. During the ongoing Covid-19, the exchange rate did not significantly impact any stock performance indicators, which means that its power to impact stock performance was totally diminished.

The current study provides in-depth analysis and comparison of various indicators of stock performance for country-scale corporations. The affection dynamics of various determinants such as oil prices, Covid-19 derived approximates, Ruble-USD exchange rate and Moscow Stock Exchange index price is trailed on pre-pandemic and ongoing coronavirus periods. Although significant evidence is presented, the study follows the limitation of relative number of stocks in the sample. It is worth mentioning one more time, that study covers six large scale corporations, while each of the listed is being one of the largest representatives of their sector. Despite, the study did not consider small- and medium-sized corporations which represent the valuable share of Russian stock market. It was mentioned in this study that SMEs experienced quite harsh aftermaths of economy transformations due to Covid-19. The study does not exclude the possibility, that the large-scale corporations could have followed the better performance during the Covid-19 period in comparison to SMEs. Consequently, the study does not represent the significant evidence for the entire Russian stock market but contains the reaction of country-scale market players on global phenomena of Covid-19 and international oil market prices. It is recommended for the future research to take the larger sample of stocks including corporations of varied sizes. Moreover, as oil approximates can be chosen other internationally traded oil financial instruments, such as Brent or Oman crude oil instruments.

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Appendices

Appendix 1. Multivariate Linear Regression Matrix (pre-Covid-19 period)

Multivariate Linear Regression Matrix (pre-Covid-19 period)

	Stock	*Intercept*	*MKT*	*OIL1*	*OIL2*	*ER1*	*ER2*	R^2
Return	1	.025***	.004***	-.003	.000	-.014	-.003	.653
	2	-.035***	-.002***	.004	-.003	.003	-.007	.624
	3	.029***	-.002***	-.022***	.028***	.002	.011	.539
	4	-.043***	.003***	-.002	.002	.012*	.006	.822
	5	.040***	.000	-.004	.006**	.002	.012	.714
	6	.026***	.001***	-.010***	.013***	-.018	-.007	.678
Risk	1	.210***	-.024***	.025***	-.029***	-.029	-.031	.879
	2	.046***	-.012***	.023***	-.025***	-.022	-.038	.747
	3	-.170***	-.003	.141***	-.175***	-.047	-.135	.594
	4	.032***	-.004***	-.008	.010**	.012	.013	.501
	5	.128***	-.010***	.051***	-.057***	-.05	-.049	.506
	6	-.009	-.023***	.040***	-.040***	.005	-.044	.790
Beta	1	12,643***	-.949***	.747*	-1,052**	-4,974**	-4,132**	.745
	2	6,684***	-.455***	.320	-.331	-1,783*	-1,27	.814
	3	-5,908***	.141	-1,952	2,811*	11,319	1.988	.183
	4	4,810***	-.355***	.027	-.020	-.468	-.046	.745
	5	.520	-.342***	1,983***	-2,418***	-3,416	-4,579*	.555
	6	-.302	-.926***	2,025***	-1,951***	1,906	-.206	.667

CAPM	1	-.834***	.037***	-.019	.042	.387**	.269*	.711
	2	-.407***	.029***	-.018	.018	.122*	.078	.824
	3	.505***	-.053***	.243**	-.310**	-.841	-.902	.233
	4	-.259***	-.015***	.046**	-.048**	.042	-.062	.762
	5	.001	.019***	-.158***	.194***	.264	.335*	.556
	6	.121**	.095***	-.191***	.187***	-.15	.064	.719
CAR	1	.860***	-.033***	.016	-.043	-.401**	-.272*	.706
	2	.372***	-.031***	.022	-.021	-.119*	-.085	.820
	3	-.476***	.051***	-.266**	.338***	.843	.913	.251
	4	.215***	.017***	-.048**	.050**	-.03	.069	.753
	5	.039	-.019***	.153***	-.188***	-.263	-.322*	.527
	6	-.094*	-.093***	.180***	-.174***	.132	-.071	.721

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where MKT – the nat. logarithm of MOEX index price, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 522

Appendix 2. Multivariate Linear Regression Matrix (Covid-19 period)

Multivariate Linear Regression Matrix (Covid-19 period)

	Stocks	*Intercept*	*MKT*	*CVD1*	*CVD2*	*CVD3*	*CVD4*	*CVD5*	*OIL1*	*OIL2*	*ER1*	*ER2*	R^2
Return	1	-.009	.004***	.000	.000***	.021***	.000*	.000***	.000	-.001***	-.009	-.003	.609
	2	-.025***	.003***	.000	-.001***	.054***	.000***	.000***	.000**	.000	.010	.010	.876
	3	-.012	.005***	-.001***	-.002***	.015*	.001***	-.001***	-.001***	.000*	-.014	-.009	.385
	4	.014**	-.002***	.000***	-.001***	.040***	.001***	-.001***	-.001***	.001***	.003	.002	.444
	5	.013	-.005***	-.001***	-.002***	.026***	.002***	-.002***	-.001***	.002***	.004	-.002	.615
	6	-.041***	.005***	.000***	-.001***	.026***	.000***	.000***	.000	.000	.009	.008	.875
Risk	1	.337***	-.033***	-.001	-.002***	.068**	.006***	-.006***	-.005***	.006***	-.053	-.037	.707
	2	.281***	-.029***	.000	.002**	-.053**	.003***	-.004***	-.004***	.004***	-.052	-.042	.781
	3	.082	.008	-.001	-.003**	-.041	.003***	-.003**	-.005***	.004***	-.027	-.002	.129
	4	.168***	-.018***	.000	.000	-.021*	.002***	-.002***	-.002***	.002***	-.016	-.012	.861
	5	.146***	-.016***	-.001***	-.002***	.068***	.003***	-.003***	-.002***	.002***	-.020	-.020	.842
	6	.227***	-.023***	.001***	.002***	-.009	.002***	-.002***	-.003***	.004***	-.039	-.030	.755
Beta	1	11,285***	-.979***	-.016	-.117***	2,370**	.181***	-.189***	-.187***	.189***	-1,66	-1,002	.635
	2	1.741***	-1,115***	-.008	.060**	-2,482***	.121***	-.112***	-.120***	.122***	-1,935	-1,737	.824
	3	8,951***	-.673***	-.060***	-.029	-4,147***	.098***	-.058***	-.116***	.098***	-1,394	-.797	.741
	4	3,510***	-.430***	-.001	.008	-1,002***	.036***	-.030***	-.046***	.071***	.615	.570	.735
	5	1,969***	-.259***	.009*	-.008	2,057***	.008	-.010	-.002	-.014*	-.033	-.195	.593
	6	2,112***	-.125***	.023***	.074***	-1,014***	-.042***	.027***	.011	.028***	-.627	-.584	.271
CAPM	1	-.814***	.075***	.003	.013***	-.273***	-.016***	.016***	.015***	-.014***	.130	.076	.609
	2	-.580***	.073***	.000	-.005***	.140**	-.006***	.007***	.007***	-.008***	.101	.100	.812
	3	-.719***	.060***	.006***	.007***	.213***	-.011***	.007***	.011***	-.008***	.109	.055	.702
	4	-.488***	.052***	.003***	.006***	.004	-.009***	.006***	.007***	-.007***	.031	.004	.754

	5	-.245***	.032***	.001*	.004***	-.167***	-.005***	.003***	.003***	-.001	.060	.058	.728
	6	-.058	.010***	-.002***	-.008***	.112***	.005***	-.003***	-.002**	-.002**	.034	.037	.307
CAR	1	.805***	-.071***	-.003	-.013***	.295***	.016***	-.016***	-.015***	.013***	-.139	-.079	.602
	2	.555***	-.070***	.000	.004***	-.086	.006***	-.007***	-.007***	.009***	-.091	-.090	.784
	3	.707***	-.055***	-.007***	-.009***	-.198**	.012***	-.008***	-.012***	.009***	-.123	-.064	.647
	4	.502***	-.054***	-.003***	-.007***	.036	.010***	-.007***	-.008***	.008***	-.028	-.002	.746
	5	.259***	-.037***	-.002***	-.006***	.193***	.007***	-.005***	-.004***	.002***	-.056	-.059	.744
	6	.017	-.005	.002***	.007***	-.086***	-.004***	.003***	.002***	.002***	-.026	-.029	.352

Significant at *** p < 0.01, ** p < 0.05, and * p < 0.10. Where MKT – the nat. logarithm of MOEX index price, CVD1 – the nat. logarithm of Covid-19 new cases, CVD2 – the Covid-19 daily recovery rate, CVD3 – the Covid-19 daily mortality rate, CVD4 – the nat. logarithm of Covid-19 new recoveries, CVD5 – the nat. logarithm of Covid-19 new deaths, OIL1 – the nat. logarithm of WTI oil Futures price, OIL2 – the nat. logarithm of WTI oil Spot price, ER1 – the nat. logarithm of USD/RUB exchange rate (measured in Russian Rubles), ER2 – the nat. logarithm of RUB/USD exchange rate (measured in US Dollars). Total number of observations = 462