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THE IMPACT OF FINANCIAL POSITION ON MARKET VALUE DECLINE DURING ECONOMIC SHOCKS. EXAMPLE OF Covid-19 CRISIS

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.
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ABSTRACT

The Covid-19 pandemic caused plenty of negative economic consequences worldwide - lockdowns, travel restrictions, and uncertainty about the future led to the crash of companies' stock market prices in different sectors in different countries. This paper aims to find what fundamental indicators from the companies' financial reports impact the stock price change in the period of economic shock caused by the Coronavirus disease 2019 (Covid-19) crisis and determine the relationship between these indicators and market value decline.

The paper will study a) what fundamentals are statistically significant in explaining the decline of the market value resulting from the Covid-19 outbreak, b) do the bankruptcy prediction models' components impact the deepness of decline, and c) do the determinants of the decline differ by companies of different sizes and different.

To fulfil the aim of the master thesis, the author uses the cross-sectional regression model on the ground of 3034 companies with capitalisation of over 1 billion US dollars from all over the world. The leading fundamental indicators impacting a stock price decline were detected and estimated: cash holdings, indebtedness, a short-term debt ratio of total debt, market-to-book value, and volatility of previous periods. Cash holdings, short-term debt ratio, and market-to-book value have positive relations, and others have negative relations to the stock price decline. Also, bigger companies meet more modest declines than smaller companies, ceteris paribus. Bankruptcy models' components do not have a significant impact on the market value decline. The fundamentals explaining the decline of market value differ for companies of different sizes and countries of origin.

Keywords: Covid-19, stock prices, financial analysis, fundamental analysis

INTRODUCTION

The decline of the market value of financial assets is an inevitable attribute of most economic shocks. Investors in panic sell their stocks; bearish behaviour prevails in most markets, and many entities go bankrupt. It happened during the global financial crisis (2007-2009) and during the Covid-19 pandemic, which spread at the beginning of 2020. Regardless of the different nature of these two economic shocks, the consequences are similar – market collapse in the first days, a decline in the market value of most public companies, and severe economic problems for years.

Every investor with a long-term investing horizon should understand how sensitive is they assets' value towards economic commotions – will the firm survive after the next economic shock or not, and which losses the investor will face if the pessimistic scenario realises. The analysis of a company's fundamentals is the default variant, available for every investor to predict the stability of the entity towards economic shocks. This paper tries to find such fundamentals that would explain the decline of stock price during the outbreak of economic shock on an example of Covid-19.

The main aim of the current master thesis is to find what fundamental indicators from companies' financial reports impact the stock price change in the outbreak of the Covid-19 crisis and determine the relationship between these indicators and market value decline. The change in the stock price resulting from the Covid-19 pandemic is considered abnormal in this paper.

The main questions paper tries to find the answer to:

1. What fundamental indicators of the companies impact the decline of stock prices in the period of uncertainty caused by the outbreak of economic shock?
2. What values of fundamental indicators mitigate the decline of stock prices during economic shocks?
3. Do the bankruptcy prediction models' components impact the stock price decline during a pandemic?

4. Do the determinants of stock price changes in the Covid-19 differ between companies with small and large capitalisation and between United States (US) and European Union (EU) companies?

The hypothesises are the following:
Hypothesis 1: Stock returns of the companies with higher financial leverage and lower cash holdings are more sensitive to the Covid-19.
Hypothesis 2: Bankruptcy prediction models' components are statistically significant variables of stock price change in the period of economic shocks.
Hypothesis 3: The fundamentals determining the changes in stock prices are the same among companies with different capitalisation sizes and the US and EU countries, but their estimates vary.

This paper includes three parts – 1) an overview of the literature, 2) describing the data and metrics, and 3) results of empirical analysis. The first part describes the reaction of the stock market to economic shocks in the past and specifically on the outbreak of Covid-19; describes the determinants of the stock returns from the theoretical literature, studying the general determinants of stock returns and specifically determinants of abnormal stock returns in economic shocks. Financial leverage and cash holdings will be considered more detailed, as they are supposed to be the most important determinants of abnormal stock returns. Also, the theoretical part includes the main bankruptcy models and their description because bankruptcy prediction models' components are supposed to impact the decline. The second part describes the data and the methodology used in empirical analysis. The third part reviews the results of empirical analysis and presents the findings.

The theoretical review will consider empirical findings of the papers, studying earlier economic shocks to understand how the outbreak of these shocks affects the companies and stock returns and what fundamental characteristics of the companies help mitigate the negative effect of the crises. Especial attention will be put on the Covid-19 pandemic and its impact on stock returns. These findings will be used in the empirical part of this paper.

1. STOCK RETURNS AND THEIR FLUCTUATIONS DURING ECONOMIC SHOCKS

Every outbreak of economic shock is usually accompanied by an increased level of anxiety among investors, downwards trending sentiments, which lead to overreaction in the stock market, in the face of a quick and severe decline in stock returns (Burns, Peters, & Slovic, 2012). Investors become more pessimistic about near future cash flows. In periods of such turbulence, investors prefer to take fewer risks or get higher premiums for compensating the risk of uncertainty prevailing in the market. Such anxiety leads to pessimism in the market and impacts investment decisions, which, in turn, carries the decline in stock prices (Kaplanski & Levy, 2010). Because of the interdependence of stock markets, the correlation of stock returns between different assets increases during the period of economic shocks (Chiang, Jeon, & Li, 2007), which means that the decline in one sector will lead to declines in another industry and affect the market in a whole. The global market today is so interlinked that a crisis in one country will affect another country as well, which, in turn, will affect the stock movements in both locations (Morales & Andreosso, 2012). The impact of the past economic shocks on the stock market movements and the stock market's reaction to the Covid-19 pandemic will be discussed in the following sections.

1.1. Stock market reaction to economic shocks in the past

This part will describe the most significant crises for the last 35 years from the 1987th year. The stock market crash of 1987, on October 16, is known as “Black Monday”, when Dow Jones Industrial Average Index (DJIA) collapsed by 22,61% in one day. Collapse is explained by the dollar's decreasing value and the Iran-American political conflict. Asian and Russian Crises in 1997-1998 caused a decline of DJIA by 7,18% in one day. Hong Kong Stock Exchange lost in the same time 33,4% in eight days. Further Russian crisis led to a 4% fall of DJIA on the news of collapsing Russian exchange market and then a 6,37% fall on August 31, 1998, reasoned by a combination of the deterioration of the Asian and Russian crises. Terrorist attacks on September 11, 2001, caused stock DJIA to fall by 7,13% and a further 4,37% on September 20, 2001, after the military counterattack against the Taliban system in Afghanistan. The global financial crisis

caused the loss of almost 7% of DJIA value in one day on September 29, 2008, and a further substantial fall -7,33% on October 9, 2008, explained by the supreme mortgage crisis in the USA. (Amélie Charles, 2012)

During economic shocks, the volatility in financial markets becomes incredibly high. The average yearly standard deviation of the US stock market from 1802 to 2010 was 13%, while the standard deviation during Great Depression in the USA (1929-1939) jumped to 30% per year. The typical standard deviation per month is 4%, but during the global financial crisis (2008-2009), the average standard deviation was estimated as 8% – twice as normal. The standard deviation of US markets in 2000-2002 during the "Dot-com bubble" exceeded 8%. The daily standard deviation during the global financial crisis in 2008-2009 was more than four times higher than average (0,7% on average and above 3% during the crisis). The highest daily standard deviation from 1802 to 2010 within US stocks was observed in 1987 when the standard deviation reached 8,7% for the S&P index and 24,1% for S&P futures (Schwert G. W., 2011). The vulnerability of companies' stock movements is enforced by the differences in fundamental characteristics of companies' finances and risks. It means that the stocks' price changes depend on an individual company's fundamental characteristics and these characteristics contribute to the sustainability of the company's market value during different economic shocks. (Singal, 2015)

1.2. Stock markets' reaction to the Covid-19 crisis

The collapse of financial markets caused by Covid-19 in March 2020 was one of the most severe in history. Financial markets and economic growth were declining as the people's health and lives were under threat. Announcements of new cases and deaths caused by Covid-19 led to panic in financial markets. S&P500 index dropped by 31,52% from the beginning of 2020 until March 23rd, reaching the maximum drawdown of 12,77% per day (Just & Echaust, 2020). S&P500 reached the maximum on 19 February ($3386,15) and fell over 30% by 23 March 2020.

The S&P500 daily standard deviation tripled from 0.69% in February to 2,68% in March (Zhang, Hu, & Ji, 2020). The Brazil exchange fell by 46%, the Hong Kong exchange by 25%, the Italy exchange lost 41%, and Japan lost 31% of their initial value (Ding, Levine, Lin, & Xi, 2021). The dynamic conditional correlation between non-financial companies from G7 countries and China has increased remarkably (Akhtaruzzaman, Boubaker, & Sensoy, 2020). A lot of other stocks

around the world have fallen similarly. Dow Jones Average Index dropped 26% in four days. US GDP fell 4,8% in the first quarter, and the unemployment rate reached 20%. UK's main index FTSE fell more than 10% per day on 12 March; Japan's stock market dropped more than 20% from its December position (Zhang, Hu, & Ji, 2020). European countries faced extreme risks at the same time. Many businesses were forced to stop their operations – governments imposed the quarantine requirements, and businesses began to cut their labour costs. As a result, economic output and level of consumption remarkably diminished. Subsequently, the expected future cash flows of the companies were under threat. Around 90% of the S&P1500 stocks have generated asymmetrically distributed negative returns.

The reaction of different industries in different stages also varies. The real estate sector and consumer services performed neutrally during the incubation period and in the outbreak but fell as the health crisis grew. Oil companies in the USA get into recession already in the incubation stage, and the negative effect of Covid-19 was enforced by decreasing the oil price. The companies operating in the crude petroleum sector, real estate, hospitality, and entertainment have declined by over 70%. In contrast, firms in the natural gas and chemicals sectors generated above 10% of positive returns on average. Some performers in software, technologies, natural gas, food, and healthcare industries faced a market capitalisation growth of over 20%. Compared to the financial crisis in 2007-2009, when the stock market decline was quite durable, the Covid-19 crisis impact was much quicker, and a sharp fall happened in a few days. For the first time in economic history, the stock market was not related to bad fundamentals or a "market bubble". (Ramelli & Wagner, 2020)

The best performing sectors were software and technologies (especially supporting online working), food and grocery, healthcare, and natural gas. The average monthly positive return of the companies in such industries exceeded 20%. Extreme negative returns were accompanied by extreme volatility (average volatility in the entertainment and hospitality sectors reached 20%). In contrast, companies with high returns had lower volatility, regardless of the industry and average volatility indicators in this industry before the crisis. Asymmetric volatility (higher volatility and negative returns) can be theoretically explained by the financial leverage effect (Schwert, 1981), or short-sale constraints and heterogeneous beliefs of investors (Hong & Stein, 1999).

Asian countries reacted to the outbreak of Covid-19 quicker than companies from other countries. The decrease in stock returns in Asia is also more significant than in other countries (Liu, Manzoor,

Wang, Zhang, & Manzoor, 2020). Some companies from other countries also faced a decline in the returns in the incubation phase of Covid-19 (Jan 02 – Jan 17), but only those companies that had tighter ties with Asia, particularly with China. Companies that trade more internationally than domestically also met the decreased returns in the early stages of the Covid-19 spread. It shows the first signs of a fear that international trade is under threat. By the end of February, the health situation in China began to improve, and stocks started to turn up, expecting the recovery of the economy of China, despite the worsening situation in Europe and USA. (Ramelli & Wagner, 2020)

The global market has become very volatile, and financial risk has jumped because of the high uncertainty of future market behaviour (Zhang, Hu, & Ji, 2020). Investors expected the real, not only financial consequences of the pandemic outbreak. The behaviour of society and political decisions were hardly predictable in the background of the quick spread of the virus and mortality rates, so any attempt to predict the developments was complicated. Future cash flows were unsure, and discount rates were impossible to assess fairly because of high uncertainty.

According to psychology literature, the financial market tends to overreact to the news related to outbroken crises. Panic spreads in the market, leading to heightened global volatility (Haroon & R.Rizvi, 2020). It was also observed during the Covid-19 outbreak that the negative impact of the disease on investors' sentiments resulted in wrong financial decisions, which, in turn, impacted the stock market and entities' prices. Such fears are channels for transmitting pandemic effects on financial markets (Liu, Manzoor, Wang, Zhang, & Manzoor, 2020). Wang et al. (2020) find that such sentiments are noisy and informationally harmful. They impose more damage to stock market sustainability than the Covid-19 itself. That can be demonstrated by Akhtaruzzaman et al. (2020) findings that the decline of stock returns of non-financial entities did not correlate with the number of cases and deaths in the US and other G7 countries.

The variance and stock returns have been influenced by the number of deaths in Italy – then started the first panic in the media (Just & Echaust, 2020). Ding et al. (2021) found that cases in Italy are an important signal for stock markets in countries near Italy. The number of cases in China was not important until the moment when it was clear that the virus would spread out of Asia.

1.3. Determinants of stock prices' fluctuations

This chapter will overview the main findings from the literature concerning the relationship between companies' fundamental characteristics and their stock returns. It is important in the context of the current study because it will give an initial list of variables, that potentially could explain the change in stock price during economic shocks. The ability of fundamentals to describe the changes in stock return during a pandemic will be checked in the empirical part.

The problem of stock price changes, and their determinants is thoroughly studied by different authors and there are lots of different approaches to assessing the value of the company and predicting the stock returns. Stock price fluctuation reflects the changes in investors' view on the firm's fair value, which, in turn, reflects the investors' expectations of future cash flows the company will generate (Damodaran, 2012). In other words, the behaviour of stock price depends on how the market participants evaluate the fair price of the company and whether they are ready to buy it for the current price. The main determinants of fair market value are discussed in this chapter to understand the main factors impacting the stock returns.

There are three main approaches to evaluate the enterprise value of the company – method of discounted cash flows, comparable method, and the third one – the assessment of the contingent claim. The first method of discounting the cash flows assesses the expected cash flows of the companies and adjusts them with the discount rate. The calculated result is a projection of fair value. A cash flow, in the case of stocks, usually is considered dividends. The comparable method compares the price ratios to some results of one company with industry averages (to earnings, sales, cash flows, book value, etc.). The most popular ratios are P/E (price to earnings per share), Tobin's Q (market value to book value). These variables are important to point out because they will be used in the empirical part. The third method implies the existence of the options (financial options and real options) that can be used to assess the company's fair value. (Damodaran, 2012)

Such ratios like price-to-earnings (P/E) and market-to-book value (P/B) were also proven to predict the stock return in the following periods. Companies with a smaller P/B ratio tended to generate a higher return in the following years – thus, companies with a P/B value less than 1,0 have generated an average of 32,3% in 1988-2019 years in Helsinki exchange. In addition to the P/B ratio, it is important to consider the company's level of profitability – a company with a high profitability ratio (ROE or ROA) generates a higher return in the following periods. A study of

S&P500 returns found that the ratios “price to cash flow”, “price to sales”, and the return of shares in the previous year are also statistically significant determinants of stock return in the following year (Saario, 2020).

Allen and Rachim (1996) found the significant negative impact of dividends' yield and pay-out ratio on the stock price return – higher dividend pay-outs (in per cent and in absolute values) lead to smaller stock return and vice versa. Hussainey et al. (2001) suggest that the size and debt level of the share issuer have the highest correlation with the stock price change. The bigger size of the firm leads to lower price volatility, and the higher level of debt (financial leverage) leads to higher volatility in the stock market – more leveraged companies’ stock prices will be more volatile. It indicates the existence of a relationship between a company’s size, financial leverage and stock returns.

Another factor influencing the further volatility is volatility itself in previous periods (Campbell, Hilscher, & Szilagyi, 2008) – price fluctuation in the past causes the investors to request a higher risk premium, which equilibrates prices, reinforcing the impact of bad news and offsetting the impact of good news.

Companies with higher default risks tend to release extraordinary bad or extraordinary good news, suggest Habib et al. (2018), which leads to heightened volatility of the stock market price. Kim et al. (2011) found that the main proxy for default risk is financial leverage and the company size. On the contrary, Campbell (2008) found that companies with higher leverage are generating higher returns than companies with lower financial leverage. That can be explained by the under-pricing of highly leveraged companies (Habib et al., 2018). But anyway, financial leverage reflects the high fluctuations of stock prices of such companies.

Another reason for the high volatility of stock prices can be the fundamental nature of the company’s operations. Resource companies, which are sensitive to the changes in their product prices, and insurance companies with large claims and heightened risks – this means they are prone to the higher volatility of a firm’s stock price. (Habib et al., 2018)

Chen et al. (2017) suggest that higher volatility of earnings leads to higher volatility of stock prices and greater risk of price crash. But this factor is being mitigated with a growing share of institutional shareholders in the ownership structure. Kim et al. (2014) find that companies with

strong corporate social responsibility (CSR) face a lower risk of stock price crashes. Another risk associated with CSR is the risk of "impression management", trying to hide the poor performance, covering it with engagement in CSR. Chang et al. (2016) find the stocks' liquidity as an important proxy of future volatility, meaning that the effect of bad or good news on companies' stock prices will be bigger if the liquidity of the asset is higher (so it's easier to buy or sell the asset quickly). Callen and Fang (2016) suggest that the heightened interest in short sales will increase the risk of a stock price crash in the future, implying that short-sellers know something others don't consider. Habib and Hasan (2017) found that innovative business strategies are more prone to the risk of future price crashes.

Financial leverage and cash holdings as a determinant of a firm's market value change will be studied under more scrutiny in the following paragraphs because they are supposed to be the most important determinants of abnormal returns because of economic shocks.

1.3.1. Financial leverage as a determinant of stock returns during economic shocks

Financial leverage is one of the determinants of the cost of capital and overall financial risk. A higher level of leverage (or higher proportion of debt in the capital structure) means a higher risk of default, higher volatility of net earnings, and from another side, increased return on equity (Baker & Martin, 2011). There are dozens of different theories and approaches, assessing the role of capital structure in companies' performance and describing the stocks' return with significantly different views. The classical theory of Modigliani-Miller claims that the source of the capital is irrelevant to companies' value, so it can't affect stock prices because they depend only on the level of effectiveness the firm uses the resources (Modigliani & Miller, 1958). Durand (1952), on the contrary, presents two models of evaluating investment value, and both of them consider the capital structure as an important determinant of the company's value. Robichek and Myers (1966), Baxter (1967), Bierman and Thomas (1972), and Kraus and Litzenberger (1973) found that capital structure can't be irrelevant to equity value and optimal structure must exist. Further developments find that smaller companies with higher risks with more volatile cash flows should be less indebted (Bessler et al., 2011). This could mean that cash holdings' proportion of financial leverage could affect the stock performance of the company. Larger companies with higher profits should borrow less in order to achieve the optimal structure which would maximize the company's value (Frank, Z., & Goyal, 2009). Increasing the proportion of debt impacts the value of the company because the interests are tax-deductible. On the other side, increasing debt is accompanied by an increased probability of default and incurring bankruptcy costs. In other words, the company will borrow

until the optimal point, while the value from every next borrowed dollar compensates for the increase in potential bankruptcy costs, maximizing benefits and minimizing costs of issued debt (Kraus and Litzenberger, 1973). This could mean a non-monotonic effect of financial leverage on the firm's value.

Another approach describing the dependence of company performance on financial leverage is the agency cost hypothesis. The agency-cost hypothesis implies that greater leverage will reduce agency costs by pressing managers and threatening the liquidation of the company and subsequent loss of personal income and reputation of managers (Grossman & Hart, 1982). Such an approach also claims that managers will be interested in maximizing the company's cash flows to meet the liabilities. A conflict between managers and shareholders concerning the choice of investments (Myers, 1977), risk-appetite (Williams, 1987), and dividend policy will be mitigated (Stulz, 1990). But this effect is not monotonic – agency costs will decrease with increasing the level of indebtedness if the current level of financial leverage is low. Still, when leverage is high, further increase leads to growing agency costs. (Jensen and Meckling, 1976)

There are also two contradictory approaches – the efficiency-risk hypothesis and the franchise-value approach. The efficiency-risk hypothesis claims that more efficient firms use less equity and more debt in order to generate higher returns on shareholders' capital. The franchise-value approach affirms reverse - more efficient companies tend to reduce their risks and gain their equity, not debt (Bessler et al., 2011). In other words, leaning on efficiency-risk theory, higher leverage must generate growing cash flows and consequently higher stock returns. Based on the franchise-value approach, the higher leverage will signal inefficiency in the companies, which will lead to lower stock returns.

Berger and Bonaccorsi Di Patti (2004), exploring the banking industry, confirms the agency-cost hypothesis, that a higher level of debt improves the performance of observed companies. Controlling the efficiency-risk hypothesis and franchise-value hypothesis, they found that the efficiency-risk hypothesis works on highly efficient companies and the franchise-value hypothesis works on firms with lower efficiency. Margaritis and Psillaki (2010), exploring French companies, also confirmed the agency cost hypothesis.

Financial leverage is costly. It includes direct and indirect costs. Direct costs are interest costs and all costs related to issuing debt, and indirect costs can be exposed as inefficient asset sales, lost

business benefits because of financial constraints, and dependable (from bondholders) investment policies (Opler & Titman, 1994). At the same time, financial leverage can generate some benefits for the enterprise. Wruck (1990) claims that financial leverage could be a driver for the implementation of organizational and operational changes. That can be a reason that executives of highly leveraged companies lose their jobs more often than in companies with lower debt ratios. Higher financial leverage could be beneficial for shareholders of the public-trade companies, which ratio of market value to book value is low (Lang, Ofek, & Stulz, 1996). That could mean the necessity of calculating such a variable, that would take into account the financial leverage ratio to market-to-book value in order to describe the changes in stock market prices.

In other words, the net effect of financial leverage depends on the difference between the positive power of benefits and the negative impact of costs. If the disciplinary role of leverage is more important than additional costs, the company will overperform the companies with less debt. If the debt costs will overwhelm the benefits of financial distress, such a company will perform worse.

Opler and Titman (1994), exploring US firms, found that highly leveraged companies have lower operating profits, and lose market share during turndowns (which can lead to negative stock returns). Gonzalez (2013) got the same conclusions, exploring firms in 39 different countries. During economic turndowns, the performance of companies with higher debt ratios is lower, than the performance of companies with a higher proportion of equity. Such a conclusion is valid also in a non-distressed economic situation. Furthermore, the recovery from turndown does not depend on the level of leverage. Such conclusions signal the existence of a positive relationship between the stock returns and financial leverage.

However, such an effect varies across different countries, depending on the legislation, and industries. If the industry is experiencing low operating performance, the negative effect of debt is more significant, than in other industries with higher average performance. This is observed especially in countries with civil law legislation. Companies, working in French legislation show the positive relationship between leverage and performance, implying that a firm's financial leverage encourages its management for operational changes and growth of efficiency. Also, Gonzalez (2010) points out that the disciplinary role of financial leverage is higher in countries, where the banking system is developed better than the stock market, where the banking system is more concentrated, and economies are underdeveloped.

The relation between debt ratio and total performance of the company is not monotonic, according to Coricelli et al (2012) - total productivity grows with debt ratio until a certain point, and then starts to decline. Vithessonthi and Tongurai (2015) found that financial leverage is negatively related to performance in firms, oriented to the domestic market, and related positively to companies working internationally. It can be explained by a wide range of investment opportunities international companies have, unlike domestic companies. Lang et al. (1996) suggest that the current level of debt harms the future growth rates of the company.

Cai and Zhang (2011) suggest that companies with higher levels of debt have lower stock returns, and changes in leverage ratio in one period affect the stock return in further periods. The effect is robust for companies of different sizes, betas, performance measures, and book-to-market ratios. An increase in leverage leads to a decline in real investments in the future, as suggested by Myers (1977) because an increased debt ratio leads to reducing the number of positive NPV projects in the further periods. That's caused by lower payoff from investments after fulfilling obligations, related to the debt. Cai and Zhang (2011) conclude that stock prices of the firms are sensitive to high financial leverage, and, moreover, companies with an initially high level of debt, higher default risk, and having more financial constraints, suffer more severely from the increasing of the financial leverage. The negative relationship between financial leverage and stock prices is also observed in financially healthy companies. That finding suggests that default risk is not only one reason for declining stock prices after such changes in financial leverage but can be explained by changes in expected future cash flows. Cai and Zhang (2011) claim that quarterly change in debt ratio has an immediate reaction on stock prices in the following quarter. On the contrary, Eckbo et al. (2007) suggest that the decrease in financial leverage leads to lower returns and an increase in financial leverage leads to higher returns because of asymmetric information, existing on the stock market.

Dimitrov and Jain (2008) claim about the negative relation between current and following years' stock returns and changes in debt ratio, because of decreasing future earnings. They explain it by giving a signal to the market of the weakening performance of a company, which is expected to decline in the future. Finding the negative correlation between financial leverage and future returns, the authors claim that when a company issues debt disproportionately to the change in total assets, the economic performance of such a company is poor. And, vice versa, if a company's issued debt is lower than a change in total assets, the economic performance of the entity is better

than expected. Conelly et al. (2012) find no relationship between financial leverage and companies' market value ratio to book value.

The study of Gulf Cooperation Council countries showed that financial leverage, as a part of capital structure, was one of the most important factors, negatively influencing companies' performance before and after the financial crisis of 2008-2012. During the crisis, the amount of debt was increased, and borrowings were made with higher costs leading to a decline in the operational performance of a majority of firms (Zeitun and Saleh, 2015). Bancel and Mitoo (2011), studying French listed and non-listed companies, considering capital structure as a determinant of financial flexibility of a company, found that low financial leverage together with high cash holdings, internal funding, and low short-term debt are significant factors, determining financial flexibility of an enterprise and subsequently reduce the negative impact of the global financial crisis. They also suggest that it's highly important to consider operating, financial, and liquidity ratios together, not only individual ratios of debt. A study of Thailand companies shows that the financial leverage has a positive effect on the performance of small companies and a negative effect on the performance of large companies during the financial crisis 2007-2009. (Vithessonthi & Tongurai, 2015)

1.3.2. Cash holdings as a determinant of stock returns during economic shocks

Another important determinant of stock price changes is the company's cash holdings which give the firm several advantages and impact its value. Large cash holdings foster companies to invest more in the development of the products and to extend their share of the market (Chevalier & Scharfstein, 1996). Additionally, larger companies are more resistant to the crisis and economic turmoil, because they have sufficient amount of resources to cover the unexpected expenditures. This has a favourable effect on the strategic advantage over the competitors because allows the firm to use an aggressive pricing policy (Bolton & Scharfstein, 1990), which may be especially important during general economic turndowns. Companies with larger cash holdings are more mobile and open to restructuring, they are able to fund more competitive choices (like relocation to more profitable places or the construction of more effective networks), and they have more opportunities for advertising and employment of more qualified employees. (Campello, 2006)

Large cash holdings are able to prevent the entering the market of new competitors or extend the market share of current competitors, conducting aggressive marketing and pricing policy, distorting rivals' actions in the market (Fresard, 2010). That also proves Fresard (2010), who

claims that companies with larger cash holdings tend to expand their market share more and quicker than other companies with smaller cash holdings. Moreover, Fresard (2010) finds that the factor of large cash holdings is especially sensitive to companies' performance, when a company's competitors in the same industry, in general, have weaker liquidity. That indicates a necessity to consider the cash holdings relative to the industry averages, not separately. The company's performance in foreign markets is more sensitive to cash holdings than in domestic markets. Companies in the technology industry also require more cash to generate better performance.

During the global financial crisis of 2008, large cash holdings also showed their impact on the performance of the company. Campello, Graham, and Harvey (2009) found that companies with smaller cash holdings tend to cut their expenditures on research and development, and reduce employment and investments to cope with financial obstacles. Cash-rich companies managed to benefit from the crisis, gaining their position in the market when the downturn ended. So it will be reasonable to say, that companies with larger cash holdings tend to grow their expected future cash flows. That will increase the market value of such companies, as was found before.

The classical pecking order theory of capital structure, based on information asymmetry, claims that companies are inclined to prioritize the sources of financing, preferring, firstly, internal resources (retained earnings from previous periods, cash holdings), secondly – debt, and lastly – raising equity. If a company raises capital through debt, it signals insufficient retained earnings; issuing equity could be the signal of the inability of a company to borrow money (indicating, that company is overvalued) (Myers, 1986). Using firms' cash holdings rather than debt gives a signal to the market about the confidence of the company in future cash flows, which, in turn, gives a positive reference to the market value. That again could mean that cash holdings are related to a stock price change in the future.

On another side, cash holdings may reference the heightened business risk, limitations to external financial sources, and riskier cash flows (or cash flow fluctuations in near-future), which could motivate entities to hold more cash (Bates, Kahle, & Stulz, 2007).

1.4. Determinants of stocks' prices changes in the period of Covid-19

As mentioned before, the differences in companies' characteristics can affect the fluctuation of the stock prices. This chapter provides information about findings, what fundamentals describe the stock's vulnerability specifically related to Covid-19 pandemic outbreaks, and how these fundamentals are related to the stock returns during the Covid-19 pandemic.

Ramelli and Wagner (2020) studied the reaction of stock prices to Covid-19 and found that financial leverage and cash holdings are important determinants of abnormal returns, which confirms the findings described in the previous chapter. Ding et al. (2021) also find that some pre-pandemic characteristics predetermine the stock price reaction to the outbreak of the Covid-19 pandemic – cash, unused credit lines, low financial leverage, low short-term debt, larger profitability – these indicators predict the better stock performance compared to other companies. That is explained by liquidity, being ensured by these indicators, that is necessary to meet obligations in uncertain market conditions to cover current and unexpected costs.

Companies with lower liquidity (smaller amount of cash) and a high indebtedness suffered more than companies with sufficient cash holdings and a moderate level of debt in the same industries in the period 24 February – 20 March. The size of cash holdings describes the one-sixth of the standard deviation of stock abnormal return and market beta with financial leverage describes another one-sixth of the standard deviation. Cash holdings show the importance already in the first stages of the pandemic (20 January– 21 February) mainly because of the initial rise in uncertainty during this period. Further spread of the pandemic only increases the importance of cash holdings – one standard deviation of cash growth (25,8%) leads to a 2,99% higher cumulative return in the period of 24 February – 20 March (if other characteristics remain the same). This is explained by the ability of the companies with large cash holdings to diminish the risk of bankruptcy and save their human and physical capital in the company. Additionally, cash holdings give an ability to undertake new investments as soon as the market comes into the recovery phase. Financial leverage is a more important factor for investors in cash-poor companies rather than in value companies. Financial leverage is a more important determinant in companies with a more severe decline in stock prices. In other words, the severity of the hurt of the Covid-19 pandemic increases the importance of financial leverage in describing the abnormal returns. The level of long-term debt must be more significant than short-term debt, which didn't prove its impact on the abnormal stock returns (Ramelli and Wagner, 2020). Ding et al. (2021) find that one standard deviation

change in return is negatively associated with a 3,25% change in financial leverage and a 3,5% change in cash holdings. Lins et al. (2017) found a similar magnitude in Global Financial Crisis, claiming that a standard increase in cash holdings led to 3,48% change and one standard increase of leverage led to -2,16% change in stock return. Companies with a larger proportion of short-term debt tended to have a more severe decline in stock returns during the pandemic.

Companies with higher profitability ratios performed relatively better from 24 February to 20 March of the 2020 year because of higher resilience to potential falls in companies' cash flows. Firms with higher book-to-market ratios performed worse if the industry effect was not controlled. The investment horizons could explain it – companies with high book-to-market ratios are expected to generate cash flows in the near time. In contrast, firms with low book-to-market ratios are the companies with growth expectations, and near-time cash flows are not the subject of investors' interest. The interaction between book-to-market value and financial leverage is also important to point out – companies with higher book-to-market value are more sensitive to high levels of indebtedness, and companies with lower book-to-market value didn't show such a significant relevance of financial leverage on the stock return. That is explained again by the focus of the investors on near-future cash flows of companies with high book-to-market value companies. (Ramelli and Wagner, 2020)

Companies with high exposure to China show the dependence of risk-adjusted return on the firm's beta. Low-beta stocks with lower dependence on China underperformed in the down-trending market. High-beta stocks with higher interdependence with China companies showed better performance in the period of 24 February – 20 March (Ibid.). Companies with international supply chains and more exposure to the international market (with a bigger proportion of international clients) were suffering more from the outbreak of the Covid-19, and it was reflected in their stock price returns (Ding et al., 2021). Low-beta stocks in general, performed poorer in this down-trending market (Ramelli and Wagner, 2020).

The companies, investing in Corporate Social Responsibility (CSR) in pre-pandemic periods show more stability to Covid-19 outbreak and higher stock prices return. This supports the main idea of CSR principles – to strengthen companies' sustainability, their relationships with employees and society – the local community, and also customers. The stockholders of such companies tend to support the business in times of economic turbulence (Ding et al., 2021). Albuquerque et al. (2019) show that companies investing in CSR meet the higher loyalty of the clients, and these firms'

sensitivity to financial turndowns is lower (Lins et al., 2017), which potentially could mean the higher stock returns.

Ding et al. (2021) also find that stock markets view the executives' entrenchment as a negative signal, meaning that entrenched executives will not be able to respond to pandemic challenges effectively. The impact of board structure or executives' compensation systems didn't find the proof. The structure of the ownership is important in describing the reaction to the pandemic – companies controlled by families showed better performance and more resilience in stock returns. Companies belonging to the government and banks also showed better sustainability in the pandemic outbreak. That can be explained by the "large pockets" of the owners, allowing them to support the business in a period of economic turmoil. Companies with a big share of hedge funds in the ownership structure showed worse stock performance during the pandemic, which may be caused by the heightened level of risk and financial leverage the hedge funds use in their daily operations.

Stock markets also react to the changes in governmental policies concerning the pandemic – social distances, lockdowns, fiscal stimulus, and governmental debt purchases, but there are not found any links between financial indicators of countries and the performance of their stock markets. (Ibid.)

1.5. Risk of financial distress

One of the reasons why the company's stock prices are going down during economic shocks (including the Covid-19 pandemic) may be the growing risk of bankruptcy of the company. This suggestion is also presented as one of the hypotheses in this master thesis. To check this hypothesis, it will be reasonable to consider the main bankruptcy scores and separately the ratios, used in these bankruptcy scores. These findings will be tested in the empirical part.

One of the most popular bankruptcy prediction models is the model of Altman, which main focus is directed to manufacturing companies (known as the Altman Z-score). His formula considers such variables as profitability, liquidity, leverage, solvency, and activity. The formula suggests the likelihood of bankruptcy of the company, giving to firm a score from 0 to 3, where 0 is potential

bankruptcy and 3 – is excellent financial position. To every ratio from the list above, Altman assigns a coefficient. Z score components and their coefficients are following (Altman, 1968):

- working capital to total assets (with coefficient 1.2);
- EBIT to total assets (with coefficient 3.3);
- retained earnings to total assets (with coefficient 1.4);
- sales to total assets (with coefficient 1.0);
- market value to total liabilities (with coefficient 0.6).

Another way to assess the bankruptcy risk is the model of Zmijewski (1984). Zmijewski uses the same logic – takes into account the financial ratios of the company and put them into the model, which aim is to predict the bankruptcy in two following years. The result of the model is a probability of bankruptcy. A score less than 0,5 means a higher probability of default. The components of the model are the following:

- net income to total assets (with a coefficient of -4,513);
- total liabilities to total assets (with a coefficient of 5,679);
- current assets to current liabilities (with a coefficient of 0,004);
- the intercept used in this model is equal to -4,336.

The third model considered in this study is the model of Shumway (2001). He takes into account the following components:

- net income to total assets (with coefficient -1,982);
- total liabilities to total assets (with coefficient 3,593);
- relative size (with coefficient -0,467);
- excess return (with coefficient -1,809);
- stock volatility (with coefficient 5,791);
- intercept -13,303.

Relative size is the logarithm of a company’s market value divided by the total indices value. Excess return is defined as a difference between the monthly return of the firm and the indices' return. Shumway (2001) was using NYSE/AMEX market for these calculations. Stock volatility is a daily standard deviation computed using the last 60 days' market prices.

Chava and Jarrow (2004) found that Shumway's model shows the most accurate result on a large sample of data and outperforms both Altman's and Zmijewski's models. Also, they claim that the net income ratio to total assets is not statistically important, but coefficients and signs are consistent with economic logic.

The empirical part of this study will take into account all three models described here and also will separately study the effect of each ratio used in these models to control its impact on the decline of stock return during a pandemic.

2. DATA AND METHODOLOGY

To control the relationship between abnormal returns in the Covid-19 spread period and companies' fundamental financial indicators, the data of 8729 companies were extracted from Eikon Refinitiv Database with corresponding financial indicators. The sample contains all active publicly traded companies in the world with a capitalisation of more than 1 billion US dollars. Because of gaps in financial information, a significant part of the companies was eliminated. The final sample consists of 3304 companies.

The sample includes the returns for the period 01.02.2020-30.04.2020 and corresponding financial indicators as of 31.12.2019 or the closest earlier date if the end of the fiscal year differs from 31.12. On the ground of returns during 01.02.2020-30.04.2020 was found the maximum price and minimum price for every stock, following the sequence – the maximum price must be earlier than the minimum price. It is important, because, firstly, it ensures that the sign (negative or positive) of return will be correct, and, secondly, the variable "return" should describe the decline, not the growth, because the main aim of this paper is to explain the decline in the stock prices. The current period (01.02.2020-30.04.2020) was chosen because this paper is focused on the reaction of the stock price to the outbreak of uncertainty, caused by Covid-19 and the corresponding economic shock. Every company in the sample got its individual highest and lowest stock price so that it would be possible to calculate the deepest drop of every single stock. It is more reasonable than choosing the same dates for all companies, because one company may have the lowest value, for example, on 21 March, another company on 25 March. By such an individual approach author ensures, that analysing return is correct and comprehensive. The sample is not prolonged to future periods, because the further changes in stock prices are more specific to the nature of Covid-19 and are out of the interest of this master thesis.

The distribution of such returns is shown in Figure 1.

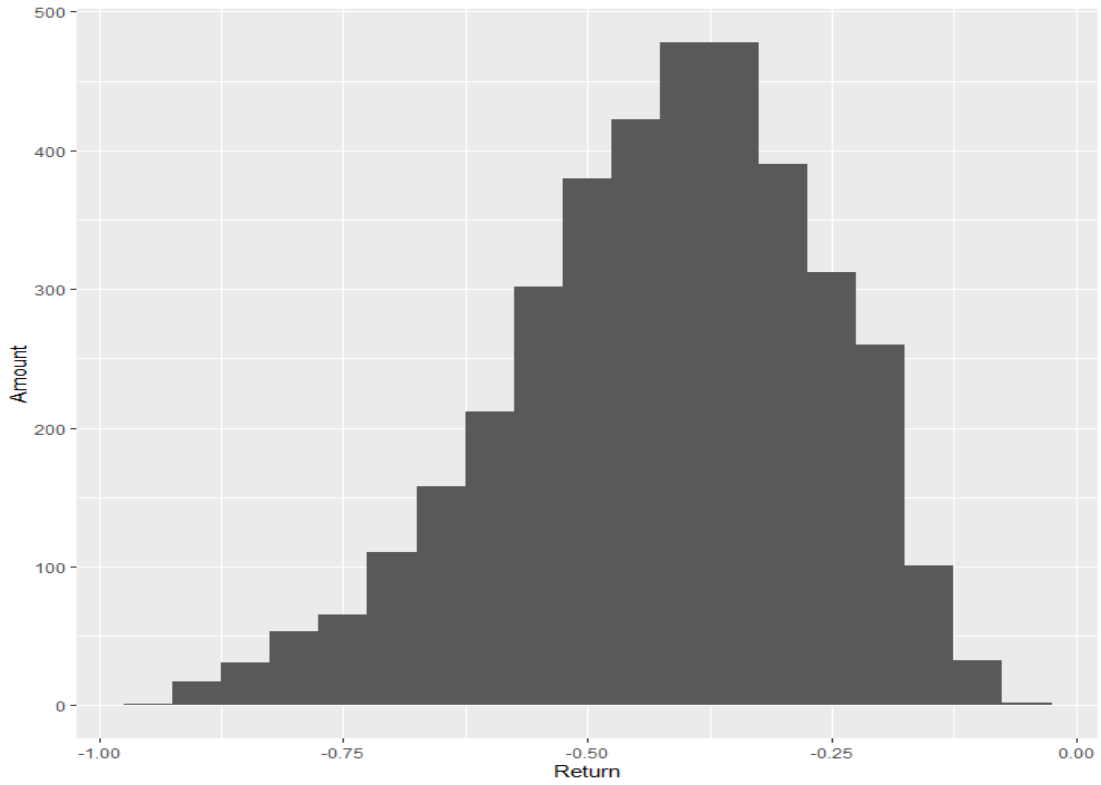

Figure 1. Distribution of returns
Source: author's calculations

There are only negative returns in the sample, as it is the main focus of the paper. The average return of the companies in the sample during the chosen period is -42,32% with long left-sided tails of the distribution of returns. That shows the significant amount of companies, whose stock prices had fallen deeper than average.

Additionally, to the numerical variables, observed data also includes information about the country of the company (the main market) and the industry of the company. There are 100 countries in the sample and 71 industries. Countries were grouped into 5 groups – the United States of America, the European Union, China, the United Kingdom and Others. Such division helps to diminish the number of dummy variables in future models and, at the same time, to save the accuracy of the model. The distribution of the returns during the Covid-19 outbreak is presented in Figure 2.

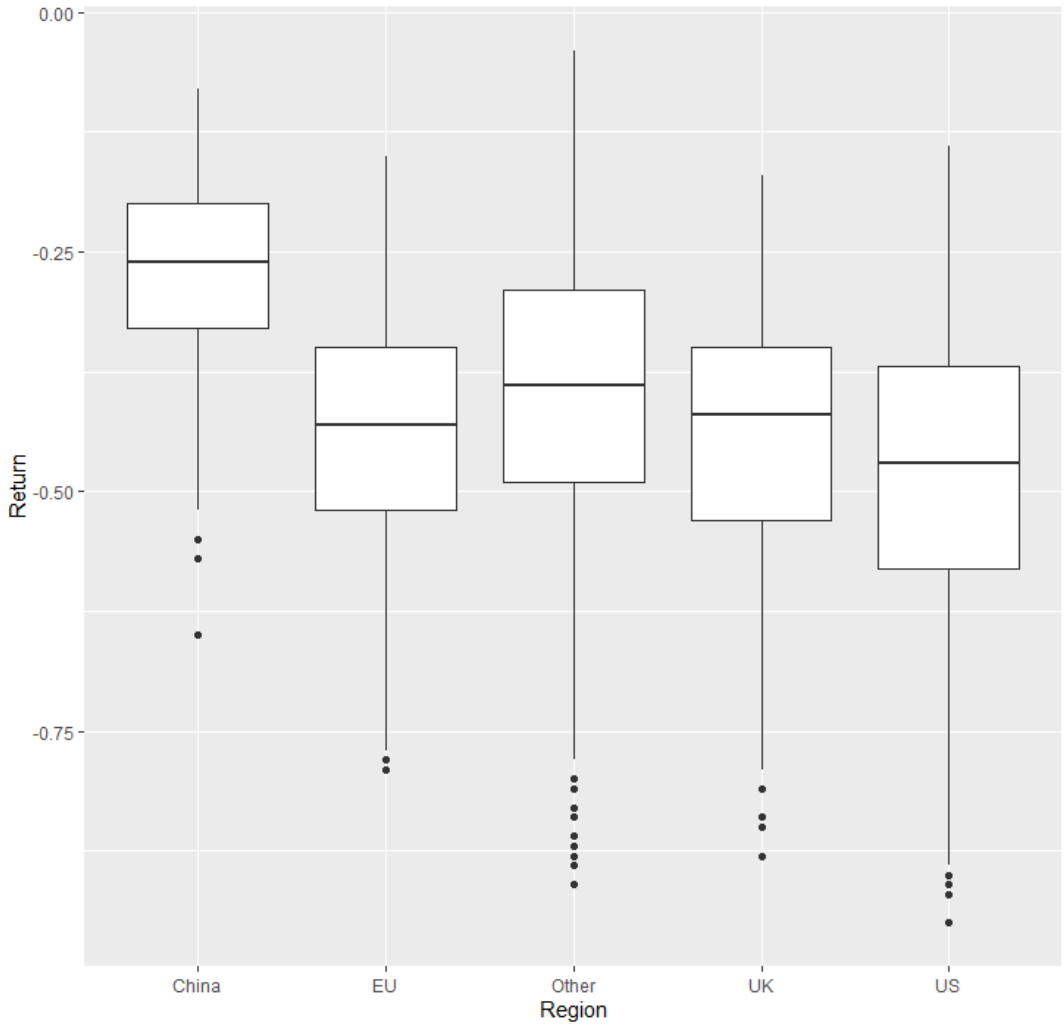

Figure 2. Return by the region

Source: author's calculations

Figure 2 shows the distribution of the returns during the period 01.02-30.04.2020 between the maximum and minimum point. The most severe decline is observed in US countries, where the extreme values and the medians are the lowest in the sample. The EU companies shows a little bit better performance and China companies were facing much less harmful losses. This could be explained by the decline of China companies in earlier phases of the Covid-19 outbreak, which occurred at the end of 2019.

Returns also vary across the industries – there are industries with more severe decline and industries, whose decline is more modest. Some companies face a severe crash in their stock prices by 95%. Table 1 shows 8 industries with the most severe decline and 8 industries with the lowest decline.

Table 1. Return by industry

Industry	Mean	Min	Max	Amount
Mortgage Real Estate Investment Trusts	-73%	-86%	-52%	14
Energy Equipment & Services	-65%	-89%	-19%	31
Airlines	-60%	-86%	-24%	26
Hotels, Restaurants & Leisure	-59%	-90%	-18%	90
Oil, Gas & Consumable Fuels	-58%	-95%	-14%	147
Consumer Finance	-54%	-83%	-31%	18
Thrifts & Mortgage Finance	-54%	-73%	-26%	15
Leisure Products	-53%	-75%	-24%	17
<…>	<…>	<…>	<…>	<…>
Diversified Telecommunication Services	-33%	-64%	-5%	43
Beverages	-32%	-61%	-14%	51
Food Products	-30%	-57%	-8%	100
Wireless Telecommunication Services	-29%	-67%	-11%	26
Food & Staples Retailing	-29%	-91%	-13%	52
Renewable Electricity Producers	-29%	-58%	-9%	35
Household Products	-28%	-61%	-20%	12
Water Utilities	-26%	-40%	-15%	14

Source: author's calculations

The most wounded industries are related to finance sector, tourism, and energy. The industries with the best performance are difficult to group, but in general, it is the industries related to everyday demand goods. Interestingly, companies generating renewable electricity have not fallen so deeply as traditional electricity producers.

2.1. Variables

Financial indicators, needed for the analysis were chosen leaning on the theoretical background described in the previous chapter – its indicators of size, profitability, indebtedness, liquidity and volatility. There are variables considered as a ratio, and variables, considered as an absolute value.

The sample includes the information about the company's financial position through the following data: Market capitalisation, total assets, total capital, cash, net sales or revenues, international sales and its share in companies' total revenue, EBITDA, net income, retained earnings. Financial leverage is presented in such ratios as debt-to-equity, debt-to-assets, and debt-to-capital. Cash holdings are presented in ratios of cash-to-debt, cash-to-assets, and cash-to-capital. Short-term debt is presented in variables short-term-debt-to-assets and short-term-debt-to-capital. Retained

earnings are also presented as a ratio from debt (retained-earnings-to-debt) and to assets (retained-earnings-to-assets). Market value towards equity's book value is resented by the ratio of market-to-book value. Price ratios include price-to-earnings, price-to-cash-flow, and price-to-sales. There are also such ratios as financial leverage multiplication to market book value, and market value to total liabilities. Return on assets and return on equity are presented as a profitability ratio. Current assets to current liabilities ratio, Beta, CSR ranking, volatility and trading volumes are also added to the sample. All these financial indicators were taken as of 31.12.2019 or the closest earliest date – on the end of the company's fiscal year. Descriptive statistics for the important variables are presented in Table 1 and the description of the variables is below.

Table 2. Descriptive statistic

	Mean	Std. Dev	Min	Max	CV
Beta	1,11	1,93	-40,9	85,68	1,7
Cash (in mln)	10	310	-	18447	31
Cash to assets	0,09	0,58	-	15,96	6,5
Cash To Capital	0,17	0,24	-0,81	3,54	1,4
CSR	39,18	33,98	-	99,83	0,9
Debt to kapitaal	0,45	0,47	-5,16	6,58	1
Debt To Equity	-0,05	37,41	-2202,29	96,14	-778,7
EBITDA (in mln)	16	506	-44	30282	32
International Sales (in mln)	17	170	0	6702	10
International turnover (from total)	0,29	0,35	-0,06	2,01	1,2
Market Cap (in billions)	8,35	49,81	1,00	1880,00	6
Market to book	1,81	2,6	0,02	56,68	1,4
Net income (in mln)	5	125	-288	7546	25
Retained earnings (in mln)	22	245	-527	10408	11
Revenue (in mln)	74	2122	0	130000	29
ROA	0,05	0,65	-11,91	25,09	13,5
ROE %	18,66	527,62	-3711,51	31560,00	28,3
Short term debt to capital	0,12	0,29	-2,35	6,39	2,4
Total assets (in mln)	21074	132394	0	2720000	6
Total capital (in mln)	106	3505	-23	215000	33
Total debt (in mln)	63	2084	-	128000	33
Days	37,84	13,29	2	90	0,35
Volatility %	24,65	9,34	4,66	65,28	0,4

Source: author's calculations

Some variables are exported directly from the Eikon Database, others are calculated manually, based on the exported information. Variables will be briefly described below.

The company's Beta shows how the current company's stock price moves toward its market. Beta is often considered a risk measure, implying that higher beta tends to higher risk. That's the main reason why Beta is included in the variables' list.

Cash holdings are presented as the company's total cash in its bank account. The cash-to-assets ratio represents, what share of total assets is constituted by cash. Accordingly, cash to capital represents the share of the cash in the company's capital structure. Under the company's capital meant the shareholders' equity and the outside capital (usually debt).

CSR – Corporate Social Rating is the official CSR score, given to the company by an authorized organization, as the factor, which can mitigate the risk of deep declines during crises (Lins et al., 2017). Total debt shows the amount of long-term debt and short-term debt reported by the company in its financial report. Debt to capital represents the share of the debt in the company's capital structure and debt-to-assets – its share in the company's assets. Short-term debt to total debt shows the proportion of short-term debt towards total debt.

Revenue shows the total turnover company generates. EBITDA and Net income show the company's financial results – its 1) earnings before interests, taxes, depreciation, and amortisation, and 2) the company's net profit. There are positive values and negative values, so the sample includes profitable firms, as companies with losses. Retained earnings show the number of earnings, got in previous periods and not paid as dividends. International turnover and international turnover's share show how much the company trades with non-home countries, and what is the share of these revenues in the structure of firms' turnover.

Market capitalisation and total assets show the company's market value as of 31.12.2019 and the value of the company's total assets, as reported by 31.12.2019 or by the end of the fiscal year 2019. Market-to-book value shows the ratio between market capitalisation and the book value of the company.

ROA and ROE are the profitability indicators and show the ratio of 1) net income to total assets, and 2) net income to equity. These indicators show how profitable is the company and how effectively it uses its resources. ROE and ROA also could be negative, which indicates that the net income in the firm is less than zero. Variable "Volatility" shows the volatility of the stock price during the 2019 year. Volatility, like Beta, also indicates the level of risk.

Variable “Days” is the amount of days, during which the stock price was declining during the period of the Covid-19 outbreak 01.02.2020-30.04.2020. It is important to take this variable into account, because the market value decline can occure in different timeframes, and the length of the decline could make the model more accurate, diminishing the models’ errors. This variable will be added to all models, regardless of its statistical significance.

2.2. Methodology

The aim of this paper is to find such fundamental indicators, that affect the stock return during the Covid-19 pandemic outbreak. To find such indicators, impacting the depth of the decline of stock prices, and assess their effects, the author will construct the cross-sectional regression model, where the response variable will be the stock return, and explanatory variables will be the variables, described in part 2.1. Such a model will help to find the main determinants of the decline of stock prices and estimate this influence.

As the paper’s questions cover the difference in the reasons for the fall of the stock returns across different sizes and countries, it’s essential to construct several models. Therefore 5 models will be created – 1) general model, 2) model for large companies, 3) model for small companies, 4) model for US companies, and 5) model for EU companies. The analysis of models and the comparison between variables will give evidence of whether the negative stock return determinants differ across the size of the company and the country of origin and how this difference is denoted.

The first general model will include all companies from the sample. It will be the base model – the further models will be compared with it to determine the significant differences (if they will exist). The second model will focus only on large companies. The third model will study small companies. The fourth model analyses a sample, consisting only of US companies, and the fifth model analyses a sample with European Union companies only.

All regression models will include a dummy variable – “Industry”, and the general model (the first one), models for large and small companies will additionally include the dummy variable “Region”. This would increase the accuracy of the model in describing the stock returns and will help to analyse the impact of the qualitative variable on the response variable (Wooldridge, 2003). The initial model will include all variables discussed in the previous chapter. As a dummy variable

will be added region (US, EU, UK, China, Others) and the variable "Industry" which describes the sector the company works in. Then all non-significant variables will be deleted one by one until it remains no insignificant variables (Ibid.). The variable is considered important, if its p-value equals to or less than 0,1.

The format of the model used in this paper is the following:

$$y = \alpha + \beta \times X + \gamma \times I + \delta \times R + \epsilon$$

where
y – response variable, return
α – intercept
β – a vector of X_{ir} variables estimations
X – a vector of explanatory variables
γI – a vector with dummies for industries with its estimations γ
δR – a vector with dummies for regions with its estimations δ
ϵ – random error

The significance of the results will be idicated throgh the asterisks: „***" means p-value 0,001 or less „**" – 0,01 or less „*" – 0,05 or less „." – 0,1 or less. Modelling, estimation, and further tests of the models are conducted using R software.

2.3. Inference of regression model

It's important to make sure, that constructed models are eligible for further analysis and estimated results are reliable enough. For cross-sectional regression models it's essential to check the a) normality of error distribution, b) Heteroscedasticity presence, and c) Multicollinearity presence. (Wooldridge, 2003)

The classical assumption for the regression model is the normality of the residuals of the regression model. If the distribution of the errors is not normal, the model's estimation maybe is not trustworthy. The normality of errors' distribution is tested by the test of Jarque-Bera. This test compares the kurtosis and skewness of the model's errors with a normal distribution. (Kennedy, 2014)

In the case of heteroskedasticity, the variance of residuals depends on the size of the regressor. Such interdependence does not make the result of the model biased, but the validity of standard

errors of the model becomes incorrect. Heteroskedasticity is determined by the Breusch-Pagan test, and its idea is to control the dependence of the value of the regressors to the variance of the model's residuals. If heteroskedasticity will be discovered, it would mean that robust standard errors must be used in the models. (Wooldridge, 2003)

Multicollinearity means that some explanatory variables are correlated with each other. Such interdependence causes the results of modelling to be less trustworthy. Multicollinearity in the models will be controlled by the correlation between explanatory variables of the models. (*Ibid*.)

3. EMPIRICAL RESULTS

The focus of this paper was directed to the stock prices' decline during the Covid-19 outbreak period. Additional questions of this master thesis cover the difference in determinants of stock returns between companies of different sizes and from the US and EU. Therefore, different models were constructed, and their analyses and conclusions are presented in this chapter.

3.1. General model

The initial model prepared for the analysis includes all groups of variables with one variable per group. One variable for size – market capitalisation, for cash – cash holdings ratio to capital, for the debt – debt amount to total capital, etc. The most influential variable in each group was chosen as a result of testing different models, and the variable with the lowest p-value was left in the model. This model is essential for further analysis to understand which variables do not significantly impact the decline of stock price during the Covid-19 pandemic outbreak. The model is available in Table 3. The dummy variables for industries are not shown in this table – they are available in Appendix 1.

The model shows, that profitability indicators in reported periods are not significant in describing the fluctuations of the stock prices during the Covid-19 crisis. The same works for the price ratios (price to earnings, price to cash flow and price to sales), CSR rating and Retained earnings to debt, international turnover, and the volumes of trading. No one component from bankruptcy prediction models didn't confirm its efficiency in predicting the decline during the Covid-19 pandemic.

The variables, that proved to be important are the following ones. Market capitalisation is a statistically important variable, the increase of market capitalisation by one billion US dollars leads to the increase of the return by $1{,}65*10^{-2}$ percentage points. The debt has a negative relationship with a return – the increase of debt to capital ratio to one percentage point leads to the decrease of return by 2,35 percentage points. Cash to capital impacts positively on return, the increase of it by 1 percentage point leads to an increase in a return by 4,56 percentage points. Short-term debt has

an unexpectedly positive relation with a return, the one percentage point increase in it leads to a 4,95 percentage points increase in return.

Table 3. General model

Variable	Estimate	Std. error	t-value	Pr(>|t|)	
Intercept	-0,1195	0,0269	-4,4500	$8,89*10^{-6}$	***
Market capitalisation in billions	$1,65*10^{-4}$	$5,31*10^{-5}$	3,10	$1,93*10^{-3}$	**
Debt to capital	- 0,0235	0,0064	-3,6490	$2,68*10^{-4}$	***
Cash To Capital	0,0456	0,0115	3,9700	$7,37*10^{-5}$	***
Short term debt to total debt	0,0495	0,0090	5,5200	$3,69*10^{-8}$	***
International turnover share	$-3,17*10^{-5}$	$7,63*10^{-3}$	-0,0040	$9,97*10^{-1}$	
Market to book	0,0068	0,0011	5,9790	$2,52*10^{-9}$	***
Retained earnings to debt	$4,95*10^{-6}$	$7,1410*10^{-6}$	0,6930	$4,88*10^{-1}$	
Market value to total liabilities	$-9,28*10^{-11}$	$4,05*10^{-11}$	-0,2290	$8,19*10^{-1}$	
Net Income to Total assets	0,0041	0,0046	0,8920	$3,72*10^{-1}$	
Current assets to current liabilities	0,0017	0,0010	1,7830	$7,47*10^{-1}$	*
ROE	$1,84*10^{-6}$	$3,76*10^{-6}$	0,4910	$6,24*10^{-1}$	
P To E	$-1,06*10^{-6}$	$1,26*10^{-6}$	-0,8410	$4,00*10^{-1}$	
CSR	$-3,30*10^{-6}$	$7,11*10^{-6}$	-0,4650	$6,42*10^{-1}$	
Volatility	-0,0069	0,0003	22,3180	$< 2*10^{-16}$	***
Volumes	$-5,32*10^{-4}$	$1,65*10^{-4}$	- 3,2170	$1,31*10^{-3}$	
Days	$9,81*10^{-8}$	$9,92*10^{-8}$	0,9890	$3,23*10^{-1}$	
Region EU	-0,1916	0,0109	-17,5600	$< 2*10^{-16}$	***
Region Other	-0,1536	0,0085	-18,0210	$< 2*10^{-16}$	***
Region UK	-0,1930	0,0118	-16,4040	$< 2*10^{-16}$	***
Region US	-0,2091	0,0088	-23,8030	$< 2*10^{-16}$	***

Source: author's calculations

Comments: observations – 3034; adjusted R^2 – 0,4879

To make the model more accurate, unimportant variables should be removed from the initial model, beginning with the variable with the highest p-value. Thus, the final model will consist only of important variables and will be applicable for further inference tests and estimations. The result of the final general model is presented below in Table 4. Estimations for dummy variables for industries are not presented as they are not the subject of the interest of this paper. The whole model is available in Appendix 2.

The model's adjusted R^2 is relatively high – 0,491, making the model eligible and trustworthy enough. Model's residuals are normally distributed. There is a heteroskedasticity presented in the model, so the robust standard errors were applied. Multicollinearity is not presented.

Table 4. General adjusted model

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
Intercept	-0,1194	0,0267	-4,4690	$8{,}14*10^{-6}$	***
Market capitalisation	$1{,}68*10^{-4}$	0,0001	3,2100	$1{,}34*10^{-3}$	**
Debt to capital	-0,0163	0,0048	-3,4230	$6{,}27*10^{-4}$	***
Cash to capital	0,0457	0,0109	4,2080	$2{,}65*10^{-5}$	***
Short terb debt to total debt	0,0486	0,0088	5,5200	$3{,}67*10^{-8}$	***
Market to book value	0,0078	0,0011	7,3200	$3{,}16*10^{-13}$	***
Volatility	-0,0069	0,0003	-23,7700	$< 2*10^{-16}$	***
Days	-0,0005	0,0002	-3,2300	$1{,}25*10^{-3}$	**
Region EU	-0,1951	0,0101	-19,3800	$< 2*10^{-16}$	***
Region Other	-0,1556	0,0079	-19,8080	$< 2*10^{-16}$	***
Region UK	-0,1946	0,0111	-17,5760	$< 2*10^{-16}$	***
Region US	-0,2109	0,0082	-25,7670	$< 2*10^{-16}$	***

Source: author's calculations
Comments: observations – 3034; adjusted R^2 – 0,491

The constructed model proves that cash holdings and the debt ratio are significant indicators that impact the stock price during the pandemic outbreak, confirming the first hypothesis that financial leverage and cash holdings are important fundamentals that impact abnormal stock returns. Financial leverage impacts negatively and cash holdings – positively.

The variable Cash proves the importance of cash holdings to capital ratio. That means that stock price decline depends on the cash share in the company's capital structure. The increase of cash share by one percentage point increases the return by 4,57 percentage points. The debt ratio to total capital is also significant. The increase of debt share in the capital structure by one percentage point decreases the return by 1,63 percentage points. These findings correspond with Cai and Zhang (2011), Dimitrov and Jain (2008) in the context of financial leverage, and Ramelli and Wagner (2020) in the context of both cash holdings and indebtedness. The size of the company, expressed by the market capitalisation, is a significant variable – the increase of market capitalisation by one billion US dollars leads to an increase of return by $1{,}68*10^{-2}$ percentage points. This finding corresponds with Hussainey et al. (2001), who claimed the importance of a company's size in explaining stock price changes.

Short-term debt share in capital structure has unexpectedly shown its positive influence on the stock return – an increase by one percentage point in short-term debt leads to 4,86 percentage points growth in return during the Covid-19 outbreak period. This finding is not consistent with Bancel and Mitoo (2011), who claimed the negative effect of short-term debt on stock returns

during the global financial crisis. The positive effect of short-term debt is difficult to explain without a more profound analysis, but one of the reasons could lay in credit lines, as wrote Ding et al. (2021), which could help meet the companies' short-term obligations.

The risk indicator of the stock – volatility shows statistical importance in describing the changes in stock returns. The increase in volatility by one point leads to a decrease in stock return by 0,7 percentage points. This finding is consistent with Ramelli and Wagner (2020).

The market-to-book ratio also showed its influence on the stock returns. A higher market-to-book ratio leads to higher stock returns. It can be explained by the fact that companies with high P/B ratios are expected to grow in the future, not now, and current cash flows are not very relevant to the company's value. It is also proved by Ramelli and Wagner (2020).

Many variables which influence stock returns were proved by earlier studies but did not find the proof in the current study. For example, international turnover and its share in total company revenue are not significant enough to explain abnormal returns during a pandemic outbreak, as wrote Ding et al. (2021). Most factors from bankruptcy prediction models did not prove their effectiveness in explaining stock price decline (such ratios as current assets to current liabilities, net income to total assets, market value to total liabilities, retained earnings to total assets). Profitability ratios are also unimportant, which means that profitability in the past did not impact the investors' expectations of the company's future effectiveness and ability to cope with crises. Price ratios (Price to earnings, price to cash flow, price to sales) also did not find any confirmation of being important. CSR rating's effect on stock returns is also not significant enough. Companys' trading volumes in the past also did not cause any effect on the stock decline during a pandemic.

The region of the company is an important variable. On average, companies from the EU and UK fell 19,5% and 19,4% more than companies in China. Companies from the US fell on average by 21% more than companies from China. As mentioned before, such a result for China companies could be explained by the more significant effect of Covid-19 on China companies in earlier periods.

3.2. Model for large companies

As was mentioned in chapter "Data and methodology", the initial sample was divided into two groups – large companies and small companies. All companies whose total assets size is larger than the average size in the initial sample are considered large companies. Other companies are considered large companies. The summary results for modelling stock returns are presented in Table 5. There are 1866 companies in the sample, and adjusted R^2 equals 0,5105, making the model eligible for further analysis and trustworthy enough. Model's residuals are normally distributed, heteroskedasticity presents, and multicollinearity is not found. Estimations for industry dummy variables are not presented in the following table because they are not the subject of the paper's interest. The whole model is available in Appendix 3.

Table 5. Model for large companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
Intercept	-0,0847	0,0360	-2,3530	$1,87*10^{-2}$	*
Market capitalisation	$1,42*10^{-4}$	$5,51*10^{-4}$	2,5830	$9,87*10^{-3}$	**
Debt to capital	-0,0139	0,0060	-2,3100	$2,10*10^{-2}$	*
Cash to capital	0,0499	0,0145	3,4470	$5,79*10^{-4}$	***
Short terb debt to total debt	0,0419	0,0119	3,5120	$4,56*10^{-4}$	***
Market to book value	0,0157	0,0022	7,2680	$5,32*10^{-13}$	***
Volatility	-0,0078	0,0004	-18,5810	$< 2*10^{-16}$	***
Days	-0,0002	0,0002	-0,9010	$3,68*10^{-1}$	

Source: author's calculations

Comments: observations – 1866; adjusted R^2 – 0,5105

The main conclusions are the same – cash holdings and financial leverage are significant variables affecting the stock return in crises caused by the Covid-19 pandemic. Here, the size of the company, expressed in market capitalisation, has a statistically significant effect on stock return – a larger company will face a lower decline during a pandemic – an increase of market capitalisation by 1 billion dollars leads to a 1,42*10-2 percentage points increase in stock return. The dependence of stock return on financial leverage is negative. The increase of debt to capital to one percentage point leads to a decrease of return by 1,4 percentage points. Cash to capital ratio growth of 1 percentage point leads to an increase in stock return by five percentage points. Short-term debt and market-to-book ratio are positively related to stock return. Risk indicator volatility has a negative influence on the stock return.

A more detailed comparison between the model for large companies and the general model will be conducted in chapter 3.6.

3.3. Model for small companies

Companies whose size (total assets) is smaller than the average total assets value in the sample are considered small companies. The model for small companies shows that some significant variables in previous models are not important enough. It means that non-important variables must be eliminated and replaced (if possible) with other variables. It means that the determinants of abnormal returns in small companies differ from large companies.

The adjusted model for small companies is presented in Table 6. It has a lower adjusted R^2 – 0,4165, but it is enough for conducting the analysis. The sample includes 1227 companies. The results of this model are presented in table 6. Model's residuals are normally distributed, heteroskedasticity presents, and multicollinearity is not found. Estimations for industry dummy variables are not presented in the following table because they are not the subject of the paper's interest. The whole model is available in Appendix 4.

Table 6. Model for small companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
Intercept	-0,2931	0,0397	-7,3800	0,0000	***
Market capitalisation	$4{,}66*10^{-4}$	$2{,}27*10^{-4}$	2,0560	0,0400	*
Cash to capital	-0,0388	0,0132	3,4550	0,0006	***
Short term debt to total debt	0,0455	0,0014	1,6220	0,1000	.
Market to book value	0,0023	0,0001	7,7640	0,0000	***
CSR	0,0008	0,0018	-1,9270	0,0543	.
Beta	-0,0034	0,0003	-3,9260	0,0001	***
Days	-0,0012	0,0167	-5,8830	0,0000	***
Region EU	-0,0982	0,0133	-5,0460	0,0000	***
Region Other	-0,0672	0,0178	-5,0420	0,0000	***
Region UK	-0,0895	0,0135	-8,7520	< 2e-16	***
Region US	-0,1183	0,0397	-7,3800	0,0000	***

Source: author's calculations
Comments: observations – 1227; adjusted R^2 – 0,4165

Some determinants of the decline of stock price within small companies are the same as in previous models. However, financial leverage is no longer a significant factor, so it is eliminated from the model. Cash holdings still play a significant role in explaining stock price decline during a

pandemic outbreak. Cash holdings are essential in terms of their ratio to the total capital. However, in the context of small companies, the cash holdings negatively relate to the return – the increase in cash to the capital ratio by one percentage point leads to a decrease in stock return by 3,88 percentage points. The company's size, expressed in market capitalisation, is a statistically significant variable, the same as for large companies, which shows that larger companies better cope with crises than smaller companies. Short-term-debt-to-total-debt and market-to-book value are also positively related to the stock return, same as in the previous models. The CSR ranking is significant for small companies. As a risk indicator, in the context of small companies, the beta can explain the differences in stock returns more accurate than volatility. The stock return also differs across countries – US companies met the more extensive loss.

3.4. Model for US companies

The sample of this model excludes all companies, which the primary market is not in the US, decreasing the sample to 1179 companies. The model's predictable power (adjusted R2) is 0,4737, and the model's summary is presented in table 7. The model's results do not include the country's dummies variables because there's only one country studied in this model. The whole model is available in Appendix 5.

Table 7. Model for US companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
Intercept	-0,3825	0,0292	-13,105	$< 2*10^{-16}$	***
Market capitalisation	$1,14*10^{-4}$	$5,78*10^{-5}$	1,977	0,0482	*
Debt to capital	-0,0166	0,0067	-2,465	0,0138	*
Short term debt to total debt	0,0854	0,0162	5,272	0,0000	***
Market to book value	0,0209	0,0019	10,972	$< 2*10^{-16}$	***
Volatility	-0,0065	0,0004	-15,559	$< 2*10^{-16}$	***
Days	-0,0012	0,0003	-3,718	0,0002	***

Source: author's calculations

Comments: observations – 1179; adjusted R^2 – 0,4737

The general picture is the same as in previous models. However, in the case of US companies, cash holdings are not a statistically significant variable, so it was eliminated from the model. Financial leverage is a significant determinant of abnormal stock return through debt to capital ratio. Increasing the debt ratio to one percentage point decreases the stock return by 1,66

percentage points. The short-term debt ratio to total debt is also important here - it is positively related to the change in stock return. Market value ratio to book value also positively impacts the return. Risk indicator ”Volatility” is negatively related to the stock return.

3.5. Model for EU companies

The last model is focused on EU companies, checking the determinants of abnormal stock returns in countries of the European Union. The sample for this model is the smallest one – only 205 companies are included. The main reason for that is the limited information for EU companies in Eikon Refinitiv - some data is not available for thorough analysis.

The initial model shows that some variables being used in previous models are not significant in the case of EU companies. So, the model was adjusted, and the unimportant variables were replaced with others or deleted from the model. The adjusted model's R^2 is 0,5196, which is enough for trustworthy analysis and reliable interpretation of results. The model is presented in Table 8. Model's residuals are normally distributed, heteroskedasticity presents, and multicollinearity is not detected. Estimations for industry dummy variables are not presented in the following table because they are not the subject of the paper's interest. The whole model is available in Appendix 6.

Table 8. Model for EU companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
Intercept	-0,1575	0,0889	-1,772	0,0779	
Turnover	-0,0009	0,0003	-2,88	0,0044	**
Debt to capital	-0,0491	0,0268	-1,831	0,0686	.
Short term debt to total debt	0,0757	0,0331	2,29	0,0231	*
Market value to total liabilities	$6,65*10^{-9}$	$2,68*10^{-9}$	2,483	0,0138	*
Volatility	-0,0064	0,0010	-6,623	$3,03*10^{-10}$	***
Days	-0,0011	0,0006	-1,789	0,0752	.

Source: author's calculations

Comments: observations – 205; adjusted R^2 – 0,5196

The abnormal return of EU companies does not depend on the company's size – market capitalisation is not an important variable. However, companies from the EU negatively depend on the turnover – companies with higher turnover faced a more severe decline in stock prices

during the outbreak of the Covid-19 pandemic. The growth in turnover by one million dollars led to a decrease in stock price by 0,09 percentage points. Cash holdings are not proven to play any role in explaining stock returns, but financial leverage is still significant. The increase of debt to the capital ratio by one percentage point leads to a decline in stock return by 4,9 percentage points. The short-term debt ratio to capital is also a significant determinant as in the previous models. Market-value to total liabilities – ratio from the bankruptcy prediction model is significant in this model. Higher volatility of the stock price in the previous periods leads to higher losses in market value within EU companies.

3.6. Comparison between models

To answer the 4th question of this master thesis, whether the determinants of abnormal returns are the same across companies of different sizes and across the US and EU countries or not, it is essential to put the results of the models together and compare them with each other. The data with variables, coefficients and their significance are presented in Table 9.

Table 9 shows that the company's size is an essential variable in describing the abnormal decline in the pandemic period. In the case of EU companies, it is expressed through their turnover. In other cases – by market capitalisation. The most significant effect of market capitalisation is found in small companies. The increase of market capitalisation by one billion leads to an increase in total return by 0.47 percentage points. It is the most significant coefficient related to market capitalisation with the highest confidence intervals. The intercepts of the models also confirm the difference in returns between large and small companies – the intercept for large companies is significantly higher than the intercept in models for small companies. The confidence intervals do not coincide (see Appendix 2 and 3), so the average return for large and small companies is significantly different. The same is applicable for US companies and EU companies – their confidence intervals do not coincide, so their difference is statistically significant. This finding is consistent with Hussainey et al. (2001) and Kim et al. (2011).

Cash holdings, expressed in such ratios as cash to capital, are significant in all models, besides the models for US and EU companies. It means that the cash holdings are important determinants of the abnormal return during a pandemic regardless of size, but not the company's origin. The impact of cash is significant in large companies – large firms need to have more extensive cash holdings

in their capital structure to mitigate the negative shocks caused by such crises like the Covid-19 pandemic.

Table 9. Comparison of different models

Variable	General	Large	Small	US	EU
Intercept	-0,1194 (0,0246) ***	-0,0847 (0,0360) **	-0,2931 (0,0397) ***	-0,3825 (0,0292) ***	-0,1575 (0,0889) *
Turnover					$-9{,}27*10^{-4}$ $(3{,}22*10^{4})$**
Market cap, (in billions)	$1{,}68*10^{-4}$ $(5{,}22*10^{-5})$ ***	$1{,}42*10^{-4}$ $(5{,}51*10^{-5})$ **	0,0047 (0,0022) *	$1{,}14*10^{-4}$ $(5{,}78*10^{-5})$ *	
Debt to capital	-0,0163 (0,0048) ***	-0,0139 (0,006) *		-0,0166 (0,0067) *	-0,0491 (0,0268) ,
Cash to Capital	0,0457 (0,0109) ***	0,0499 (0,0145) ***	-0,039 (0,0152) **		
Short-term debt to total debt	0,0486 (0,0088) ***	0,0419 (0,0119) ***	0,0455 (0,0132) **	0,0854 (0,0162) ***	-0,0757 (0,0331) ***
Market to book value	0,0078 (0,0011) ***	0,0157 (0,0022) ***	0,0023 (0,0014) .	0,0209 (0,0019) ***	
Volatility	-0,0069 (0,0003) ***	-0,0078 (0,0004) ***		-0,0065 (0,0004) ***	-0,0064 (0,001) ***
Market value to total liabilities					$6{,}65*10^{-9}$ $(2{,}68*10^{-9})$ *
Days	-0,0005 (0,0002) **	-0,0002 (0,0002)	-0,0012 (0,0003) ***	-0,0012 (0,0003) ***	-0,0011 (0,0006) .
CSR			0,0008 (0,0001) ***		
Beta			-0,0034 (0,0018) .		
Region EU	-0,1951 (0,0101) ***	-0,2135 (0,0128) ***	-0,0982 (0,0167) ***		
Region Other	-0,1556 (0,0079) ***	-0,1771 (0,0099) ***	-0,0672 (0,0133) ***		
Region UK	-0,1946 (0,0111) ***	-0,2272 (0,0146) ***	-0,0895 (0,0178) ***		
Region US	-0,2109 (0,0082) ***	-0,2411 (0,0106) ***	-0,1183 (0,0135) ***		

Source: author's calculations

Financial leverage is expressed as debt to total capital ratio and is statistically significant in all observed models. Financial leverage is essential for companies of different sizes and origins, but its coefficients differ for countries and sizes. Nevertheless, the coefficient difference is not statistically significant, as their confidence intervals coincide. The first hypothesis is confirmed – companies with higher financial leverage and smaller cash holdings are more sensitive to Covid-

1 with one exception – if EU companies are observed separately, they are not as sensitive to cash holdings as companies from other countries.

Despite expectation, the short-term debt ratio to total debt is a statistically significant variable with relatively high positive coefficients. Companies with higher short-term debt share in total debt are less sensitive to the Covid-19 crisis. It is found in all models regardless of the size or origin of the company.

The market-to-book-value ratio proves its statistical significance in all models, except the model for EU companies. Despite its absence in the last model, it will be reasonable to assume that market-to-book-value is significant across different sizes and in all regions because the general model (the first one) proves its importance. Companies with higher market value to book value are more sustainable in the crises like Covid-19 than companies with lower market-to-book value.

As one variable of the bankruptcy prediction model of Altman's Z score, the market value ratio towards total liabilities is statistically significant only for EU companies.

The risk of the stock, expressed in the volatility or beta, shows high importance in describing the abnormal returns. Small companies are more influenced by beta, while other companies are influenced by the volatility of the previous periods. Coefficients of volatility are with a negative mark. The higher risk indicators lead to a more profound decline during pandemics like Covid-19. Higher volatility in the past causes higher volatility in the future (Campbell, Hilscher, & Szilagyi, 2008). Volatility is also one of the variables of the bankruptcy prediction model of Shumway (2001). This variable shows its importance in all models, excluding the model for small companies.

Corporate Social Responsibility (CSR) rating is a statistically significant variable in small companies, but it was not found important in the general model. CSR can play some role in explaining the stock price changes within companies of smaller sizes.

Some absolute value variables found the confirmation of significance. Thus, EU companies with higher turnover are more sensitive to the crisis. The impact of absolute turnover value is found only in EU companies and was not proved in other models. So it will be fair to assume that the impact of turnover is not significant enough for general conclusions.

The 3rd hypothesis cannot be confirmed because companies of different sizes and from different countries have different determinants, impacting the decline of stock prices. Small companies, among other things, depend on turnover and CSR rating, while large companies do not. Companies from the US depend on market capitalisation and cash holdings, which do not affect companies in the EU. Financial leverage, short-term debt share, and risk indicators (volatility or beta) are these essential determinants that influence stock returns and are inherent for all companies of different sizes and different countries.

3.7. Summary of empirical analysis

The empirical analysis was conducted to find the answers to the questions formulated in the introductory part and to control the hypothesis proposed by the author. Results of models' estimations show that financial position contains statistically significant determinants that impact the company's sustainability during economic shocks. Investors with long-term investing horizons with risk-averse attitudes are supposed to pay attention to these factors.

Such fundamental indicators of companies that, in general, impact the stock return during the outbreak of the Covid-19 pandemic are the size of the firm, expressed in the market capitalisation, companies' cash holdings (cash share in the capital structure), financial leverage (debt-to-capital ratio), short-term debt share in debt structure, market-to-book value and company's stock price volatility in the previous year. It is the answer to the first question of the current paper.

The second question is related to the direction of the influence of the fundamental indicators. Higher cash holdings tend to increase the returns during economic shocks like the pandemic of Covid-19 (or, in other words, stock prices decline in companies with higher cash holdings is less significant). Higher financial leverage, on the contrary, makes the company more sensitive to such crises, and a company with a higher debt ratio faces a more profound decline in stock price. Short-term debt share in the debt structure and the market-to-book ratio are positively related to the stock return. At the same time, higher volatility and higher beta led to a more severe decline in stock prices after the Covid-19 spread. Other determinants observed in the theoretical part are not confirmed to be statistically significant in explaining the crash of stock prices.

The bankruptcy prediction models' components are not found to be significant in determining stock price decline. Only one model, constructed on a limited sample, proved the significance of one ratio from bankruptcy prediction models (ratio of market value to total liabilities). Still, in the general model, such a relationship does not present. That is the answer to the third question.

The fourth question consists of two parts – do the determinants differ across countries, and do they vary across sizes of the firms. Empirical analysis shows that, yes, differences exist. Separate models for samples with different countries and sizes show the significance of other variables.

The first hypothesis is confirmed because it's fully concurred with the results of the general model, constructed in the empirical part. Financial leverage and cash holdings are significant fundamentals, and the stock returns of the companies with higher financial leverage and smaller cash holdings are more sensitive to Covid-19. The second hypothesis that bankruptcy prediction models' components are statistically significant variables of abnormal returns in economic shock periods is rejected because of no evidence of such variables' impact. And the last hypothesis, claiming that the fundamentals determining abnormal returns are the same among companies with different sizes of capitalisation and the US and EU countries, but their importance varies, is rejected – variables are different, and their estimation varies. Thus, the aim of the paper is reached.

CONCLUSION

Covid-19 pandemic was a "black swan", which caused a big panic among investors worldwide and put the stock prices go down. The decline of the stocks during the spread of such uncertainty is very hard to predict and, especially, prevent. Still, some fundamental indicators could help to forecast the possible reaction of the stock prices to potential crises. This paper aims to find such fundamental indicators from companies' financial reports that impact the stock price change in the period of outbreak of economic shock in the example of the Covid-19 crisis and determine the relationship between these indicators and market value decline. Additionally, this paper analyses whether the bankruptcy models' components impact the decline of the market value and whether the determinants of decline differ in companies with different sizes and countries of origin or not.

Such fundamental indicators proving its efficiency in explaining the decline in economic shocks are cash holdings, financial leverage, short-term debt share in debt structure, market-to-book value, volatility during the previous period, and company size, expressed in the market capitalisation. Large cash holdings create a buffer for the company, and the decline of stock price is not so deep, comparing to the companies with lower cash holdings. Financial leverage negatively relates to stock returns – higher indebtedness deepens the fall during the pandemic. Short-term debt share in debt structure unexpectedly shows its positive impact on stock return. High market-to-book value also indicates a positive relationship with a stock return – companies with higher P/B value tend to meet softer consequences of pandemic panic. Volatility in the past causes future fluctuations, so the more volatile stocks fell more than stable stocks. A company's size also plays an important role in explaining the fluctuations of stock prices – companies with higher market capitalisation (larger companies) usually met less significant falls during the outbreak of the Covid-19 pandemic.

There are also such indicators whose impact was proven in other papers but did not find any confirmation in the current study. No one profitability indicator showed an effect on the abnormal return. Price ratios – price-to-sales, price-to-earnings, and price-to-cash-flow do not have a statistically significant impact on returns, the same as the Corporate Social Responsibility rating. The bankruptcy prediction model's components are not proved to have any effect as well.

Fundamentals affecting the deepness of market value decline differ across the countries and companies of different sizes. Companies with a lower market capitalisation (small companies) tend to meet deeper declines in market value. Unlike others, their financial leverage is not a significant determinant in explaining the market value decline. Still, the Corporate Responsibility Rating is essential within them. As a variable of risk in small companies, Beta has a more significant impact, while companies from other groups are more dependent on the volatility.

Differences also exist within the companies with a different countries of origin. Considering EU and US companies separately, the cash holdings are not found to be significant determinants of market value decline. EU companies are affected not by the market capitalisation but by turnover – higher turnover leads to deeper fall in the case of EU companies. Also, the group of EU companies is only one group that has one bankruptcy model component in explanatory variables – market value to total liabilities.

The aim of the current thesis is fulfilled. Factors impacting the abnormal return during the Covid-19 pandemic are found, and their relationship is estimated. Hypothesis 1 is confirmed – stock returns of the companies with higher financial leverage and lower cash holdings are more sensitive to the Covid-19. Hypotheses 2 and 3 are rejected - bankruptcy prediction models' components are not statistically significant variables of stock price change in the period of economic shocks, and the fundamentals determining the changes in stock prices differ among companies with different capitalisation sizes and across the US and EU countries. Every question formulated in the introductory part got an answer.

The current topic can be developed further – it would be interesting to study the determinants of the recovery of stock markets after the outbreak of economic shocks. This information, together with the findings of the current study, could improve investors' position who want to invest in financially sustainable companies which can effectively manage economic shocks. Also, it could give an insight into how to get an additional return, buying stocks from the bottom after passing the most severe part of the crisis.

KOKKUVÕTE

ETTEVÕTTE FINANTSSEISU MÕJU TURUVÄÄRTUSE LANGUSELE MAJANDUSŠOKKIDE AJAL, COVID-19 NÄITEL

Artemi Žukov

Majandusšokk – on regulaarne nähtumus, mis aeg-ajalt tekib ja toob aktisaturule palju määramatust. Mõned ettevõtted lähevad pankrotti, enamus puutub kokku turuväärtuse langusega. Covid-19 pandeemia on teistsugune kriis, kuna sai alguse mittefinantsiliste põhjuste tõttu, kuid tõi muuhulgas ka finantsilised tagajärjed. Turuväärtuse langust kriisi ajal on väga keeruline ette prognoosida, kuid on võimalik seda riski maandada. Käesoleva magistritöö eesmärk on Covid-19 kriisi näitel välja selgitada, millised fundamentaalsed näitajad ettevõtete finantsaruannetest mõjutavad ettevõtte turuväärtuse langust majandusšokkide ajal ning määrata nende näitajate seos turuväärtuse langusega.

Magistritöös on püstitatud 4 uurimisküsimust:

1. Millised fundamentaalsed näitajad mõjutavad majandusšokist tingitud ebakindluse perioodil aktsiahindade langust?
2. Millised fundamentaalnäitajate väärtused leevendavad aktsiahindade langust Covid-19 pandeemia ajal?
3. Kas pankroti prognoosimismudelite komponendid mõjutavad aktsiahinna langust Covid-19 pandeemia ajal?
4. Kas fundamentaalsed näitajad, mis mõjutavad aktsiahindade langust Covid-19 pandeemia ajal, erinevad ettevõtetes erineva suuruse ja päritoluga?

Magistritöös on püstitatud ka kolm hüpoteesi:
Hüpotees 1: Suurema finantsvõimenduse ja väiksema sularaha seisuga ettevõtete aktsiahinnad on tundlikumad COVID-19 suhtes.

Hüpotees 2: Pankroti prognoosimise mudelite komponendid on statistiliselt olulised aktsiahindade muutmise selgitamiseks majandussõkkide perioodil.
Hüpotees 3: Fundamentaalsed näitajad, mis mõjutavad aktsiahindade langust Covid-19 pandeemia ajal, on suurtes ja väikestes ettevõtetes samad, aga nende koefitsiendid võivad olla erinevad.

Magistritöö koosneb kolmest osast: teema teoreetiline käsitlemine, andmed ja metoodika kirjeldus ning empiirilise uurimuse tulemused. Esimeses osas on välja toodud Covid-19 peamised majandustagajärjed ja turgude reaktsioon pandeemia puhkemisele, teiste autorite tulemused erinevate majandussõkkide mõjust aktsiaturgudele, peamised teoreetilised kontseptsioonid fundamentaalsete näitajate ja aktsiahindade muutuste omavahelistest seostest. Fundamentaalsed näitajad, mis mõjutasid turuväärtuse langust teistes uuringutes, on kasutatud selle töö empiirilises osas. Teises osas on vaja toodud andmete ja metoodika kirjeldus, mis on kasutatud empiirilises analüüsis. Kolmandas osas on välja toodud empiirilise analüüsi tulemused ja järeldused.

Magistritöö tulemused näitavad, et mõned fundamentaalsed näitajad suurendavad ettevõtte püsimisvõimet majandussõkkide suhtes, ning tänu nendele turuväärtus ei kahene nii kiiresti võrreldes teiste ettevõtetega. Selliste näitajate hulka kuuluvad raha jääk pangakontol, võlasuhe, lühiajalise võla suhe kogu võlaga, turuväärtuse suhe raamatupidamisliku väärtusega, eelmiste perioodide volatiilsus ning ettevõtte suurus. Mida rohkem on ettevõttel raha, seda paindlikum see ettevõte on, ning seda väiksem on ettevõtte turuväärtuse langus. Ettevõtte finantsvõimendus (võlasuhe) on negatiivselt seotud turuväärtuse muutusega – mida rohkem on ettevõttel kohustisi, seda sügavamale langeb selle ettevõtte aktsia hind. Lühiajalise võla suhe kogu võlaga on positiivselt seotud turuväärtuse muutusega ehk lühiajaline võlg võib parandada ettevõtte positsiooni majandussõoki ajal. Turuväärtuse suhe bilansiväärtusega on ka seotud turuväärtuse muutusega positiivselt. Ettevõtted suurema P/B suhtega ei ole niivõrd tundlikud majandussõkkide suhtes. Eeldatakse, et investorid panustavad raha sellistesse ettevõtetesse, sest usuvad nende rahavoogude kasvusse tulevikus ning praegused mured ei ole nendele niivõrd tähtsad. Eelmiste perioodide volatiilsus tekitab suuremat volatiilsust ka tulevikus – see kehtib ka majandussõkkide kontekstis. Ettevõtted suurema volatiilsusega eelnevates perioodides puutuvad kokku suurema langusega Covid-19 puhkemise ajal.

Näitajad, mis mõjutavad ettevõtte turuväärtuse langust erinevad suurtes ja väikestes ettevõtetes ning USA ja EL riikides. Pankroti ennustamise mudelid ega nende komponendid ei mõjuta turuväärtuse langust.

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APPENDICES

Appendix 1. Model with all variables

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	
(Intercept)	-0,1195	0,0269	-4,4500	$8,89*10^{-6}$	***
Market_Cap_mlrd	$1,65*10^{-4}$	$5,31*10^{-5}$	3,10	$1,93*10^{-3}$	**
Debt_to_capital	-0,0235	0,0064	-3,6490	$2,68*10^{-4}$	***
Cash_To_Capital	0,0456	0,0115	3,9700	$7,37*10^{-5}$	***
Short_term_debt_to_total_debt	0,0495	0,0090	5,5200	$3,69*10^{-8}$	***
Intern_turnover_.	$-3,17*10^{-5}$	$7,63*10^{-3}$	-0,0040	$9,97*10^{-1}$	
Market,to,book_manual	0,0068	0,0011	5,9790	$2,52*10^{-9}$	***
Retained_earnings_to_debt	$4,95*10^{-6}$	$7,14*10^{-6}$	0,6930	$4,88*10^{-1}$	
Market_value_to_total_liabilities	$-9,28*10^{-11}$	$4,05*10^{-10}$	-0,2290	$8,19*10^{-1}$	
Net_Income_To_Total_assets	0,0041	0,0046	0,8920	$3,72*10^{-1}$	
Current_assets_to_current_liabilities	0,0017	0,0010	1,7830	$7,47*10^{-2}$	.
ROE	$1,84*10^{-5}$	$3,76*10^{-6}$	0,4910	$6,24*10^{-1}$	
P_To_E	$-1,06*10^{-6}$	$1,26*10^{-6}$	-0,8410	$4,00*10^{-1}$	
CSR	$-3,30*10^{-5}$	$7,11*10^{-5}$	-0,4650	$6,42*10^{-1}$	
Volatility	-0,0069	0,0003	-22,3180	$< 2*10^{-16}$	***
Days	$-5,32*10^{-4}$	$1,65*10^{-4}$	-3,2170	$1,31*10^{-3}$	**
Volumes	$9,81*10^{-8}$	$9,92*10^{-8}$	0,9890	$3,23*10^{-1}$	
RegionEU	-0,1916	0,0109	-17,5600	$< 2*10^{-16}$	***
RegionOther	-0,1536	0,0085	-18,0210	$< 2*10^{-16}$	***
RegionUK	-0,1930	0,0118	-16,4040	$< 2*10^{-16}$	***
RegionUS	-0,2091	0,0088	-23,8030	$< 2*10^{-16}$	***
IndustryAerospace & Defense	-0,0134	0,0306	-0,4380	$6,61*10^{-1}$	
IndustryAir Freight & Logistics	0,0795	0,0343	2,3190	$2,05*10^{-2}$	*
IndustryAirlines	-0,1215	0,0341	-3,5590	$3,78*10^{-4}$	***
IndustryAuto Components	-0,0056	0,0315	-0,1790	$8,58*10^{-1}$	
IndustryAutomobiles	-0,0094	0,0351	-0,2670	$7,89*10^{-1}$	
IndustryBanks	0,0165	0,0257	0,6430	$5,20*10^{-1}$	
IndustryBeverages	0,0634	0,0299	2,1200	$3,41*10^{-2}$	*
IndustryBiotechnology	0,1336	0,0306	4,3680	$1,30*10^{-5}$	***
IndustryBuilding Products	0,0366	0,0336	1,0900	$2,76*10^{-1}$	
IndustryCapital Markets	0,0373	0,0274	1,3630	$1,73*10^{-1}$	
IndustryChemicals	0,0507	0,0274	1,8480	$6,47*10^{-2}$	.

IndustryCommercial Services & Supplies	0,0223	0,0305	0,7290	$4,66*10^{-1}$	
IndustryCommunications Equipment	0,0284	0,0345	0,8230	$4,11*10^{-1}$	
IndustryConstruction & Engineering	-0,0106	0,0302	-0,3500	$7,26*10^{-1}$	
IndustryConstruction Materials	0,0194	0,0321	0,6030	$5,47*10^{-1}$	
IndustryConsumer Fince	-0,0531	0,0375	-1,4170	$1,57*10^{-1}$	
IndustryContainers & Packaging	0,0822	0,0347	2,3690	$1,79*10^{-2}$	*
IndustryDistributors	-0,0092	0,0449	-0,2040	$8,38*10^{-1}$	
IndustryDiversified Consumer Services	0,0430	0,0410	1,0470	$2,95*10^{-1}$	
IndustryDiversified Fincial Services	0,0062	0,0359	0,1740	$8,62*10^{-1}$	
IndustryDiversified Telecommunication Services	0,1091	0,0306	3,5650	$3,69*10^{-4}$	***
IndustryElectric Utilities	0,0582	0,0293	1,9870	$4,70*10^{-2}$	*
IndustryElectrical Equipment	0,0413	0,0307	1,3440	$1,79*10^{-1}$	
IndustryElectronic Equipment Instruments & Components	0,0398	0,0278	1,4320	$1,52*10^{-1}$	
IndustryEnergy Equipment & Services	-0,1199	0,0367	-3,2670	$1,10*10^{-3}$	**
IndustryEntertainment	0,0703	0,0330	2,1300	$3,33*10^{-2}$	*
IndustryEquity Real Estate Investment Trusts (REITs)	-0,0512	0,0254	-2,0160	$4,39*10^{-2}$	*
IndustryFood & Staples Retailing	0,1346	0,0296	4,5540	$5,47*10^{-6}$	***
IndustryFood Products	0,1053	0,0272	3,8710	$1,11*10^{-4}$	***
IndustryGas Utilities	0,0366	0,0356	1,0260	$3,05*10^{-1}$	
IndustryHealth Care Equipment & Supplies	0,0726	0,0299	2,4320	$1,51*10^{-2}$	*
IndustryHealth Care Providers & Services	0,0324	0,0284	1,1400	$2,54*10^{-1}$	
IndustryHealth Care Technology	0,0394	0,0451	0,8740	$3,82*10^{-1}$	
IndustryHotels Restaurants & Leisure	-0,1255	0,0283	-4,4440	$9,17*10^{-6}$	***
IndustryHousehold Durables	-0,0420	0,0300	-1,3990	$1,62*10^{-1}$	
IndustryHousehold Products	0,1465	0,0450	3,2530	$1,15*10^{-3}$	**
IndustryIndependent Power and Renewable Electricity Producers	0,1015	0,0325	3,1210	$1,82*10^{-3}$	**
IndustryIndustrial Conglomerates	0,0652	0,0328	1,9880	$4,69*10^{-2}$	*
IndustryInsurance	0,0018	0,0274	0,0670	$9,46*10^{-1}$	
IndustryInteractive Media & Services	-0,0007	0,0371	-0,0180	$9,85*10^{-1}$	
IndustryInternet & Direct Marketing Retail	0,0470	0,0447	1,0510	$2,93*10^{-1}$	
IndustryIT Services	0,0033	0,0295	0,1110	$9,12*10^{-1}$	
IndustryLeisure Products	-0,0733	0,0410	-1,7870	$7,41*10^{-2}$	.

IndustryLife Sciences Tools & Services	0,1363	0,0354	3,8530	$1,19*10^{-4}$	***
IndustryMachinery	0,0368	0,0274	1,3420	$1,80*10^{-1}$	
IndustryMarine	0,1036	0,0398	2,6030	$9,28*10^{-3}$	**
IndustryMedia	0,0385	0,0292	1,3170	$1,88*10^{-1}$	
IndustryMetals & Mining	0,0835	0,0271	3,0760	$2,12*10^{-3}$	**
IndustryMortgage Real Estate Investment Trusts (REITs)	-0,2575	0,0424	-6,0820	$1,34*10^{-9}$	***
IndustryMulti-Utilities	0,0570	0,0333	1,7120	$8,70*10^{-2}$	.
IndustryMultiline Retail	0,0106	0,0361	0,2950	$7,68*10^{-1}$	
IndustryOil Gas & Consumable Fuels	-0,0722	0,0269	-2,6780	$7,45*10^{-3}$	**
IndustryPaper & Forest Products	0,0245	0,0424	0,5780	$5,63*10^{-1}$	
IndustryPersol Products	0,0691	0,0402	1,7200	$8,56*10^{-2}$	.
IndustryPharmaceuticals	0,1027	0,0282	3,6370	$2,80*10^{-4}$	***
IndustryProfessiol Services	0,0480	0,0314	1,5270	$1,27*10^{-1}$	
IndustryReal Estate Magement & Development	0,0647	0,0274	2,3660	$1,80*10^{-2}$	*
IndustryRoad & Rail	0,0469	0,0336	1,3980	$1,62*10^{-1}$	
IndustrySemiconductors & Semiconductor Equipment	0,0489	0,0286	1,7100	$8,74*10^{-2}$	.
IndustrySoftware	0,0548	0,0284	1,9330	$5,33*10^{-2}$	.
IndustrySpecialty Retail	-0,0454	0,0289	-1,5720	$1,16*10^{-1}$	
IndustryTechnology Hardware Storage & Peripherals	0,0797	0,0331	2,4100	$1,60*10^{-2}$	*
IndustryTextiles Apparel & Luxury Goods	-0,0253	0,0313	-0,8080	$4,19*10^{-1}$	
IndustryThrifts & Mortgage Fince	-0,0196	0,0397	-0,4940	$6,22*10^{-1}$	
IndustryTobacco	0,1021	0,0525	1,9440	$5,20*10^{-2}$	.
IndustryTrading Companies & Distributors	0,0208	0,0305	0,6810	$4,96*10^{-1}$	
IndustryTransportation Infrastructure	0,0162	0,0326	0,4960	$6,20*10^{-1}$	
IndustryWater Utilities	0,1409	0,0396	3,5630	$3,72*10^{-4}$	***
IndustryWireless Telecommunication Services	0,1465	0,0333	4,4000	$1,12*10^{-5}$	***

Source: author's calculations

Comments: observations – 3034; adjusted R^2 – 0,4879

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

Appendix 2. General model

Variable	Estimate	Std. Error	t-value	Pr(>|t|)		Conf. int. from	Conf. int. to
(Intercept)	-0,1194	0,0267	-4,4690	$8{,}14*10^{-6}$	***	-0,07	-0,17
Market_Cap_mlrd	$1{,}68*10^{-4}$	$5{,}22*10^{-5}$	3,2100	$1{,}34*10^{-3}$	**	0,00	0,00
Debt_to_capital	-0,0163	0,0048	-3,4230	$6{,}27*10^{-4}$	***	-0,01	-0,03
Cash_To_Capital	0,0457	0,0109	4,2080	$2{,}65*10^{-5}$	***	0,07	0,02
Short_term_debt_to_total_debt	0,0486	0,0088	5,5200	$3{,}67*10^{-8}$	***	0,07	0,03
Market,to,book_manual	0,0078	0,0011	7,3200	$3{,}16*10^{-13}$	***	0,01	0,01
Volatility	-0,0069	0,0003	-23,7700	$< 2*10^{-16}$	***	-0,01	-0,01
Days	-0,0005	0,0002	-3,2300	$1{,}25*10^{-3}$	**	-0,00	-0,00
RegionEU	-0,1951	0,0101	-19,3800	$< 2*10^{-16}$	***	-0,18	-0,21
RegionOther	-0,1556	0,0079	-19,8080	$< 2*10^{-16}$	***	-0,14	-0,17
RegionUK	-0,1946	0,0111	-17,5760	$< 2*10^{-16}$	***	-0,17	-0,22
RegionUS	-0,2109	0,0082	-25,7670	$< 2*10^{-16}$	***	-0,19	-0,23
IndustryAerospace & Defense	-0,0357	0,0296	-1,2050	$2{,}28*10^{-1}$		0,02	-0,09
IndustryAir Freight & Logistics	0,0774	0,0341	2,2730	$2{,}31*10^{-2}$	*	0,14	0,01
IndustryAirlines	-0,1223	0,0335	-3,6560	$2{,}61*10^{-4}$	***	-0,06	-0,19
IndustryAuto Components	-0,0065	0,0309	-0,2110	$8{,}33*10^{-1}$		0,05	-0,07
IndustryAutomobiles	-0,0126	0,0346	-0,3630	$7{,}17*10^{-1}$		0,06	-0,08
IndustryBanks	0,0123	0,0254	0,4820	$6{,}30*10^{-1}$		0,06	-0,04
IndustryBeverages	0,0614	0,0294	2,0900	$3{,}67*10^{-2}$	*	0,12	0,00
IndustryBiotechnology	0,1357	0,0295	4,6060	$4{,}27*10^{-6}$	***	0,19	0,08
IndustryBuilding Products	0,0363	0,0331	1,0990	$2{,}72*10^{-1}$		0,10	-0,03
IndustryCapital Markets	0,0358	0,0270	1,3290	$1{,}84*10^{-1}$		0,09	-0,02
IndustryChemicals	0,0491	0,0266	1,8450	$6{,}51*10^{-2}$	.	0,10	-0,00
IndustryCommercial Services & Supplies	0,0201	0,0301	0,6660	$5{,}06*10^{-1}$		0,08	-0,04
IndustryCommunications Equipment	0,0311	0,0336	0,9240	$3{,}56*10^{-1}$		0,10	-0,03
IndustryConstruction & Engineering	-0,0119	0,0299	-0,4000	$6{,}89*10^{-1}$		0,05	-0,07
IndustryConstruction Materials	0,0162	0,0315	0,5130	$6{,}08*10^{-1}$		0,08	-0,05
IndustryConsumer Fince	-0,0569	0,0374	-1,5200	$1{,}29*10^{-1}$		0,02	-0,13
IndustryContainers & Packaging	0,0748	0,0337	2,2230	$2{,}63*10^{-2}$	*	0,14	0,01
IndustryDistributors	-0,0103	0,0448	-0,2300	$8{,}18*10^{-1}$		0,08	-0,10

IndustryDiversified Consumer Services	0,0417	0,0409	1,0200	$3{,}08*10^{-1}$		0,12	-0,04
IndustryDiversified Fincial Services	0,0013	0,0357	0,0360	$9{,}71*10^{-1}$		0,07	-0,07
IndustryDiversified Telecommunication Services	0,1108	0,0300	3,6960	$2{,}23*10^{-4}$	***	0,17	0,05
IndustryElectric Utilities	0,0551	0,0289	1,9070	$5{,}67*10^{-2}$	.	0,11	-0,00
IndustryElectrical Equipment	0,0417	0,0301	1,3870	$1{,}65*10^{-1}$		0,10	-0,02
IndustryElectronic Equipment Instruments & Components	0,0410	0,0270	1,5220	$1{,}28*10^{-1}$		0,09	-0,01
IndustryEnergy Equipment & Services	-0,1191	0,0362	-3,2900	$1{,}02*10^{-3}$	**	-0,05	-0,19
IndustryEntertainment	0,0697	0,0327	2,1310	$3{,}32*10^{-2}$	*	0,13	0,01
IndustryEquity Real Estate Investment Trusts (REITs)	-0,0527	0,0251	-2,0960	$3{,}61*10^{-2}$	*	-0,00	-0,10
IndustryFood & Staples Retailing	0,1325	0,0293	4,5220	$6{,}37*10^{-6}$	***	0,19	0,08
IndustryFood Products	0,1046	0,0267	3,9180	$9{,}13*10^{-5}$	***	0,16	0,05
IndustryGas Utilities	0,0333	0,0354	0,9400	$3{,}47*10^{-1}$		0,10	-0,04
IndustryHealth Care Equipment & Supplies	0,0710	0,0293	2,4270	$1{,}53*10^{-2}$	*	0,13	0,01
IndustryHealth Care Providers & Services	0,0290	0,0281	1,0330	$3{,}02*10^{-1}$		0,08	-0,03
IndustryHealth Care Technology	0,0395	0,0450	0,8780	$3{,}80*10^{-1}$		0,13	-0,05
IndustryHotels Restaurants & Leisure	-0,1218	0,0274	-4,4470	$9{,}01*10^{-6}$	***	-0,07	-0,18
IndustryHousehold Durables	-0,0389	0,0296	-1,3140	$1{,}89*10^{-1}$		0,02	-0,10
IndustryHousehold Products	0,1484	0,0418	3,5470	$3{,}95*10^{-4}$	***	0,23	0,07
IndustryIndependent Power and Renewable Electricity Producers	0,0986	0,0322	3,0610	$2{,}23*10^{-3}$	**	0,16	0,04
IndustryIndustrial Conglomerates	0,0650	0,0324	2,0050	$4{,}50*10^{-2}$	*	0,13	0,00
IndustryInsurance	-0,0005	0,0272	-0,0180	$9{,}85*10^{-1}$		0,05	-0,05
IndustryInteractive Media & Services	-0,0047	0,0368	-0,1270	$8{,}99*10^{-1}$		0,07	-0,08
IndustryInternet & Direct Marketing Retail	0,0221	0,0429	0,5150	$6{,}07*10^{-1}$		0,11	-0,06
IndustryIT Services	0,0059	0,0288	0,2030	$8{,}39*10^{-1}$		0,06	-0,05

IndustryLeisure Products	-0,0843	0,0398	-2,1210	$3{,}40*10^{-2}$	*	-0,01	-0,16
IndustryLife Sciences Tools & Services	0,1354	0,0347	3,9000	$9{,}82*10^{-5}$	***	0,20	0,07
IndustryMachinery	0,0365	0,0268	1,3630	$1{,}73*10^{-1}$		0,09	-0,02
IndustryMarine	0,1014	0,0396	2,5590	$1{,}05*10^{-2}$	*	0,18	0,02
IndustryMedia	0,0356	0,0286	1,2430	$2{,}14*10^{-1}$		0,09	-0,02
IndustryMetals & Mining	0,0827	0,0262	3,1560	$1{,}62*10^{-3}$	**	0,13	0,03
IndustryMortgage Real Estate Investment Trusts (REITs)	-0,2707	0,0417	-6,4990	$9{,}44*10^{-11}$	***	-0,19	-0,35
IndustryMulti-Utilities	0,0532	0,0329	1,6160	$1{,}06*10^{-1}$		0,12	-0,01
IndustryMultiline Retail	0,0208	0,0354	0,5860	$5{,}58*10^{-1}$		0,09	-0,05
IndustryOil Gas & Consumable Fuels	-0,0712	0,0263	-2,7080	$6{,}80*10^{-3}$	**	-0,02	-0,12
IndustryPaper & Forest Products	0,0233	0,0419	0,5560	$5{,}78*10^{-1}$		0,11	-0,06
IndustryPersol Products	0,0675	0,0387	1,7420	$8{,}16*10^{-2}$	.	0,14	-0,01
IndustryPharmaceuticals	0,1050	0,0274	3,8310	$1{,}30*10^{-4}$	***	0,16	0,05
IndustryProfessiol Services	0,0453	0,0310	1,4610	$1{,}44*10^{-1}$		0,11	-0,02
IndustryReal Estate Magement & Development	0,0632	0,0271	2,3330	$1{,}97*10^{-2}$	*	0,12	0,01
IndustryRoad & Rail	0,0448	0,0333	1,3440	$1{,}79*10^{-1}$		0,11	-0,02
IndustrySemiconductors & Semiconductor Equipment	0,0502	0,0275	1,8260	$6{,}80*10^{-2}$	.	0,10	-0,00
IndustrySoftware	0,0517	0,0277	1,8700	$6{,}16*10^{-2}$	.	0,11	-0,00
IndustrySpecialty Retail	-0,0446	0,0282	-1,5820	$1{,}14*10^{-1}$		0,01	-0,10
IndustryTechnology Hardware Storage & Peripherals	0,0822	0,0319	2,5760	$1{,}00*10^{-2}$	*	0,14	0,02
IndustryTextiles Apparel & Luxury Goods	-0,0257	0,0306	-0,8390	$4{,}01*10^{-1}$		0,03	-0,09
IndustryThrifts & Mortgage Fince	-0,0249	0,0397	-0,6280	$5{,}30*10^{-1}$		0,05	-0,10
IndustryTobacco	0,1103	0,0490	2,2490	$2{,}46*10^{-2}$	*	0,21	0,01
IndustryTrading Companies & Distributors	0,0192	0,0301	0,6370	$5{,}24*10^{-1}$		0,08	-0,04
IndustryTransportation Infrastructure	0,0179	0,0321	0,5570	$5{,}78*10^{-1}$		0,08	-0,04

IndustryWater Utilities	0,1383	0,0394	3,5140	$4,47*10^{-4}$	***	0,22	0,06
IndustryWireless Telecommunication Services	0,1394	0,0328	4,2510	$2,19*10^{-5}$	***	0,20	0,08

Source: author's calculations

Comments: observations – 3034; adjusted R^2 – 0,5041

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

Appendix 3. Model for large companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	Conf. int. from	Conf. int. to
(Intercept)	-0,0847	0,0360	-2,3530	$1,87*10^{-2}$	-0,01	-0,16
Market_Cap	$1,42*10^{-13}$	$5,51*10^{-13}$	2,5830	$9,87*10^{-3}$	0,00	0,00
Debt_to_capital	-0,0139	0,0060	-2,3100	$2,10*10^{-2}$	-0,00	-0,03
Cash_To_Capital	0,0499	0,0145	3,4470	$5,79*10^{-4}$	0,08	0,02
Short_term_debt_to_ total_debt	0,0419	0,0119	3,5120	$4,56*10^{-4}$	0,07	0,02
Market,to,book_manual	0,0157	0,0022	7,2680	$5,32*10^{-13}$	0,02	0,01
Volatility	-0,0078	0,0004	-18,5810	$< 2*10^{-16}$	-0,01	-0,01
Days	-0,0002	0,0002	-0,9010	0,37	0,00	-0,00
RegionEU	-0,2135	0,0128	-16,6970	$< 2*10^{-16}$	-0,19	-0,24
RegionOther	-0,1771	0,0099	-17,8790	$< 2*10^{-16}$	-0,16	-0,20
RegionUK	-0,2272	0,0146	-15,5700	$< 2*10^{-16}$	-0,20	-0,26
RegionUS	-0,2411	0,0106	-22,7920	$< 2*10^{-16}$	-0,22	-0,26
IndustryAerospace & Defense	-0,0617	0,0389	-1,5850	$1,13*10^{-1}$	0,01	-0,14
IndustryAir Freight & Logistics	0,0607	0,0460	1,3180	$1,88*10^{-1}$	0,15	-0,03
IndustryAirlines	-0,1246	0,0406	-3,0720	$2,15*10^{-3}$	-0,05	-0,20
IndustryAuto Components	-0,0284	0,0397	-0,7150	$4,75*10^{-1}$	0,05	-0,11
IndustryAutomobiles	-0,0197	0,0445	-0,4430	$6,58*10^{-1}$	0,07	-0,11
IndustryBanks	0,0015	0,0335	0,0460	$9,63*10^{-1}$	0,07	-0,06
IndustryBeverages	0,0448	0,0421	1,0660	$2,87*10^{-1}$	0,13	-0,04
IndustryBiotechnology	0,1436	0,0425	3,3790	$7,43*10^{-4}$	0,23	0,06
IndustryBuilding Products	0,0344	0,0439	0,7850	$4,33*10^{-1}$	0,12	-0,05
IndustryCapital Markets	0,0295	0,0356	0,8300	$4,07*10^{-1}$	0,10	-0,04
IndustryChemicals	0,0328	0,0353	0,9290	$3,53*10^{-1}$	0,10	-0,04
IndustryCommercial Services & Supplies	-0,0279	0,0415	-0,6740	$5,0*10^{-1}$	0,05	-0,11
IndustryCommunications Equipment	0,0304	0,0446	0,6800	$4,97*10^{-1}$	0,12	-0,06
IndustryConstruction & Engineering	-0,0257	0,0388	-0,6620	$5,08*10^{-1}$	0,05	-0,10
IndustryConstruction Materials	-0,0153	0,0406	-0,3770	$7,07*10^{-1}$	0,06	-0,09
IndustryConsumer Fince	-0,0157	0,0571	-0,2750	$7,83*10^{-1}$	0,10	-0,13
IndustryContainers & Packaging	0,0592	0,0442	1,3380	$1,81*10^{-1}$	0,15	-0,03
IndustryDistributors	-0,0079	0,0538	-0,1470	$8,83*10^{-1}$	0,10	-0,11
IndustryDiversified Consumer Services	-0,0003	0,0504	-0,0070	$9,94*10^{-1}$	0,10	-0,10

IndustryDiversified Fincial Services	-0,0420	0,0434	-0,9690	$3,33*10^{-1}$	0,04	-0,13
IndustryDiversified Telecommunication Services	0,0898	0,0402	2,2330	$2,57*10^{-2}$	0,17	0,01
IndustryElectric Utilities	0,0320	0,0403	0,7940	$4,27*10^{-1}$	0,11	-0,05
IndustryElectrical Equipment	0,0276	0,0396	0,6980	$4,85*10^{-1}$	0,11	-0,05
IndustryElectronic Equipment Instruments & Components	0,0153	0,0363	0,4220	$6,73*10^{-1}$	0,09	-0,06
IndustryEnergy Equipment & Services	-0,1014	0,0476	-2,1290	$3,34*10^{-2}$	-0,01	-0,19
IndustryEntertainment	0,0648	0,0411	1,5750	$1,15*10^{-1}$	0,15	-0,02
IndustryEquity Real Estate Investment Trusts (REITs)	-0,0697	0,0333	-2,0950	$3,63*10^{-2}$	-0,00	-0,13
IndustryFood & Staples Retailing	0,1218	0,0404	3,0120	$2,63*10^{-3}$	0,20	0,04
IndustryFood Products	0,0847	0,0358	2,3630	$1,82*10^{-2}$	0,15	0,01
IndustryGas Utilities	0,0208	0,0424	0,4910	$6,24*10^{-1}$	0,10	-0,06
IndustryHealth Care Equipment & Supplies	0,0002	0,0476	0,0040	$9,96*10^{-1}$	0,09	-0,09
IndustryHealth Care Providers & Services	0,0032	0,0374	0,0870	$9,31*10^{-1}$	0,08	-0,07
IndustryHealth Care Technology	0,0706	0,0665	1,0630	$2,88*10^{-1}$	0,20	-0,06
IndustryHotels Restaurants & Leisure	-0,1332	0,0363	-3,6720	$2,47*10^{-4}$	-0,06	-0,20
IndustryHousehold Durables	-0,0759	0,0390	-1,9450	$5,19*10^{-2}$	0,00	-0,15
IndustryHousehold Products	0,1121	0,0658	1,7040	$8,85*10^{-2}$	0,24	-0,02
IndustryIndependent Power and Renewable Electricity Producers	0,0697	0,0404	1,7260	$8,45*10^{-2}$	0,15	-0,01
IndustryIndustrial Conglomerates	0,0592	0,0411	1,4410	$1,50*10^{-1}$	0,14	-0,02
IndustryInsurance	-0,0274	0,0352	-0,7770	$4,37*10^{-1}$	0,04	-0,10
IndustryInteractive Media & Services	0,0330	0,0497	0,6630	$5,07*10^{-1}$	0,13	-0,06
IndustryInternet & Direct Marketing Retail	-0,0193	0,0535	-0,3610	$7,18*10^{-1}$	0,09	-0,12
IndustryIT Services	-0,0307	0,0393	-0,7800	$4,36*10^{-1}$	0,05	-0,11
IndustryLeisure Products	-0,0780	0,0542	-1,4390	$1,50*10^{-1}$	0,03	-0,18
IndustryLife Sciences Tools & Services	0,1294	0,0501	2,5810	$9,91*10^{-3}$	0,23	0,03
IndustryMachinery	0,0084	0,0360	0,2350	$8,14*10^{-1}$	0,08	-0,06
IndustryMarine	0,0916	0,0473	1,9370	$5,29*10^{-2}$	0,18	-0,00

IndustryMedia	0,0305	0,0376	0,8110	$4,18*10^{-1}$	0,10	-0,04
IndustryMetals & Mining	0,0649	0,0352	1,8460	$6,50*10^{-2}$	0,13	-0,00
IndustryMortgage Real Estate Investment Trusts (REITs)	-0,2038	0,0580	-3,5120	$4,56*10^{-4}$	-0,09	-0,32
IndustryMulti-Utilities	0,0449	0,0470	0,9560	$3,39*10^{-1}$	0,14	-0,05
IndustryMultiline Retail	-0,0292	0,0474	-0,6160	$5,38*10^{-1}$	0,06	-0,12
IndustryOil Gas & Consumable Fuels	-0,0548	0,0355	-1,5410	$1,23*10^{-1}$	0,01	-0,12
IndustryPaper & Forest Products	0,0024	0,0521	0,0470	$9,62*10^{-1}$	0,10	-0,10
IndustryPersol Products	-0,0293	0,0576	-0,5090	$6,11*10^{-1}$	0,08	-0,14
IndustryPharmaceuticals	0,0831	0,0372	2,2350	$2,56*10^{-1}$	0,16	0,01
IndustryProfessiol Services	-0,0177	0,0441	-0,4020	$6,87*10^{-1}$	0,07	-0,10
IndustryReal Estate Magement & Development	0,0415	0,0356	1,1650	$2,44*10^{-1}$	0,11	-0,03
IndustryRoad & Rail	0,0307	0,0414	0,7410	$4,59*10^{-1}$	0,11	-0,05
IndustrySemiconductors & Semiconductor Equipment	0,0321	0,0376	0,8540	$3,93*10^{-1}$	0,11	-0,04
IndustrySoftware	0,0075	0,0378	0,1990	$8,42*10^{-1}$	0,08	-0,07
IndustrySpecialty Retail	-0,0399	0,0373	-1,0710	$2,85*10^{-1}$	0,03	-0,11
IndustryTechnology Hardware Storage & Peripherals	0,0510	0,0405	1,2580	$2,09*10^{-1}$	0,13	-0,03
IndustryTextiles Apparel & Luxury Goods	-0,0529	0,0416	-1,2740	$2,03*10^{-1}$	0,03	-0,13
IndustryThrifts & Mortgage Fince	-0,0027	0,0500	-0,0550	$9,56*10^{-1}$	0,10	-0,10
IndustryTobacco	-0,0626	0,1187	-0,5270	$5,98*10^{-1}$	0,17	-0,30
IndustryTrading Companies & Distributors	0,0080	0,0387	0,2070	$8,36*10^{-1}$	0,08	-0,07
IndustryTransportation Infrastructure	0,0051	0,0418	0,1210	$9,03*10^{-1}$	0,09	-0,08
IndustryWater Utilities	0,1333	0,0479	2,7850	$5,41*10^{-3}$	0,23	0,04
IndustryWireless Telecommunication Services	0,1353	0,0438	3,0890	$2,04*10^{-3}$	0,22	0,05

Source: author's calculations

Comments: observations – 1866; adjusted R^2 – 0,5306

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

Appendix 4. Model for small companies

Variable	Estimate	Std, Error	t-value	Pr(>|t|)	Conf. int. from	Conf. int. to
(Intercept)	-0,2931	0,0397	-7,3800	0,0000	-0,22	-0,37
Market_Cap	$4{,}66*10^{-12}$	$2{,}27*10^{-12}$	2,0560	0,0400	0,00	0,00
Cash_To_Capital	-0,0388	0,0152	-2,5490	0,0109	-0,01	-0,07
Short_term_debt_to_ total_debt	0,0455	0,0132	3,4550	0,0006	0,07	0,02
Market,to,book_manual	0,0023	0,0014	1,6220	0,1000	0,01	-0,00
CSR	0,0008	0,0001	7,7640	0,0000	0,00	0,00
Beta	-0,0034	0,0018	-1,9270	0,0543	0,00	-0,01
Days	-0,0012	0,0003	-3,9260	0,0001	-0,00	-0,00
RegionEU	-0,0982	0,0167	-5,8830	0,0000	-0,07	-0,13
RegionOther	-0,0672	0,0133	-5,0460	0,0000	-0,04	-0,09
RegionUK	-0,0895	0,0178	-5,0420	0,0000	-0,05	-0,12
RegionUS	-0,1183	0,0135	-8,7520	$< 2*10^{-16}$	-0,09	-0,14
IndustryAerospace & Defense	-0,1010	0,0463	-2,1820	0,0293	-0,01	-0,19
IndustryAir Freight & Logistics	0,0482	0,0518	0,9320	0,3515	0,15	-0,05
IndustryAirlines	-0,3528	0,0769	-4,5870	0,0000	-0,20	-0,50
IndustryAuto Components	-0,0908	0,0518	-1,7550	0,0795	0,01	-0,19
IndustryAutomobiles	-0,1282	0,0576	-2,2250	0,0262	-0,02	-0,24
IndustryBanks	-0,0148	0,0414	-0,3570	0,7209	0,07	-0,10
IndustryBeverages	-0,0127	0,0427	-0,2970	0,7663	0,07	-0,10
IndustryBiotechnology	-0,0081	0,0409	-0,1980	0,8429	0,07	-0,09
IndustryBuilding Products	-0,0366	0,0503	-0,7290	0,4662	0,06	-0,14
IndustryCapital Markets	-0,0158	0,0417	-0,3780	0,7058	0,07	-0,10
IndustryChemicals	-0,0393	0,0409	-0,9630	0,3358	0,04	-0,12
IndustryCommercial Services & Supplies	-0,0051	0,0448	-0,1150	0,9087	0,08	-0,09
IndustryCommunications Equipment	-0,0846	0,0497	-1,7010	0,0892	0,01	-0,18
IndustryConstruction & Engineering	-0,0596	0,0478	-1,2460	0,2128	0,03	-0,15
IndustryConstruction Materials	-0,0456	0,0532	-0,8580	0,3912	0,06	-0,15
IndustryConsumer Fince	-0,1664	0,0503	-3,3060	0,0010	-0,07	-0,27
IndustryContainers & Packaging	0,0127	0,0520	0,2440	0,8075	0,11	-0,09
IndustryDistributors	-0,1413	0,0905	-1,5610	0,1187	0,04	-0,32
IndustryDiversified Consumer Services	-0,0110	0,0573	-0,1910	0,8482	0,10	-0,12
IndustryDiversified Fincial Services	0,0639	0,0692	0,9240	0,3555	0,20	-0,07

IndustryDiversified Telecommunication Services	0,0430	0,0454	0,9470	0,3438	0,13	-0,05
IndustryElectric Utilities	-0,0005	0,0429	-0,0130	0,9899	0,08	-0,08
IndustryElectrical Equipment	-0,0544	0,0466	-1,1670	0,2435	0,04	-0,15
IndustryElectronic Equipment Instruments & Components	-0,0153	0,0405	-0,3780	0,7058	0,06	-0,09
IndustryEnergy Equipment & Services	-0,2667	0,0533	-5,0050	0,0000	-0,16	-0,37
IndustryEntertainment	-0,0356	0,0575	-0,6200	0,5356	0,08	-0,15
IndustryEquity Real Estate Investment Trusts (REITs)	-0,0755	0,0396	-1,9090	0,0565	0,00	-0,15
IndustryFood & Staples Retailing	0,0682	0,0428	1,5960	0,1108	0,15	-0,02
IndustryFood Products	0,0354	0,0404	0,8750	0,3817	0,11	-0,04
IndustryGas Utilities	0,0159	0,0909	0,1750	0,8612	0,19	-0,16
IndustryHealth Care Equipment & Supplies	-0,0065	0,0403	-0,1610	0,8720	0,07	-0,09
IndustryHealth Care Providers & Services	-0,0216	0,0421	-0,5130	0,6080	0,06	-0,10
IndustryHealth Care Technology	-0,0521	0,0597	-0,8730	0,3831	0,06	-0,17
IndustryHotels Restaurants & Leisure	-0,1953	0,0416	-4,6900	0,0000	-0,11	-0,28
IndustryHousehold Durables	-0,0814	0,0447	-1,8190	0,0691	0,01	-0,17
IndustryHousehold Products	0,1253	0,0574	2,1820	0,0293	0,24	0,01
IndustryIndependent Power and Renewable Electricity Producers	0,0052	0,0574	0,0910	0,9275	0,12	-0,11
IndustryIndustrial Conglomerates	-0,0300	0,0570	-0,5270	0,5982	0,08	-0,14
IndustryInsurance	0,0414	0,0453	0,9130	0,3613	0,13	-0,05
IndustryInteractive Media & Services	-0,1015	0,0525	-1,9360	0,0531	0,00	-0,20
IndustryInternet & Direct Marketing Retail	-0,0719	0,0772	-0,9300	0,3524	0,08	-0,22
IndustryIT Services	-0,0446	0,0418	-1,0690	0,2853	0,04	-0,13
IndustryLeisure Products	-0,1629	0,0572	-2,8480	0,0045	-0,05	-0,27
IndustryLife Sciences Tools & Services	0,0234	0,0481	0,4860	0,6270	0,12	-0,07
IndustryMachinery	0,0037	0,0406	0,0900	0,9284	0,08	-0,08
IndustryMarine	0,0610	0,0902	0,6760	0,4990	0,24	-0,12
IndustryMedia	-0,0741	0,0445	-1,6660	0,0960	0,01	-0,16

IndustryMetals & Mining	-0,0631	0,0391	-1,6160	0,1064	0,01	-0,14
IndustryMortgage Real Estate Investment Trusts (REITs)	-0,3623	0,0571	-6,3480	0,0000	-0,25	-0,47
IndustryMulti-Utilities	-0,0161	0,0481	-0,3340	0,7383	0,08	-0,11
IndustryMultiline Retail	-0,0146	0,0547	-0,2670	0,7897	0,09	-0,12
IndustryOil Gas & Consumable Fuels	-0,2247	0,0395	-5,6970	0,0000	-0,15	-0,30
IndustryPaper & Forest Products	-0,1119	0,0686	-1,6310	0,1032	0,02	-0,25
IndustryPersol Products	0,0818	0,0515	1,5880	0,1126	0,18	-0,02
IndustryPharmaceuticals	0,0079	0,0404	0,1950	0,8453	0,09	-0,07
IndustryProfessiol Services	0,0244	0,0445	0,5480	0,5835	0,11	-0,06
IndustryReal Estate Magement & Development	0,0135	0,0420	0,3210	0,7480	0,10	-0,07
IndustryRoad & Rail	-0,0039	0,0640	-0,0610	0,9512	0,12	-0,13
IndustrySemiconductors & Semiconductor Equipment	-0,0497	0,0399	-1,2440	0,2136	0,03	-0,13
IndustrySoftware	-0,0009	0,0396	-0,0220	0,9822	0,08	-0,08
IndustrySpecialty Retail	-0,1559	0,0432	-3,6070	0,0003	-0,07	-0,24
IndustryTechnology Hardware Storage & Peripherals	0,0200	0,0555	0,3600	0,7191	0,13	-0,09
IndustryTextiles Apparel & Luxury Goods	-0,0880	0,0460	-1,9120	0,0561	0,00	-0,18
IndustryThrifts & Mortgage Fince	-0,1135	0,0632	-1,7970	0,0726	0,01	-0,24
IndustryTobacco	0,0748	0,0634	1,1800	0,2381	0,20	-0,05
IndustryTrading Companies & Distributors	-0,0772	0,0498	-1,5490	0,1215	0,02	-0,17
IndustryTransportation Infrastructure	-0,0469	0,0521	-0,8990	0,3687	0,06	-0,15
IndustryWater Utilities	0,0913	0,0768	1,1880	0,2350	0,24	-0,06
IndustryWireless Telecommunication Services	0,0551	0,0506	1,0890	0,2763	0,15	-0,04

Source: author's calculations

Comments: observations – 1227; adjusted R^2 – 0,4165

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

Appendix 5. Model for US companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	Conf. int. from	Conf. int. to
(Intercept)	-0,3825	0,0292	-13,105	$< 2*10^{-16}$	-0,325	-0,44
Market_Cap	$1,14*10^{-4}$	$5,78*10^{-5}$	1,977	0,0482	0,00	0,00
Debt_to_capital	-0,0166	0,0067	-2,465	0,0138	-0,00	-0,03
Short_term_debt_to_ total_debt	0,0854	0,0162	5,272	0,0000	0,12	0,05
Market,to,book_manual	0,0209	0,0019	10,972	$< 2*10^{-16}$	0,02	0,02
Volatility	-0,0065	0,0004	-15,559	$< 2*10^{-16}$	-0,01	-0,01
Days	-0,0012	0,0003	-3,718	0,0002	-0,00	-0,00
IndustryAir Freight & Logistics	0,1662	0,0485	3,427	0,0006	0,26	0,07
IndustryAirlines	-0,0898	0,0442	-2,034	0,0422	-0,00	-0,18
IndustryAuto Components	0,0451	0,0413	1,091	0,2757	0,13	-0,04
IndustryAutomobiles	-0,0163	0,0514	-0,317	0,7513	0,08	-0,12
IndustryBanks	0,0381	0,0279	1,365	0,1725	0,09	-0,02
IndustryBeverages	0,1230	0,0402	3,062	0,0023	0,20	0,04
IndustryBiotechnology	0,1665	0,0313	5,321	0,0000	0,23	0,11
IndustryBuilding Products	0,0835	0,0374	2,235	0,0256	0,16	0,01
IndustryCapital Markets	0,0873	0,0311	2,806	0,0051	0,15	0,03
IndustryChemicals	0,1027	0,0308	3,337	0,0009	0,16	0,04
IndustryCommercial Services & Supplies	0,0464	0,0350	1,325	0,1854	0,11	-0,02
IndustryCommunications Equipment	0,0892	0,0391	2,284	0,0225	0,17	0,01
IndustryConstruction & Engineering	0,0113	0,0375	0,3	0,7641	0,08	-0,06
IndustryConstruction Materials	0,0387	0,0606	0,638	0,5238	0,16	-0,08
IndustryConsumer Fince	0,0702	0,0401	1,752	0,0801	0,15	-0,01
IndustryContainers & Packaging	0,1465	0,0382	3,838	0,0001	0,22	0,07
IndustryDistributors	0,0278	0,0687	0,405	0,6852	0,16	-0,11
IndustryDiversified Consumer Services	0,1008	0,0461	2,187	0,0290	0,19	0,01
IndustryDiversified Fincial Services	0,0761	0,0838	0,908	0,3639	0,24	-0,09
IndustryDiversified Telecommunication Services	0,2311	0,0484	4,775	0,0000	0,33	0,14
IndustryElectric Utilities	0,1085	0,0336	3,233	0,0013	0,17	0,04
IndustryElectrical Equipment	0,0849	0,0391	2,173	0,0300	0,16	0,01

IndustryElectronic Equipment Instruments & Components	0,1092	0,0314	3,483	0,0005	0,17	0,05
IndustryEnergy Equipment & Services	-0,0692	0,0443	-1,562	0,1185	0,02	-0,16
IndustryEntertainment	0,1156	0,0413	2,801	0,0052	0,20	0,03
IndustryEquity Real Estate Investment Trusts (REITs)	0,0114	0,0264	0,432	0,6658	0,06	-0,04
IndustryFood & Staples Retailing	0,1477	0,0391	3,782	0,0002	0,22	0,07
IndustryFood Products	0,2014	0,0325	6,2	0,0000	0,27	0,14
IndustryGas Utilities	0,1320	0,0463	2,854	0,0044	0,22	0,04
IndustryHealth Care Equipment & Supplies	0,0928	0,0313	2,97	0,0030	0,15	0,03
IndustryHealth Care Providers & Services	0,0732	0,0303	2,416	0,0158	0,13	0,01
IndustryHealth Care Technology	0,0791	0,0487	1,623	0,1049	0,17	-0,02
IndustryHotels Restaurants & Leisure	-0,1266	0,0303	-4,181	0,0000	-0,07	-0,19
IndustryHousehold Durables	-0,0217	0,0334	-0,649	0,5168	0,04	-0,09
IndustryHousehold Products	0,1907	0,0442	4,311	0,0000	0,28	0,10
IndustryIndependent Power and Renewable Electricity Producers	0,1608	0,0686	2,344	0,0193	0,30	0,03
IndustryIndustrial Conglomerates	0,1113	0,0606	1,836	0,0666	0,23	-0,01
IndustryInsurance	0,0879	0,0320	2,745	0,0062	0,15	0,03
IndustryInteractive Media & Services	0,1041	0,0501	2,078	0,0379	0,20	0,01
IndustryInternet & Direct Marketing Retail	0,0990	0,0624	1,587	0,1128	0,22	-0,02
IndustryIT Services	0,0458	0,0330	1,385	0,1662	0,11	-0,02
IndustryLeisure Products	0,0013	0,0484	0,027	0,9784	0,10	-0,09
IndustryLife Sciences Tools & Services	0,1637	0,0392	4,18	0,0000	0,24	0,09
IndustryMachinery	0,0789	0,0289	2,727	0,0065	0,14	0,02
IndustryMarine	0,1068	0,0824	1,296	0,1953	0,27	-0,05
IndustryMedia	0,0901	0,0333	2,708	0,0069	0,16	0,02
IndustryMetals & Mining	0,1150	0,0342	3,36	0,0008	0,18	0,05
IndustryMortgage Real Estate Investment Trusts (REITs)	-0,2116	0,0417	-5,073	0,0000	-0,13	-0,29
IndustryMulti-Utilities	0,1153	0,0394	2,926	0,0035	0,19	0,04
IndustryMultiline Retail	0,0475	0,0441	1,076	0,2822	0,13	-0,04

IndustryOil Gas & Consumable Fuels	-0,0291	0,0283	-1,029	0,3038	0,03	-0,08
IndustryPersol Products	-0,0017	0,0607	-0,028	0,9777	0,12	-0,12
IndustryPharmaceuticals	0,1684	0,0362	4,656	0,0000	0,24	0,10
IndustryProfessiol Services	0,1050	0,0367	2,865	0,0042	0,18	0,03
IndustryReal Estate Magement & Development	0,0099	0,0442	0,223	0,8234	0,10	-0,08
IndustryRoad & Rail	0,1357	0,0381	3,56	0,0004	0,21	0,06
IndustrySemiconductors & Semiconductor Equipment	0,1134	0,0304	3,728	0,0002	0,17	0,05
IndustrySoftware	0,0718	0,0293	2,452	0,0144	0,13	0,01
IndustrySpecialty Retail	0,0087	0,0307	0,283	0,7768	0,07	-0,05
IndustryTechnology Hardware Storage & Peripherals	0,1158	0,0427	2,71	0,0068	0,20	0,03
IndustryTextiles Apparel & Luxury Goods	-0,0163	0,0391	-0,416	0,6773	0,06	-0,09
IndustryThrifts & Mortgage Fince	0,0686	0,0444	1,544	0,1229	0,16	-0,02
IndustryTobacco	0,2099	0,0688	3,051	0,0023	0,34	0,08
IndustryTrading Companies & Distributors	0,0632	0,0367	1,723	0,0852	0,14	-0,01
IndustryWater Utilities	0,1825	0,0515	3,541	0,0004	0,28	0,08
IndustryWireless Telecommunication Services	0,1963	0,0607	3,236	0,0012	0,32	0,08

Source: author's calculations

Comments: observations – 1215; adjusted R^2 – 0,49

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

Appendix 6. Model for EU companies

Variable	Estimate	Std. Error	t-value	Pr(>|t|)	Conf. int. from	Conf, int. to
(Intercept)	-0,1575	0,0889	-1,772	0,0779	0,02	-0,332
Turnover	$-9{,}27*10^{-4}$	$3{,}22*10^{-4}$	-2,88	0,0044	-0,00	-0,00
Debt_to_capital	-0,0491	0,0268	-1,831	0,0686	0,00	-0,10
Short_term_debt_to_capital	0,0757	0,0331	2,29	0,0231	0,14	0,01
Market_value_to_ total_liabilities	$6{,}65*10^{-9}$	$2{,}68*10^{-9}$	2,483	0,0138	0,00	0,00
Volatility	-0,0064	0,0010	-6,623	$3{,}03*10^{-10}$	-0,00	-0,01
Days	-0,0011	0,0006	-1,789	0,0752	0,00	-0,00
IndustryAerospace & Defense	$-1{,}68*10^{-1}$	$9{,}63*10^{-2}$	-1,744	0,0827	0,02	-0,36
IndustryAir Freight & Logistics	$6{,}37*10^{-3}$	$9{,}89*10^{-2}$	0,064	0,9487	0,20	-0,19
IndustryAirlines	$-8{,}98*10^{-2}$	$1{,}28*10^{-1}$	-0,701	0,4841	0,16	-0,34
IndustryAuto Components	$-1{,}31*10^{-1}$	$9{,}47*10^{-2}$	-1,386	0,1673	0,05	-0,32
IndustryAutomobiles	$-1{,}69*10^{-2}$	$1{,}07*10^{-1}$	-0,158	0,8749	0,19	-0,23
IndustryBanks	$-1{,}25*10^{-1}$	$9{,}40*10^{-2}$	-1,329	0,1855	0,06	-0,31
IndustryBeverages	$-6{,}30*10^{-3}$	$9{,}76*10^{-2}$	-0,065	0,9486	0,19	-0,20
IndustryBiotechnology	$3{,}64*10^{-2}$	$9{,}65*10^{-2}$	0,377	0,7063	0,23	-0,15
IndustryBuilding Products	$-1{,}12*10^{-1}$	$9{,}81*10^{-2}$	-1,145	0,2534	0,08	-0,30
IndustryCapital Markets	$-2{,}95*10^{-2}$	$1{,}06*10^{-1}$	-0,278	0,781	0,18	-0,24
IndustryChemicals	$-5{,}51*10^{-2}$	$9{,}18*10^{-2}$	-0,6	0,549	0,12	-0,24
IndustryCommercial Services & Supplies	$-1{,}59*10^{-1}$	$9{,}67*10^{-2}$	-1,641	0,1024	0,03	-0,35
IndustryConstruction & Engineering	$-1{,}16*10^{-1}$	$9{,}22*10^{-2}$	-1,253	0,2115	0,07	-0,30
IndustryConstruction Materials	$-1{,}41*10^{-1}$	$9{,}62*10^{-2}$	-1,46	0,1458	0,05	-0,33
IndustryContainers & Packaging	$7{,}37*10^{-3}$	$1{,}07*10^{-1}$	0,069	0,9452	0,22	-0,20
IndustryDistributors	$-7{,}09*10^{-2}$	$1{,}23*10^{-1}$	-0,579	0,5634	0,17	-0,31
IndustryDiversified Fincial Services	$-1{,}35*10^{-1}$	$9{,}73*10^{-2}$	-1,389	0,1663	0,06	-0,33
IndustryDiversified Telecommunication Services	$3{,}20*10^{-3}$	$9{,}44*10^{-2}$	0,034	0,973	0,19	-0,18
IndustryElectric Utilities	$-4{,}81*10^{-2}$	$9{,}48*10^{-2}$	-0,507	0,6124	0,14	-0,23
IndustryElectrical Equipment	$-5{,}51*10^{-2}$	$9{,}49*10^{-2}$	-0,581	0,5621	0,13	-0,24
IndustryElectronic Equipment Instruments & Components	$-2{,}19*10^{-1}$	$1{,}22*10^{-1}$	-1,785	0,0757	0,02	-0,46
IndustryEnergy Equipment & Services	$-1{,}84*10^{-1}$	$9{,}96*10^{-2}$	-1,842	0,0669	0,01	-0,38
IndustryEntertainment	$-5{,}91*10^{-2}$	$1{,}02*10^{-1}$	-0,58	0,5626	0,14	-0,26

IndustryEquity Real Estate Investment Trusts (REITs)	$-1{,}79*10^{-1}$	$9{,}01*10^{-2}$	-1,99	0,0479	-0,00	-0,36
IndustryFood & Staples Retailing	$1{,}20*10^{-1}$	$9{,}75*10^{-2}$	1,231	0,2199	0,31	-0,07
IndustryFood Products	$9{,}51*10^{-2}$	$9{,}37*10^{-2}$	1,014	0,3116	0,28	-0,09
IndustryGas Utilities	$-4{,}25*10^{-2}$	$1{,}23*10^{-1}$	-0,346	0,7296	0,20	-0,28
IndustryHealth Care Equipment & Supplies	$-1{,}64*10^{-2}$	$9{,}72*10^{-2}$	-0,169	0,8664	0,17	-0,21
IndustryHealth Care Providers & Services	$-4{,}19*10^{-2}$	$1{,}02*10^{-1}$	-0,409	0,6831	0,16	-0,24
IndustryHotels Restaurants & Leisure	$-1{,}30*10^{-1}$	$9{,}84*10^{-2}$	-1,32	0,1883	0,06	-0,32
IndustryHousehold Durables	$1{,}50*10^{-1}$	$1{,}23*10^{-1}$	1,219	0,2242	0,39	-0,09
IndustryIndependent Power and Renewable Electricity Producers	$2{,}22*10^{-2}$	$1{,}03*10^{-1}$	0,215	0,8297	0,22	-0,18
IndustryIndustrial Conglomerates	$-5{,}63*10^{-2}$	$1{,}08*10^{-1}$	-0,524	0,601	0,15	-0,27
IndustryInsurance	$-1{,}77*10^{-1}$	$9{,}29*10^{-2}$	-1,908	0,0577	0,00	-0,36
IndustryIT Services	$-5{,}37*10^{-2}$	$9{,}26*10^{-2}$	-0,579	0,5631	0,13	-0,24
IndustryLeisure Products	$-1{,}79*10^{-1}$	$1{,}07*10^{-1}$	-1,672	0,096	0,03	-0,39
IndustryLife Sciences Tools & Services	$9{,}70*10^{-2}$	$9{,}87*10^{-2}$	0,983	0,3266	0,29	-0,10
IndustryMachinery	$-1{,}05*10^{-1}$	$9{,}77*10^{-2}$	-1,071	0,2852	0,09	-0,30
IndustryMedia	$-8{,}43*10^{-2}$	$9{,}21*10^{-2}$	-0,916	0,3607	0,10	-0,26
IndustryMetals & Mining	$-5{,}99*10^{-2}$	$9{,}61*10^{-2}$	-0,624	0,5334	0,13	-0,25
IndustryMulti-Utilities	$-5{,}61*10^{-2}$	$1{,}08*10^{-1}$	-0,517	0,6055	0,16	-0,27
IndustryMultiline Retail	$5{,}22*10^{-2}$	$1{,}23*10^{-1}$	0,425	0,6712	0,29	-0,19
IndustryOil Gas & Consumable Fuels	$-8{,}45*10^{-2}$	$9{,}43*10^{-2}$	-0,896	0,3712	0,10	-0,27
IndustryPaper & Forest Products	$-9{,}64*10^{-2}$	$1{,}08*10^{-1}$	-0,894	0,3724	0,12	-0,31
IndustryPersol Products	$5{,}15*10^{-2}$	$1{,}06*10^{-1}$	0,485	0,6281	0,26	-0,16
IndustryPharmaceuticals	$9{,}62*10^{-2}$	$9{,}23*10^{-2}$	0,01	0,9917	0,18	-0,18
IndustryProfessiol Services	$-9{,}46*10^{-2}$	$9{,}31*10^{-2}$	-1,016	0,3108	0,09	-0,28
IndustryReal Estate Magement & Development	$-1{,}12*10^{-1}$	$1{,}08*10^{-1}$	-1,038	0,3005	0,10	-0,32
IndustryRoad & Rail	$-3{,}09*10^{-1}$	$1{,}27*10^{-1}$	-2,43	0,0159	-0,06	-0,56
IndustrySemiconductors & Semiconductor Equipment	$-2{,}01*10^{-2}$	$9{,}78*10^{-2}$	-0,205	0,8377	0,17	-0,21
IndustrySoftware	$-9{,}81*10^{-3}$	$1{,}07*10^{-1}$	-0,092	0,9271	0,20	-0,22
IndustrySpecialty Retail	$-6{,}74*10^{-2}$	$1{,}07*10^{-1}$	-0,63	0,5295	0,14	-0,28
IndustryTechnology Hardware Storage & Peripherals	$1{,}31*10^{-1}$	$1{,}25*10^{-1}$	1,044	0,2975	0,38	-0,11
IndustryTextiles Apparel & Luxury Goods	$-4{,}21*10^{-3}$	$9{,}63*10^{-2}$	-0,044	0,9652	0,18	-0,19
IndustryTrading Companies & Distributors	$-2{,}23*10^{-1}$	$9{,}85*10^{-2}$	-2,262	0,0247	-0,03	-0,42

IndustryTransportation Infrastructure	$-2{,}18*10^{-1}$	$1{,}07*10^{-1}$	-2,036	0,043	-0,01	-0,43
IndustryWireless Telecommunication Services	$3{,}87*10^{-3}$	$1{,}23*10^{-1}$	0,031	0,975	0,24	-0,24

Source: author's calculations

Comments: observations – 205; adjusted R^2 – 0,5196

Significance codes: *** – 0,001; ** – 0,01; * – 0,05; . – 0,1

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