# IMPACT OF THE COVID-19 PANDEMIC ON THE MARKET VALUE OF COMPANIES FROM POLISH NEW CONNECT MARKET

**Magda Wiśniewska - Kuźma**

**Abstract**

The purpose of this article is to study the impact of the COVID-19 pandemic on the changes in the capitalization value of companies from the New Connect market. The situation with COVID-19 is sometimes compared to the financial crisis of 2007-2008. Flash crashes on the financial markets were observed in exchanges around the world during the outbreak of the pandemic. This situation was defined as the so-called "Black swan", which means an unpredictable, random event of increasing scale, with both positive and negative effects. The research problem discussed in this article concerns the relationship between the development of the health crisis in Poland and the market value of companies listed on New Connect. The following research hypothesis was adopted: the health crisis related to the COVID-19 pandemic had a significant impact on the valuation of companies on the New Connect market. The hypothesis was verified positively based on the statistical analysis of change values of the market capitalization of New Connect sectors as well as an analysis of the correlation of the variables describing the expansion of the COVID-19 pandemic worldwide, and the market value of companies with NC and the trailing P/E.
**Keywords:** COVID-19, financial markets, alternative stock markets, New Connect

## 1.      Introduction

The health crisis caused by the COVID-19 pandemic has led to a global economic shock for several reasons. The first reason concerns its speed of spread and global reach. Secondly, the restriction imposed by the government violated human rights and economic freedom (e.g. no movement, isolation, restrictions on conducting business activity, no association). Third, the uncertainty of investors, consumers and business owners about future developments and the possibility of future income loss is increasing. Fourth, the panic of a part of society is caused by e.g. a lack of clear-cut information on the mode of infection, its effects, treatment options and disease control. In order to block the progression of the disease, preventive social distancing was introduced, as part of which schools and universities, offices, some enterprises, and even forests (in Poland), were closed. Cultural and sports events were canceled. Tourism and recreation, gastronomy, sports, transport and logistics enterprises have been especially affected by the restrictions. All this had an impact on the financial markets. A high share turnover with major sell-off in the markets indicated that some investors reduced their investments in order to protect current profits and /or protect invested capital against loss. However, the pessimistic mood of investors quickly turned into a wave of enthusiasm, triggered by expectations of above-average returns on higher-risk investments. After the March correction, the stock markets began to recover in April 2020, and the Polish alternative market New Connect (NC) reported the strongest growth since 2011.

The goal of this study was to examine the relationship between the expansion of the COVID-19 pandemic crisis in Poland and changes in the market valuation of shares listed on New Connect. A statistical analysis was conducted using data from two periods: from 02/02/2020 to 17/04/2020 as well as January 2019 - August 2020. An analysis of the correlation of the variables describing the expansion of the pandemic around the world and the introduction of the social distancing policy in Poland, with the market value of companies from NC and the trailing P/E, was carried out on the data from 02/02/2020 to 17/04/2020. The following variables were used to describe the expansion of the pandemic: number of cases, deaths, and dates of introducing restrictions. A statistical analysis of changes in the capitalization value of different sectors from NC was performed on the data from January 2019 – August 2020. Its aim was to identity sectors, which reported an increase in market valuation during the outbreak and expansion of the pandemic.

The subject of research was the New Connect market for the following reason. Investing on the NC, as an alternative market to the WSE, comes with higher investment risk and therefore higher potential rates of return. Investing capital in high-risk stocks during the crisis is associated with higher investor expectations of high returns than natural risk aversion and loss. Investors expected an increase in the income of certain enterprises as a result of the increase in the number of cases and the pandemic expansion, i.e. those included in the sector of new technologies, biotechnology, IT. The New Connect market collected companies from innovative sectors with high growth potential. The current situation is considered as a development opportunity for this type of enterprises. An additional impulse is the support of the government to introduce modern energy-efficient technologies, energy from alternative sources, or recycling. This contributes to high interest in companies from the renewable energy or recycling sectors. Another sector of the NC market, which "benefits" from the introduced restrictions and social distancing, are games, internet portals and online services. According to the author, the health crisis caused by COVID-19 will cause permanent changes in the real economy. This is illustrated by the current investment decisions on the financial market.

2. **COVID – 19 pandemic crisis and shock on the financial market**

The outbreak and expansion of the coronavirus pandemic caused a response from financial markets. The largest falls since the 2008 financial crisis have been reported. Dow Jones Industrial's historic high (29551 p) was achieved on February 12, 2020, after the WHO declared the novel coronavirus outbreak a public health emergency of international concern on 30 January 2020 (WHO, 2020). But from February 19, 2020, the value of the Index decreased to 18 591 points on March 23, 2020.
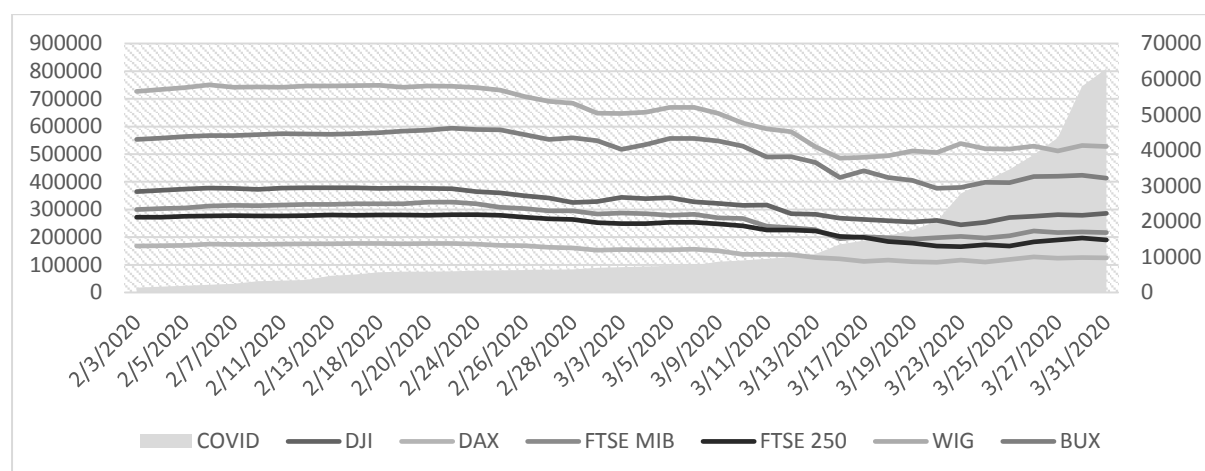


Chart 1. **Stock indices and the number of COVID -19 cases in the period February-March 2020**
Source: Own study based on data from stooq.pl (access data: 01.09.2020).

Chart 1 shows that the German, British, Italian, Polish and Hungarian indexes also reacted with declines on those dates. The sharp drops in stock indexes are associated with the escalation of COVID-19 cases in other parts of the world. On February 24, a deterioration of the health situation in Italy took place, which, as can be seen in the chart, triggered a decline in indices. On March 11, the WHO Director General declared COVID-19 a pandemic. The next day, the financial markets recorded a sharp fall in stock prices. In the second half of March, there was a high increase in cases in the United States. The USA has become the country with the largest number of infected in the world, which strengthened the pessimistic mood concerning the financial market, and consequently, the indexes achieved the lowest recorded levels (Chavez, J.Hanna, Ch. Maxouris, 2020). The oil war between Saudi Arabia and Russia would only add to it. Both countries increased production, despite the decline in oil demand as a result of the pandemic restrictions. This resulted in a fall in the share prices of fuel companies (Economic Times, 2020). An analysis of the percentage change in the value of the index from the minimum to the maximum in the period presented in the chart showed that the highest declines were recorded for the German, Italian and British stock exchanges.

Indices of alternative markets also recorded declines. These are "organized trading systems for securities and financial instruments outside the officially binding rules of the public market in a given country" (Patusiak, 2011, p. 294). These types of platforms have been functioning since the 90s, when the Alternative Investment Market AIM was launched, as part of the London Stock Exchange (1995), along with Alternext, as part of the Euronext exchange (2005) (Klimczuk, 2012, p. 129). ). In Poland, the alternative New Connect market started operating in August 2007.
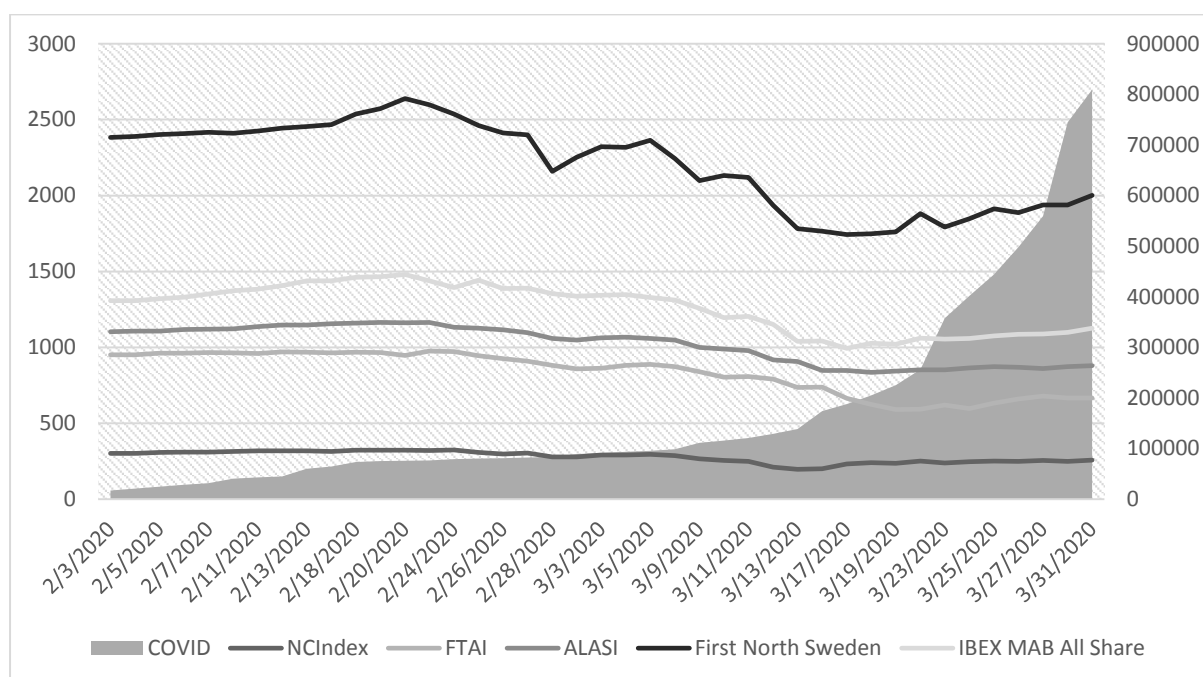
Chart 2. **Alternative Exchange Markets and COVID – 19**
Source: Own study based on data from stooq.pl and investing.com (access data: 01.09.2020).

The indices presented in Chart 2 recorded a gradual decline in value from February 20/21, reaching the lowest level on March 12 (NCIndex), March 16 (FTSE AIM Italia), March 17 (First North Sweden, IBeX MAB All Share), March 18 (FTSE AIM, ALASI). Out of these indices, the NC Index (65%) and the British FTSE AIM All - Share (65%) lost the most. The period of decline can be attributed to and affected by the date of the escalation of the pandemic, as in the case of major markets. Since April 2020, there has been a gradual improvement in the situation on the financial market. On April 30, the Polish market recovered losses, and its performance was higher than before the March correction. Other indices remained at around 80-90% of their end-February value. Rates of return on alternative systems exceeded the rates recorded in the traditional markets. An improvement in investor mood was associated with a great interest in more risky assets, such as stocks in alternative markets, cryptocurrencies or corporate bonds (Quarterly IRR, 2020).

### 3. The impact of the COVID-19 on the financial market- literature review

The outbreak and escalation of the COVID - 19 pandemic affected not only the health situation, but also different areas of society's activity: education, social relations, economic activity, cultural activity, etc. It was a sudden, unexpected event, and its subsequent development was difficult to predict due to the lack of consistent information. In this situation, conducting regular business activity and investing are extremely difficult. The reasons are the inability to identify the rights phenomenon, to estimate the relationship between it and other factors, and forecasting. Considering the importance of the issue, the impact of the pandemic on the global economy has become the subject of many studies. In particular, the strength of the impact of the pandemic on financial markets was analyzed, which is a barometer not only of the economic situation in a given country, but also of investors' expectations and forecasts regarding the development of the situation.

The analysis of the impact of the coronavirus outbreak on the world economy at the beginning of 2020 was conducted by P. Ozili and T. Arun. In their view, policymakers were under pressure to respond quickly to the threat. As a result, many governments have decided in favor of a policy of social distancing and lockdown restriction, despite the potential negative effects on the economy. The result of their research showed that a 30-day social distancing policy or lockdown restriction contributed to a reduction in the level of general economic activities and a decline in stock prices. Data from North American, Africa, Asia and Europe exchanges, from March 23 to April 23, 2020, were

analyzed[1]. Stock prices were negatively affected by the length of the lockdown of the economy, restrictions on international travel, monetary policy decisions. The number of confirmed cases was positively related to the stock prices of major stock indices. The researchers pointed out that the actions taken were contradictory - the applied monetary policy encouraged people to engage in economic activity, and the introduced restrictions made this impossible (Ozili, Arun, 2020).

Nuhu A Sansa showed a positive and significant relationship between confirmed COVID-19 cases and the performance of Chinese and US indices. The researcher examined the impact of COVID-19 on financial markets from March 1, 2020 to March 25, 2020 in China and the US. In the study, he used a regression model on time series data from the Shanghai market (as a representative of Chinese stock exchanges) and the New York Dow Jones (US representative) (Sansa, 2020). On the other hand, the results of the research conducted by F. Zeren and AE Hizarci confirmed the existence of a long-term relationship between the number of COVID-19 fatalities and the value of stock exchange indices from China, South Korea, Italy, Germany and Spain, while the number of total COVID-19 cases had an impact on the level of indices only in China, South Korea and Spain. The study used the Maki cointegration analysis on the data from January 23 to March 13, 2020. The authors of the study noted that investing in gold or cryptocurrencies may become an alternative option for investors to avoid excessive risk (Zeren, A. E. Hizarci, 2020). Q He, J. Liu and others found the short-term negative impact of the COVID-19 pandemic on daily returns of stock indices from China, Italy, South Korea, France, Germany, Japan and the US. Researchers analyzed data from June 1, 2019 to March 16, 2020 using the t-test and the non-parametric Mann-Whitney test (He, Liu, Wang, Yu, 2020). Also according to Yan, Stuart, Tu, Zhang, the outbreak of the pandemic had only a short-term impact, and financial markets will recover in the long run. They indicated tourism, technology, entertainment and gold investments as industries particularly exposed to declines during the pandemic and with potential high increases in subsequent periods. In their opinion, investments in these areas during the pandemic will allow to generate high profits in the future (Yan, Stuart, Tu, Zhang, 2020).

As an indicator of the development of the COVID-19 pandemic, the authors of the cited studies used both the total number of coronavirus cases, the number of daily new cases and the number of deaths, as well as indicators referring to the introduced lockdown of the economy. On the other hand, the daily rates of return of stock exchange indices or their daily levels were used to measure the response of financial markets. The results of their research indicate a negative impact on the financial markets of the applied socio-economic restrictions and information on fatalities. At the same time, researchers indicate that the impact of the pandemic is only short-term. Considering the short-term impact of the coronavirus on financial markets and the fact that most countries have abandoned the social distancing policy, it suggests that after a correction in the markets, share prices will increase again.

## 4. Data and empirical findings

The aim of this study is to reveal the possible effects of the Covid-19 pandemic on stock markets. A statistical analysis of monthly percentage changes in the capitalization value of companies from the New Connect market was applied, in total and by sectors. An analysis of the correlation of the daily capitalization value, the trailing P/E and the explanatory variables: the number of cases and deaths of COVID-19 in the world and the dates of introducing restrictions in Poland, was also carried out. A statistical analysis was conducted using data from two periods: from 02/02/2020 to 17/04/2020 and January 2019 - August 2020. The first research period is related to the outbreak of the pandemic in Europe, and its end date is the introduction of the first phase of recovery from the lockdown of the economy. The length of the second period of the study was selected to determine whether the previous year reported similar price fluctuations.

The alternative New Connect market was selected for the analysis due to the specific conditions of the investment: higher investment risk and potential higher rates of return, as well as higher volatility of stock prices strongly dependent on behavioral factors. The New Connect platform was launched on August 30, 2007 as a market financing the development of young, prospective enterprises. The market is organized and operated by the Warsaw Stock Exchange in the formula of a trading system alternative to the regulatory market. Medium and small enterprises can raise capital up to several dozen million zlotys on it while meeting lower formal requirements than on the regulated

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1 Data: closing price, low price, high price; indices: FTSE 500 (Great Britain), SP 500 (USA), Nikkei 225 (Japan), SA Top 40 (South Africa), as well as PMI for Japan, Great Britain, USA and South Africa for March and April 2020..

market (admission, information), and thus at lower costs[2]. The subject of trading are shares of mainly innovative companies from sectors such as IT, media, telecommunications, biotechnology, environmental protection, alternative energy, financial services, etc. (New Connect, 2020). Investors choosing to invest capital in this market accept increased risk in exchange for a potentially higher return on investment. The increased investment risk results from the risk of enterprise bankruptcy (short period of the company's operations, unstable position on the market), limited liquidity of shares (which makes it difficult to sell with high volumes), high volatility of share prices, less fragmentation of shareholding (Krzywda, 2010, pp. 9-10).

There are currently 376 companies on the market with a capitalization of nearly 21,490 million. Companies from this market create a separate stock index - NCIndex (New Connect, 2020). For the purposes of this study, a group of 353 companies was selected, which in the period of January 2019 - August 2020 were listed on the NC for at least 12 months.
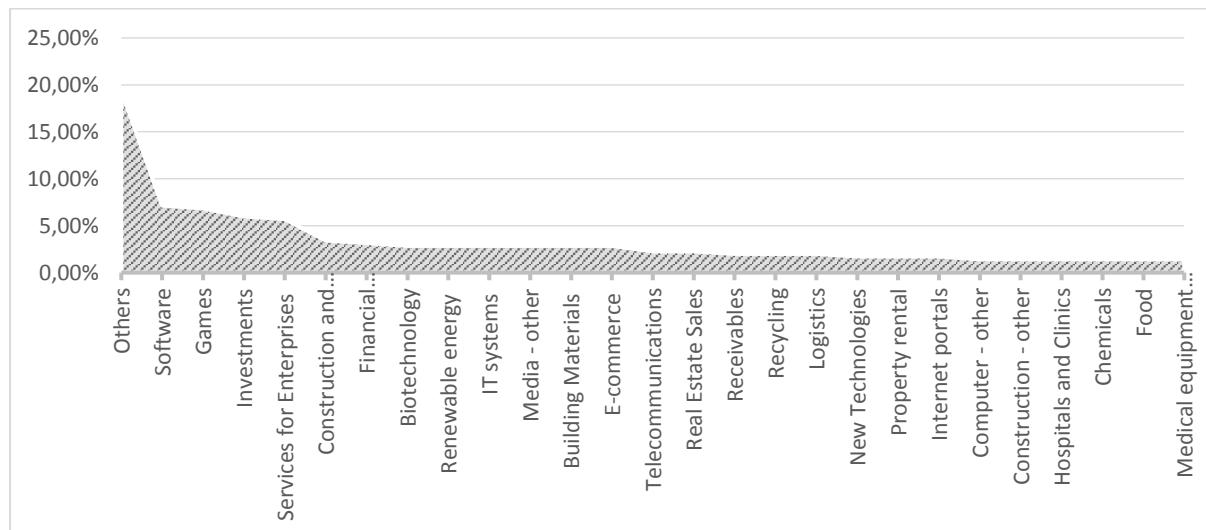


Chart 3. **Sectoral structure of the studied group[3]**
Source: Own study based on data from New Connect (access data: 08 – 09.2020).

In the research group, the highest percentage of companies are members of the NC Software subsector (7.12%), Games (6.84%), as well as subsectors related to financial activities and services for enterprises (Investment 5.98%, Business Services 5, 7%, Financial Intermediation 3.13%, Receivables 1.99%). In the group, a relatively large number of companies represent the sub-sector of Construction and Telecommunications Installations (3.42%), Biotechnology (2.85%), Renewable energy (2.85%), IT systems (2.85%), Media - other (2, 85%), Building Materials (2.85%) and E-commerce (2.85%).

The capitalization of companies, or market value, is measured as the product of the last closing price and the number of shares traded. Chart 4 shows the percentage change in the total monthly capitalization of companies from New Connect and the WSE. The capitalization of companies is subject to fluctuations in both markets. The monthly changes in the capitalization of companies from WSE usually fluctuate in the range (-2; 2), while on New Connect - in the range (-5; 5). The New Connect market is characterized by higher volatility than the WSE market. This is due to the lower valuation of companies from NC - it accounted for 1.5% in June 2019 and 4.5% of the WSE capitalization

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2 The companies present quarterly and annual reports. Only the annual report has to be verified by an auditor. The abridged financial statements are binding in accordance with § 5 Appendix No. 3 to the Alternative Trading System Regulations.

3 The Others sectors are represented by 4 or less companies: Computers and Electronics (0.57%), Distribution of Heat and Water (0.57%), Home Furnishings - other (0.85%), Wood (1.14% ), Electrical Goods (0.85%), Advertising and Aarketing (1.14%), Leasing and Factoring (1.14%), Cosmetics and Household Chemicals (0.57%), Finance - other (0.28% ), Beverages (1.14%), Civil Engineering (0.57%), Trade and Services - other (1.14%), Radio and Television (0.28%), Clothing and Footwear (0.57 %), Automotive - other (0.85%), Auto Parts (0.85%), Hotels and Restaurants (1.14%), Electrical and Electronic Equipment (0.28%), Publishing Houses (0.85%) , Everyday Items (1.14%), Insurance - other (0.28%), Sports and Recreation (0.28%), Transport (0.28%), Recreation - other (0.28%) , Sports Clubs (0.57%), Stock Exchanges and Brokerage Houses (0.85%), Asset Management (0.28%), Retail Chains - other (0.57%), Fuel and Gas Distribution (0.28% ), Fuel and Energy - others (0.28%), Specialty Chemicals (0.28%).

in August 2020. In the analyzed period, the increase in the capitalization of NC companies reached almost 40% in July 2020. The strongest market correction on New Connect was in April 2019 (around -12%). In turn, the capitalization of WSE companies reached the highest increase in the study period in April 2020, and the strongest decrease in March 2020. In connection with the announcement of the coronavirus pandemic in March 2020, there was also a relatively strong decline in the market value of companies from New Connect; however, it did not exceed the 2019 decline.

| | VII.2018 | VII.I.2018 | IX. 2018 | X. 2018 | XI. 2018 | XII.2018 | I.2019 | II. 2019 | III. 2019 | IV. 2019 | V. 2019 | VI. 2019 | VII.2019 | VII.I.2019 | IX. 2019 | X. 2019 | XI. 2019 | XII.2019 | I.2020 | II. 2020 | III. 2020 | IV. 2021 | V. 2020 | VI. 2020 | VII.2020 | VII.I.2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New Connect | -2 | -4 | -5 | -3 | -5 | 2,1 | 11 | 15 | -6 | -12 | -1 | 5,6 | 4,3 | 5 | -2 | 1,3 | 4,5 | 0,8 | 18 | -2 | -9 | 21 | 12 | 23 | 38 | -1 |
| WSE | 5,8 | -0 | -2 | -6 | 5,2 | -1 | 5 | -1 | -1 | 0,3 | -4 | 3,6 | -2 | -6 | 0,9 | 0,6 | -1 | 0,7 | -2 | -12 | -14 | 8,7 | 4,7 | 2,7 | 1,7 | 1,8 |
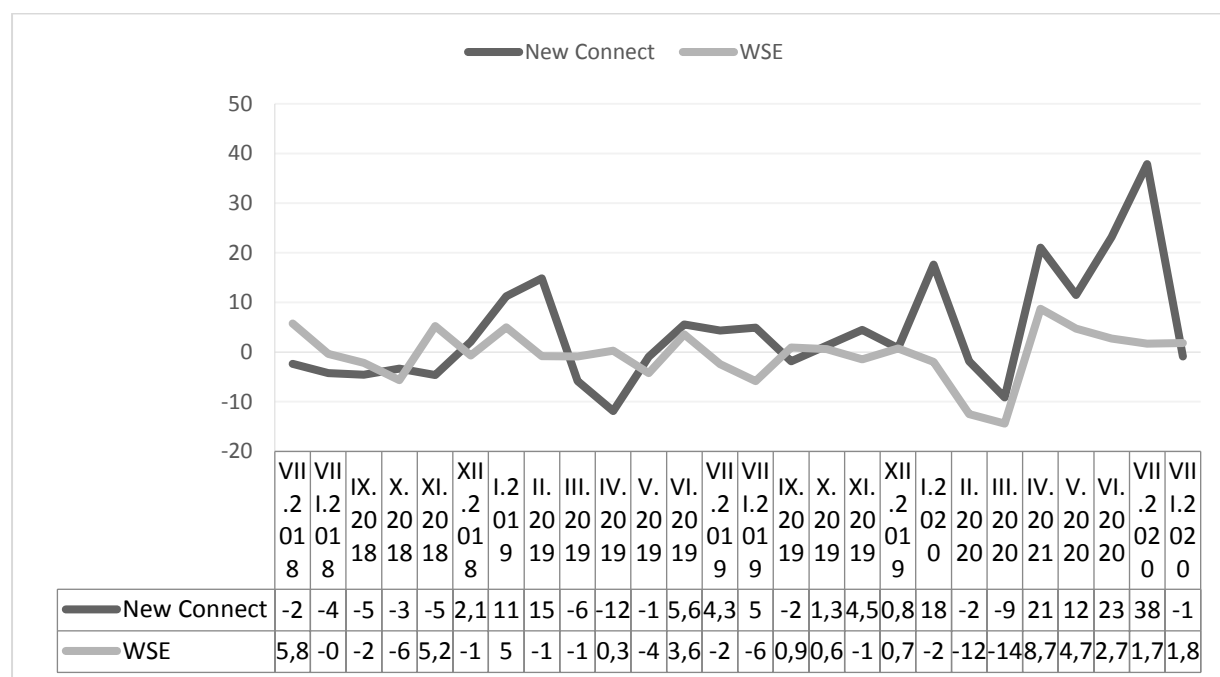
Chart 4. **Changes in the capitalization of companies from NC and WSE**.
Source: Own study based on statistical data from New Connect and the WSE (access data: 08 – 09.2020).

The analysis of changes in the capitalization of companies from WSE and NC in the study period showed that the announcement of the COVID 19 pandemic resulted in a decrease in the market value. In February and March 2020, the WSE and NC recorded declines in capitalization. While the New Connect market reacted in February 2020 with only a drop of less than 2%, the WSE dropped by 12.5%. In March 2020, there was an even greater reduction in the value of capitalization. Since April 2020, there has been an improvement in moods in both markets. The increase in the market value of New Connect in the period of April - July 2020 amounted to 20-38%. In August 2020, the capitalization of NC companies was more than 2.5 times higher than the value in August 2018. In the case of the WSE, the value of companies from August 2020 was lower than in August 2018 by almost 20%. 2019 was a period of systematic loss of market value, and the outbreak of the pandemic in Q1 2020 led to further declines. The relatively low increases in capitalization did not allow for recovery. It can be assumed that some investors moved their capital to a more risky alternative market in search of profits.

The next research step, carried out to verify the assumed hypothesis, was the analysis of the correlation of the daily capitalization value of the research group companies and trailing P/E, and the number of all COVID -19 infections, the number of deaths in the world in the period from 02/02/2020 to 17/04/2020 (on the 20th, the first stage of the lockdown of the economy was introduced). The Spearman's rank correlation coefficient was used for the correlation analysis. This coefficient was used because the Shapiro-Wilk test did not confirm the normal distribution of the time series. The data on the number of cases around the world were used because in Poland the first confirmed case was recorded on March 4, 2020. The analysis of data from that date does not show the full scope of changes related to the outbreak of the pandemic. A part of the capital on the New Connect market comes from foreign investors whose decisions are determined not only by the social and economic situation in Poland. In order to take into account the impact of the escalation of the pandemic and the decisions of the Polish government regarding social distancing on the value of capitalization of companies with NC, an analysis of the correlation between the variable daily market value of companies and the variable "significant events" was carried out, which was assigned a value of 0

or 1, with 1 assigned if important information was announced on that day concerning the escalation of the pandemic or the restrictions introduced[4].

Table 1. **Correlation analysis results**

|  | Cases | New Cases | Deaths total | New deaths | Significant events |
|---|---|---|---|---|---|
| Market value | -0,595 (***) | -0,604 (***) | -0,606 (***) | -0,506 (***) | -0,29 (*) |
| P/E | -0,735 (***) | -0,715 (***) | -0,758 (***) | -0,641 (***) | -0,27 (*) |

Source: Own study.

The results of the correlation analysis showed that the escalation of the COVID-19 pandemic was related to a decline in the market value of companies from the NC market and the trailing P/E. Also, the introduction of restrictions in Poland was not conducive to an increase in share prices. The results of these studies are in accordance with the opinion of S. R. Baker and others, who said that previous epidemics of infectious diseases did not affect the stock market as much as the COVID-19 pandemic. The reasons for such a strong influence are the reactions of public authorities (S.R. Baker and others, 2020).

The analysis of monthly percentage changes in the capitalization of companies belonging to different NC sub-sectors in the period of January 2019 - August 2020 showed strong fluctuations in the market value of companies (Appendix 1). The strongest fluctuations are recorded in the New Technologies, Business Services, Investment Activities, Construction and Telecommunications Installations, Electrical Products, Cosmetics and Household Chemicals, Food, Automotive, Construction Materials. High deviations in the capitalization value of companies are related to a high increase in the valuation of certain companies, and not a decrease in their market value (increases as high as 3,000%, and decreases maximum 30%). During the outbreak and escalation of the pandemic around the world and the introduction of restrictive restrictions in Poland (February - March 2020), most sub-sectors passed a correction. Only the Biotechnology sub-sector, Investment, Telecommunications, IT systems, Media - other and Distribution of Heating and Water recorded increases in both months. In addition, in March, companies from the Hospitals and Clinics, Real Estate Sales, Home Furnishings, Leasing and Factoring, Automotive, Internet Portals, Stock Exchanges and Brokerage Houses, Asset Management also grew. In times of crisis, investors look for sectors that will react differently from the widespread market. Investors were interested in companies that could potentially increase their profits facing the coronavirus pandemic.

April - August 2020 is a period of high increases in the valuation of companies on the NC. The highest increase in value was recorded by companies from the subsector of New Technologies, Business Services, Investment, Construction and Telecommunication Installations, Media, Trade and Services, and Construction Materials. The average increase in the four months was above 50%. The remaining companies also achieved a significant increase in capitalization - the average growth of different sub-sectors for IV-VIII 2020 exceeded 10%. The period prior to the pandemic did not bring such spectacular increases. While the average increase in capitalization of all subsectors for the period of April - August 2020 was 59.16%, in the period of September 2019 - January 2020, it was 5.56%, in the period April - August 2019 - 0.28%, and in January - March 2019 - 5.27%.

The change in investment decisions in the time of the coronavirus is evidenced not only by the increase in the valuation of NC companies as a result of increased investor interest in investments in the alternative market, but also the increase in the valuation of subsectors, which previously achieved relatively low rates of return. Examples of such a sub-sector are New Technologies, Software, Investment, Telecommunications, Construction and Telecommunications Installations, Construction - other. In the media, the Biotechnology and Games sub-sector is often mentioned as a pioneer of rises in the NC during the pandemic, but also in earlier periods, they recorded a relatively high increase in capitalization compared to the entire market.

It can be assumed that the increase in the valuation of NC companies was dictated not only by economic estimates of possible profits, but also behavioral factors had a significant impact. According to S. Adams (2010), behavioral factors were important in shaping investor decisions during the 2008 financial crisis. According to Gervais

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4 Important events: February 24, 2020 - information about the growing epidemiological threat in Italy, the Polish Ministry of Foreign Affairs advises against traveling to 11 Italian regions, February 27 - Regulation of the Minister of Health on SARS-CV-2 coronavirus infection, March 4 - the first case of COVID-19 in Poland, March 8 - GIS recommends the cancellation of some mass events, March 11 - information about the suspension of school classes, March 12 - suspension of school classes (children could come to school), March 15 - closing the Polish borders to air and rail traffic, March 16 - complete closure of schools, March 20 - introduction of the epidemic, March 25 - restrictions on movement, April 1 - further restrictions (closed forests, parks, beaches, etc.).

and Odean (2001), investors make the wrong investment decisions due to behavioral factors such as overconfidence and attributing their skills. Overconfidence and misconceptions can contribute to serious losses on stock investments (Odean, 1998). A.K. Chaudhary (2013) mentioned loss aversion, overconfidence, anchoring, over and underreaction, and herd behavior among the emotional and cognitive factors shaping investor decisions, and Pennings and Gracia (2009) added cognitive dissonance, anchoring, greed and fear to the list. The investors' attitude to risk also influences their investment behavior (Grinblatt, Keloharju 2009). On the other hand, R. Rehan found that anchoring, representativeness heuristic, availability heuristic, risk aversion, overconfidence and aversion to grief have a significant impact on investment decisions (Rehan, 2017).

After the March correction on the stock exchanges, a lot of information appeared in the media about potential high rates of return on investment in medical stocks, new technologies or games, which encouraged individual investors to buy more shares. Speculative capital has participated heavily in the NC market. Day trading investors, due to the high volatility of share prices, could achieve a daily rate of return of over ten percent. In July 2020, opinions appeared on financial forums (such as "banker") that it was enough for a company to have the word "med" in its name to increase its valuation. These are examples of representativeness heuristics (since Biomed or Medcamp achieved high rates of return, so do other companies), availability heuristics (investors in biomedical companies achieved over 200% rate of return), overconfidence (choosing companies only on the basis of media information - "I have complete information about the market, I don't need to check the financial statement"), ignoring the probability of loss or the effect of focusing on one piece of information, e.g. confirmation of a product test, without taking into account the current financial situation of the company.  The behavioral factors in the stock exchange investments in the period of the coronavirus pandemic were summed up by P. Krugman: "Yet stock prices, which fell in the first few weeks of the Covid-19 crisis, have made up much of those losses. They're currently more or less back to where they were last fall when all the talk was about how well the economy was doing. What's going on? Well, whenever you consider the economic implications of stock prices, you want to remember three rules. First, the stock market is not the economy. Second, the stock market is not the economy. Third, the stock market is not the economy. That is, the relationship between stock performance — largely driven by the oscillation between greed and fear — and real economic growth has always been somewhere between loose and nonexistent. (Krugman, 2020)."

## 5.   Summary

The aim of the study was to identify the relationship between the outbreak and the escalation of the COVID - 19 pandemic on the market value of companies from the New Connect market in Poland. Its results revealed a significant, negative correlation between the variables describing the escalation of the coronavirus pandemic around the world and the introduction of the social distancing policy in Poland on the market value of companies from New Connect and the trailing P/E. This means that investors, anticipating a decline in corporate profits in the coming period, limited their capital involvement in the New Connect market. During the period of the outbreak and escalation COVID-19 in Europe (February - March 2020), the valuation of companies in most sub-sectors decreased significantly. Only the Biotechnology sub-sector, Investment, Telecommunications, IT, Media and Distribution of Heating and Water did not decrease. In March 2020, i.e. in the month of introducing restrictions on movement and business activity in Poland, an increase in market value was also recorded by companies from the sub-sectors of Hospitals and Clinics, Real Estate Sales, Home Furnishings, Leasing and Factoring, Automotive, Internet Portals, Exchanges and Brokerage Houses and Asset Management. The increase in their value was related to investors' expectations regarding the increase in income of companies from these sectors in connection with the escalation of the pandemic in Poland. Mandatory isolation favored the use of the Internet, media, financial and (private) health services, as well as facilitating business operations in the form of remote IT solutions. Investors also expected innovative medical solutions from companies from the biotechnology sector.

The analysis of changes in the capitalization of New Connect companies showed that the crisis in the financial market was a short-term correction, and the growth began as early as April 2020. In the period April - August 2020, there was a bull market, and some companies recorded record increases. The highest increase in value was recorded by companies from the subsector of New Technologies, Business Services, Investment, Construction and Communication Installations, Media, Trade and Services, and Construction Materials. There are several reasons for this situation. First, there was an outflow of capital from the WSE main market to the NC market in search of higher rates of return. Secondly, investors noticed an opportunity for the development of previously underestimated innovative companies from the biochemical, new technologies, IT and business services sectors. Thirdly, a reduction of interest rates could encourage individual investors not only to look for alternative forms of saving, but also to obtain

credit for investment purposes. Fourth, investment funds seek ways to make up winning back losses in the main markets. The results of this study not only complement theoretical knowledge on the response of financial markets to economic crises caused by threats to the health of the society, but also have a practical application. By making conclusions on the possible market signals, you can build an investment or capital protection strategy.

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**Appendix 1**

| | 01.19 | 02.19 | 03.19 | 04.19 | 05.19 | 06.19 | 07.19 | 08.19 | 09.19 | 10.19 | 11.19 | 12.19 | 01.20 | 02t.20 | 03.20 | 04.20 | 05.20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Biotechnology | 0,23 | 43,69 | 0,98 | 4,40 | 11,35 | 0,29 | 26,87 | -8,77 | 3,46 | 3,03 | -4,74 | -5,75 | 31,92 | 14,44 | 54,39 | 33,66 | -9,54 |
| Games | 0,20 | 7,68 | 6,29 | -3,60 | -10,48 | -0,73 | 26,41 | -0,20 | 0,03 | -8,13 | 0,48 | 9,34 | 10,58 | -4,48 | -8,32 | 53,86 | 11,50 |
| New Technologies | 0,23 | 10,50 | -1,74 | 9,73 | -16,41 | 5,68 | 31,61 | -4,77 | -2,58 | 0,81 | 8,17 | 15,06 | 7,58 | -4,19 | -8,48 | 2269,04 | 28,39 |
| Renewable energy | 1,81 | 13,04 | 3,44 | 3,66 | -9,33 | 3,49 | 10,54 | 2,43 | 56,84 | 38,35 | 27,27 | -6,55 | 39,86 | -23,36 | -0,69 | 19,43 | 9,77 |
| Software | 0,11 | -0,27 | 7,97 | -0,81 | 0,72 | 4,09 | -3,48 | 4,36 | 4,32 | 4,87 | 10,76 | 12,84 | 8,71 | -7,95 | -13,77 | 27,72 | 8,69 |
| Business services | 0,11 | 23,60 | 4,82 | 5,81 | 7,80 | 1,08 | -5,17 | 0,99 | 1,23 | 3,06 | 4,57 | -3,75 | 6,28 | -2,45 | 9,95 | 50,17 | 0,83 |
| Investing | 0,21 | -2,50 | 13,86 | -0,01 | -4,79 | -3,60 | 6,66 | 9,30 | 0,79 | 3,24 | 2,11 | -6,54 | 20,74 | 12,03 | 60,99 | 36,48 | 15,86 |
| Financial Intermediation | 0,26 | 41,97 | -9,10 | 6,42 | 5,09 | -3,16 | -4,81 | -4,85 | 5,20 | 17,70 | 3,86 | 2,79 | 6,00 | -11,35 | -8,63 | 12,32 | 18,21 |
| Telecommunication | -0,03 | 2,77 | 2,87 | -3,58 | 3,45 | -9,41 | 7,59 | -4,12 | 9,03 | -9,87 | 14,48 | 34,24 | -4,16 | 5,50 | 11,46 | 22,00 | 34,95 |
| Construction and telecommunications installations | 0,04 | 1,92 | -2,33 | -1,79 | -0,56 | -4,25 | -4,93 | -0,28 | 7,79 | 0,25 | 11,09 | 2,92 | 6,28 | -12,64 | -12,80 | 28,23 | -3,73 |
| IT systems | 0,35 | 2,18 | 0,72 | -8,24 | 8,61 | 5,31 | -8,05 | 9,77 | 8,67 | 9,47 | 2,25 | -1,33 | 23,59 | 23,14 | 0,97 | 19,84 | 6,31 |
| Computers and electronics | 0,03 | 0,00 | 3,26 | 15,20 | -5,92 | 0,00 | -16,63 | 22,48 | 0,00 | 5,59 | -8,93 | 1,90 | 8,92 | -9,52 | -29,96 | 1,17 | 33,14 |
| Media-others | 0,17 | 6,02 | -1,82 | -8,87 | -8,91 | 6,74 | 4,39 | 0,70 | 11,64 | 11,18 | -1,81 | -1,22 | 10,74 | 3,11 | 0,42 | 0,62 | 327,14 |
| Computers - others | -0,01 | -8,85 | 0,35 | -5,36 | -0,18 | 3,67 | -8,14 | -1,85 | 2,93 | 11,54 | -6,50 | 2,86 | 85,94 | -7,33 | -11,58 | 11,69 | 75,13 |
| Property rental | 0,07 | 0,20 | -1,36 | -3,03 | 0,30 | 1,75 | 7,71 | 4,43 | 10,32 | 52,76 | -6,08 | 2,03 | 40,76 | -15,47 | -17,11 | 49,63 | 10,10 |
| Heat and Water Distribution | -0,01 | 8,46 | -2,65 | -2,43 | 7,01 | 6,81 | -12,03 | 2,56 | 5,55 | 2,95 | -2,70 | 0,79 | 1,40 | 0,99 | 2,01 | 31,63 | -6,83 |
| Receivables | -0,12 | -11,84 | -12,54 | -2,22 | 11,25 | -13,68 | 41,20 | 3,44 | -4,26 | -11,71 | 14,49 | -0,84 | 1,88 | -1,63 | -16,47 | 3,79 | -4,62 |
| Real State Sale | 0,03 | -0,61 | -5,95 | -5,98 | 1,91 | -11,04 | 20,45 | 12,03 | -13,17 | -0,83 | -0,84 | 3,65 | 11,78 | -1,55 | 1,55 | 4,19 | -0,18 |
| Home Furnishings | 0,09 | 14,44 | -7,51 | -9,44 | 0,95 | 4,72 | -5,12 | -16,41 | 10,62 | 3,96 | -0,23 | -0,60 | 5,50 | -1,78 | 4,03 | -4,84 | 21,86 |
| Wood | 0,03 | -3,49 | -2,20 | 0,00 | 8,24 | -13,56 | -1,43 | 5,70 | 1,57 | 6,25 | -5,40 | 3,05 | -5,83 | 0,91 | -6,86 | 3,10 | 0,22 |
| Electrical articles | 0,00 | 0,34 | -5,50 | 5,38 | -2,93 | 0,47 | -2,88 | 1,41 | 25,76 | -1,67 | 4,15 | -11,62 | 9,09 | 20,83 | -3,07 | 2486,25 | -27,96 |
| Construction - others | 0,02 | 1,94 | -3,84 | 7,63 | -2,61 | -6,03 | 1,53 | 1,29 | -11,70 | 4,89 | 8,52 | 8,00 | 14,51 | -6,36 | -9,12 | 10,22 | 7,60 |
| Advertising and Marketing | -0,09 | 0,91 | -0,13 | -1,03 | 3,99 | 0,71 | -2,60 | 0,79 | 14,54 | -14,24 | 4,66 | -7,00 | 19,81 | 5,16 | -23,09 | 5,43 | 18,30 |
| Leasing i Factoring | 0,11 | -11,98 | 39,22 | 20,43 | 3,51 | -7,57 | 18,43 | 5,82 | 9,76 | 15,96 | -5,26 | -3,65 | 1,29 | -8,99 | 15,65 | -5,02 | 1,15 |
| Cosmetics and Household chemicals | 0,01 | 17,90 | 2,02 | -26,33 | 2,22 | -5,64 | 0,11 | 38,75 | -9,84 | -0,23 | 1,98 | 2,50 | 26,20 | -8,73 | -16,01 | 45,76 | -12,02 |
| finance - others | -0,05 | 11,27 | 10,13 | 14,54 | 14,25 | -8,84 | -5,72 | -4,22 | -15,70 | 15,36 | -5,95 | 4,82 | -10,63 | 8,36 | -23,44 | 12,79 | -2,06 |
| Veverages | 0,25 | -12,38 | 2,15 | -5,10 | 2,23 | -6,78 | -12,14 | 8,44 | -0,39 | -13,31 | 13,29 | -5,79 | 3,94 | 9,25 | -17,02 | 19,02 | 12,04 |
| Hospitals and Clinics | -0,16 | 207,71 | -11,94 | 2,77 | -8,89 | 3,27 | -7,30 | -4,56 | -6,19 | -5,31 | -4,55 | -4,78 | -0,20 | -8,87 | 31,32 | 13,73 | 41,81 |
| Recycling | 0,20 | 6,33 | 1,28 | 0,67 | 28,09 | -10,76 | -0,34 | 20,73 | 4,53 | -5,13 | 10,07 | 4,04 | 21,99 | 4,66 | -12,38 | 42,61 | -1,74 |
| Civil and Water Engineering | -0,20 | 16,30 | 11,83 | -1,82 | 4,53 | 0,00 | 2,54 | -9,79 | 12,39 | 4,75 | -1,41 | -20,91 | 48,15 | -11,57 | -17,45 | 43,94 | 17,66 |
| chemicals | 0,00 | 0,30 | 4,06 | 14,11 | -11,95 | -2,78 | 1,80 | 6,72 | 5,56 | 7,29 | -6,98 | -4,47 | 2,66 | -2,74 | -8,55 | 10,35 | 6,06 |
| Foods | 0,10 | 3,70 | 17,78 | -0,88 | -4,87 | -6,20 | 8,97 | -5,27 | -2,39 | 6,94 | -8,04 | 2,28 | 6,36 | -6,27 | -17,93 | 9,03 | 138,80 |
| Trade and services- others | 0,07 | 19,40 | 17,95 | 25,86 | -8,28 | 17,08 | -0,44 | -5,28 | -1,38 | 8,72 | -8,98 | -3,53 | 74,72 | 1,80 | -12,74 | 14,47 | 258,75 |
| radio and tv | -0,06 | 0,00 | -16,67 | 0,00 | 0,00 | 10,90 | 9,03 | -12,03 | -0,86 | 5,17 | 13,12 | 0,00 | -3,62 | -12,79 | 0,00 | 0,00 | 0,00 |
| Clothing and Footwear | -0,08 | 15,06 | -11,13 | 8,86 | -10,04 | 0,00 | -11,84 | 12,03 | -2,81 | -8,78 | 21,31 | -8,74 | -7,52 | 1,31 | -11,82 | 12,76 | -10,17 |
| Automotive-other | -0,01 | 0,40 | 10,34 | -10,59 | 8,36 | -7,13 | 3,30 | 1,74 | 5,51 | 23,86 | 14,56 | -6,69 | -7,65 | -3,09 | 3,90 | 217,33 | -31,30 |
| Parts auto | -0,03 | 3,13 | 38,15 | -3,76 | -10,59 | 26,34 | 3,58 | -13,40 | 12,69 | 2,69 | 5,59 | 6,03 | -15,63 | 9,77 | -2,58 | -12,26 | 0,48 |
| Internet Portals | 0,05 | 16,60 | 15,65 | 1,03 | -0,06 | -3,10 | -12,18 | 12,03 | -4,23 | 15,04 | -9,43 | 33,51 | 59,98 | -10,64 | 15,02 | -3,72 | 7,75 |
| Hotels and Restaurants | 0,31 | 111,37 | -11,05 | -7,58 | -7,13 | 1,00 | -1,15 | 0,01 | 26,46 | 26,00 | 6,33 | -8,01 | 46,08 | -9,16 | -18,69 | 6,92 | -0,61 |
| Building Materials | -0,01 | -6,13 | 0,29 | -0,56 | -6,86 | -3,67 | -1,59 | -1,77 | 1,74 | 2,25 | -1,88 | 1,17 | 0,21 | 24,32 | -12,87 | 79,41 | -8,77 |
| E-commerce | 0,19 | 1,56 | -2,85 | -4,25 | -4,26 | 12,10 | -4,73 | 10,88 | 3,50 | 3,21 | 21,69 | -0,83 | -2,30 | 16,12 | -14,56 | 50,78 | -6,01 |
| Electrical and Electronic Equipment | 0,00 | 12,36 | 0,00 | -11,00 | 17,76 | -4,59 | -5,50 | 4,73 | -0,69 | -15,38 | 10,33 | 8,24 | 80,28 | -31,09 | -22,84 | 29,60 | 18,11 |
| Publishing Houses | 0,11 | 88,50 | -11,15 | -12,23 | 0,86 | 6,09 | 3,33 | 2,27 | -8,41 | -1,20 | -0,04 | -2,75 | -6,99 | 31,34 | -13,72 | 13,81 | 52,13 |
| logistics | -0,09 | 19,52 | 9,96 | 14,62 | 2,15 | 13,90 | 2,76 | -6,89 | -1,23 | -3,75 | 14,10 | 1,94 | 12,98 | -7,57 | -18,33 | 18,99 | 161,52 |
| Every-day items | -0,06 | 26,14 | -5,58 | 23,38 | -10,03 | 7,08 | 5,09 | -5,31 | -1,42 | 0,51 | 13,69 | 1,55 | -4,04 | 12,04 | -11,42 | 46,20 | -14,50 |
| Medical Equipment and Supplies | -0,11 | 28,05 | -9,88 | -20,63 | -0,02 | 3,17 | -4,45 | -9,17 | -6,94 | 1,79 | -23,19 | -4,73 | 3,59 | 33,16 | 11,62 | 0,84 | 1,76 |
| Insurance - others | -0,31 | 26,34 | -8,97 | -18,55 | -4,63 | -7,08 | -11,70 | -4,02 | 61,09 | 46,17 | 9,06 | -24,52 | 33,94 | -24,09 | -39,44 | 25,07 | 39,66 |
| Sport and Recreation | -0,20 | 14,01 | 2,85 | -2,07 | -0,72 | -28,57 | -7,60 | -29,45 | 3,09 | -57,15 | 11,80 | 19,55 | -0,39 | -7,50 | 12,64 | 9,58 | -38,69 |
| Transport | 0,25 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Recreation - others | 0,01 | 0,00 | 15,00 | -15,09 | -9,34 | 40,53 | -15,13 | -18,38 | 20,14 | 17,33 | 12,35 | -19,40 | -3,21 | 110,77 | -22,41 | -5,07 | -4,27 |
| Sports club | -0,13 | 0,78 | 13,84 | -11,34 | -0,45 | -22,81 | 8,36 | 21,02 | -4,54 | 20,70 | 4,25 | 0,40 | 26,42 | -10,56 | -10,14 | 5,85 | -8,13 |
| Stock Exchanges and Brokerage Houses | 0,13 | 14,42 | -1,95 | -2,59 | 0,75 | -3,70 | 5,97 | -4,04 | -9,04 | 5,39 | 2,40 | -20,10 | -2,54 | -1,69 | 42,71 | 20,87 | -0,02 |
| Asset Management | -0,01 | -2,37 | -3,63 | 0,00 | 89,86 | -11,19 | 0,52 | -0,17 | 0,00 | -4,41 | -15,00 | -9,55 | -1,74 | -7,75 | 54,65 | 12,85 | -22,79 |
| Retail chains-others | 0,00 | -3,23 | 5,83 | 11,81 | 22,54 | -11,49 | 33,77 | 0,00 | -2,43 | 1,00 | 2,46 | -12,02 | 81,42 | -31,02 | -10,92 | 23,04 | 31,47 |
| Distribution of Fuels and Gas | 0,00 | 11,95 | -2,25 | -6,83 | -8,87 | -23,36 | -50,94 | 10,56 | 1,02 | -7,35 | 11,56 | -3,38 | -18,32 | 6,65 | -19,12 | -4,05 | 63,30 |
| Fuels and Energy - others | -0,15 | -35,42 | 27,10 | 36,04 | -76,49 | -55,56 | 96,43 | -61,82 | -4,76 | 95,00 | 7,69 | 69,05 | -59,15 | 93,10 | -44,64 | -12,90 | 240,74 |

Table 2. **Changes in capitalization of New Connect subsectors**
Sources: Own study.