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# EUROPEAN UNION SANCTIONS IMPACT ON THE SECTOR STOCK PRICES – THE UKRAINAN WAR EFFECT?

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## Abstract

The aim of this paper is to analyze the current impact of the implementation of the European Union sanctions related to the Ukrainian War on the abnormal rates of return on the stock prices of companies listed on the stock exchanges. It was hypothesized that the implementation of the European Union sanctions related to the Ukrainian War is causing the varied abnormal rates of return on the stock prices of companies listed on the stock exchanges, taking into consideration the type of sector and the geographical location of the military conflict. The analysis used panel data event studies prepared using the daily rates of return on the stock prices of companies listed on the stock exchanges. Data were collected from the Refinitiv Eikon database. The models included divisions according to the type of sector and the geographical location of the military conflict. The results show that the reactions of subsectors varied. The significant impact was in the vicinity of Russia and Ukraine.

Keywords: abnormal stock prices, sanctions, Ukrainian War
JEL Classification: G14, G15, E50, F51

## 1. Introduction

The Ukrainian War, the first one since World War II, began on February 24, 2022. The mentioned situation created panic at the stock exchanges during its first days. The most affected stock prices were from countries in the vicinity of Russia and Ukraine. As a result, the European Commission introduced ten packages of sanctions in March 2023. The mentioned sanctions have been described as some of the most significant. First, sanctions were implemented as an effect of Russia's illegal annexation of Crimea and Sevastopol in 2014. Initially, the 2014 EU sanctions against Russia included individual sanctions (asset freezes and visa bans) targeting members of the Russian elite, Ukrainian separatists, and organizations associated with them and diplomatic sanctions, entailing the formal suspension of EU–Russia summits and negotiations related to the new EU–Russia cooperation agreement, as well as the suspension of Russia from the G8. Broader economic sanctions against Russia followed later, with the first restrictions on trade with Crimea and sectoral sanctions concerning the arms trade, energy, and financial cooperation with Russia. Each package has incrementally amended and broadened the scope of the sanction regimes adopted from 2014 onwards, including the addition of a new regime banning imports of goods originating in the illegally annexed territories of Donetsk, Luhansk, Kherson, and Zaporizhzhia to the EU. Beyond Russia, the EU has also adopted additional sanctions against Belarus, in response to its involvement in the invasion of Ukraine, and Iran, in relation to the use of Iranian drones in the Russian aggression against Ukraine. The cumulative effect of the successive waves of EU sanctions since February 2022, constituting an

exponential escalation of the 2014 sanctions previously in place, is intended to weaken Russia's economic base and curtail its ability to wage war. It is also intended to hamper Russia's access to military technologies and components whilst targeting political and economic elites to undermine their support for the regime. Sanctions set by the EU to date include (non-exhaustive list) (European Union, 2023):

- Targeted sanctions: asset freezing (EUR 21.5 billion in the EU so far) and travel bans;
- Blocking access to Russia's central bank reserve holdings (EUR 300 billion);
- Banning transactions with certain Russian state-owned military–industrial enterprises;
- Disconnecting ten leading Russian financial institutions, including Sberbank, Russia's largest bank, from the SWIFT international financial messaging system;
- Prohibiting export to Russia (including transit) of dual-use goods/technology, drone engines, arms, civilian firearms, ammunition, military vehicles, and paramilitary equipment;
- Banning certain exports in the aviation, maritime, and technology sectors (e.g., semiconductors) and the export of luxury goods to Russia;
- Closing EU airspace, seaports, and roads to Russian aircraft, vessels, and transport operators, respectively;
- Suspending the broadcasting activities of several Russian state-owned media outlets;
- Banning imports from Russia of coal and of crude oil and petroleum products (phased and with limited exceptions);
- Imposing a price cap on Russian crude oil and petroleum products exported to third countries and banning the provision of maritime transport, insurance, and other assistance services for the transport of products sold above the cap (G7 oil price cap);
- Prohibiting exports to Russia of goods and technologies in the oil-refining sector and prohibiting new investments in the Russian energy and mining sector;
- Applying restrictions on Russian nationals holding any positions in the governing bodies of critical infrastructure and entities of the EU.

The effect of the beginning of the Ukrainian War on February 24, 2022, has been observed on the whole world as well as on the stock exchanges. As a result, the aim of this paper is to analyze the current impact of the implementation of the European Union sanctions related to the Ukrainian War on the abnormal rates of return on the stock prices of companies listed on the stock exchanges. It was hypothesized that the implementation of the European Union sanctions related to the Ukrainian War is causing the varied abnormal rates of return on the stock prices of companies listed on the stock exchanges, taking into consideration the type of sector and the geographical location of the military conflict. The mentioned sanctions can influence the abnormal rates of return on stock prices.

Preparing the mentioned analysis of the stock market will help to assess the significance of the European Union sanctions. It will also help to assess the sensitivity of particular sectors to the mentioned restrictions. An analysis of a particular sector in a large database was not prepared. The presented paper will also address the lack of research about the impact of the geographical distance from the Ukrainian conflict on the abnormal rates of return on stock prices. The presented study will help to localize the correlations between particular sectors.

The presented study will be useful for investors and regulators. The first group can use the findings to make investment decisions. Regulators can assess the significance of sanctions for capital markets and local economies. Next, the presented paper was prepared using a large database, which helped us to verify the mentioned phenomenon more precisely. The dataset used in the analysis includes all listed companies from all over the world and their daily rates of return on their stock prices from 1$^{st}$ November 2021 to the 28$^{th}$ February 2023. This study will also help to assess the significance of the particular packages of European Union sanctions.

The Ukrainian conflict has a unique character. At first, the consequences of the Russian invasion increased the geopolitical risk (which peaked on February 24th 2022, according to the Caldara and Iacoviello (2022) studies) and had a direct impact on the global economy, causing problems in financial intermediation and trade and raising concerns about slower economic growth and faster inflation around the world. They also disrupted the global supply chain by reducing the supplies of commodities. Moreover, the embargo on Russian exports and Russia's refusal to allow foreign cargoes to transit via its waterways and airspace have disrupted the global supply chain, causing a sharp rise in commodity prices. This is a direct effect of the sanctions and can be observed in the stock prices. European countries are also dependent on food, raw materials, and energy from Russia and Ukraine. The mentioned situation has caused increases in price levels and a ripple effect on the European economy and corporate performance. Therefore, the European Union sanctions are likely to have an adverse effect on the share prices of companies. Because of their geographic proximity and economic linkages, European countries, as well as companies, are directly affected by this war. Thus, the heightened geopolitical threat in the Euro region is increasing investors' uncertainty and dampening business confidence (Caldara and Iacoviello, 2022), with a depressing effect on stock prices. Next, the study complements prior works that show that the sensitivity of stock prices to political uncertainties and geopolitics differs across industries (Boutchkova et al., 2012; Buigut and Kapar, 2020). Third, the findings of considerable country-level heterogeneity in the stock price reactions to the European Union sanctions on the stock market extend the related literature (e.g., Buigut and Kapar, 2020). This suggests that country-level variation cannot be explained solely by geographic proximity to Russia or Ukraine; rather, the extent of trade and economic ties affect stock prices significantly. Finally, the findings may guide policymakers, managers, and other key stakeholders in developing effective policies to mitigate the negative impacts of political uncertainty on stock markets.

Thus, we empirically examined the impact of the implementation of the European Union sanctions on the rates of return on the stock prices in a sample of European public companies. The remainder of the paper proceeds as follows: In Section 2, previous studies that investigated the reactions of the stock market to military conflicts are reviewed. Section 3 reports the methodology by describing the features of this data sample and the model specification on which the empirical analysis is based. Section 4 provides a discussion of the findings, and Section 5 concludes by declaring the limitations of the current study and consequently suggesting future developments.

## 2. Literature review

The impact of the European Union sanctions on the rates of return on stock prices is strictly connected to some phenomena. The basic one is the effect of political uncertainty. The financial market assesses the fear of political instability, which has a statistically significant impact on the rates of return on stock prices, as well as on the risk profiles of financial assets (Dimic et al., 2015; Gemmill, 1992; Jones and Banning, 2008; Kapar and Buigut, 2020; Li and Born, 2006; Mei and Guo, 2004; Nippani and Medlin, 2002). Researchers have tested the impacts of political uncertainty on stock returns (Berkman et al., 2011; Lehkonen and Heimonen, 2015) and currency carry trade returns (Dimic et al., 2016). Political uncertainty rises as an effect of political decisions like Brexit (Smales, 2017), non-violent diplomatic disputes between mainland China and Taiwan (He et al., 2017), diplomatic and economic blockades against Qatar (Kapar and Buigut, 2020), and the disappearance of Jamal Khashoggi (Bash and Alsaifi, 2019). Most of the mentioned decisions had a local country effect, but some of them had regional effects, like in the case of the impacts of the diplomatic and economic blockades against Qatar

on the Gulf Cooperation Council countries, with the effects varying across different industries and countries (Buigut and Kapar, 2020).

The next group of studies analyzed the impact of the economic consequences of geopolitical risk. This study belongs to the presented group of research. Uncertainty arises from the possibility of wars, terrorist acts, and conflicts between nations (Caldara and Iacoviello, 2022). The mentioned situations have significant negative impacts on financial markets and have adverse effects on investment, employment, downside risks (Caldara and Iacoviello, 2022), equity returns, bond spreads (Rigobon and Sack, 2005), and the volatility in the stock markets (Choi, 2022). The mentioned impacts are stronger than the actual occurrences of adverse events for companies (Salisu et al., 2022). The reaction of the stock market is varied during political uncertainty. In some studies, negative impacts on the rates of return on stock prices and their volatility were observed (Bash and Alsaifi, 2019; Buigut and Kapar, 2020; Choudhry, 2010; Rigobon and Sack, 2005; Smales, 2017). In other studies, positive (Guidolin and La Ferrara, 2010) or even nearly insignificant (Hudson and Urquhart, 2015) impacts were observed.

The invasion of Ukraine was tested by Boubacker et al. (2022) and Boungou and Yatié (2022). They found that the moment of this invasion generated negative cumulative abnormal returns for global stock market indices but with heterogeneous effects. Consistent with the expected economic stimulus of military preparedness, the markets of NATO countries exhibited higher returns (Boubacker et al., 2022). The results are consistent with markets of more globalized economies being more vulnerable to international conflicts, with, however, notable heterogeneities. The reaction of global stock markets was weaker in the weeks following the invasion (Boungou and Yatié, 2022). The performance of the stock market indices was weaker for the countries bordering Ukraine and Russia, as well as for the UN member countries that demanded an end to the Russian offensive in Ukraine.

The European Union sanctions also create a kind of uncertainty in the financial market. The previous literature has presented varied opinions about the impact of sanctions on the situation in the capital market. Some studies suggested that sanctions are an ineffective tool for solving geopolitical conflicts and have the strongest impacts on the countries imposing the sanctions, especially on their economies (Galtung, 1967; Lindsay, 1986), but most studies focused on the positive effects of reducing the mentioned conflicts, opening new markets, etc. (Hufbauer et al., 2009; Weber and Schneider 2022). According to Weber and Schneider (2022), the most effective sanctions are given by the European Union and United Nations, but the effectiveness of the mentioned tools is strictly connected to the economic and political relationship between the countries imposing sanctions and the countries on which sanctions are imposed. If the mentioned relationship is strong, a stronger effect is noticed (Jing et al., 2003; Smeets, 2018). An analysis of the impact of the sanctions on Russia as a result of the illegal annexation of Crimea and Sevastopol in 2014 suggested that the sanctions reduced the significance of the Russian market but increased its significance as a propagator of volatility shocks in international financial markets (Schmıdbauer et al., 2016). Increased volatility in the Russian financial market and reductions in the rates of return (Stone, 2017), as effects of the sanctions, were also noticed.

Previous studies tested the impacts of sanctions on oil prices. Tyll et al. (2018) proved that sanctions firmly bound the exchange rate of the ruble to oil price changes. Dreger et al. (2015) and Tyll et al. (2018) confirmed that sanctions decreasing oil prices are an essential factor behind the economic deterioration. Sultonov (2021) showed that sanctions have a significant positive short-term impact on exchange rate returns, a negative long-term impact on the returns and variance of the exchange rate, and a significant positive long-term impact on the returns of the stock price index. The mentioned impact is varied and depends on the region. Corporate sanctions have a positive long-term impact on exchange rate returns. The conflict between

Ukraine and Russia has had a prolonged negative reaction in the European stock markets (Ahmed et al., 2022).

The Russian financial market registered the negative impact of the US and EU 'smart sanctions' on specific companies and their shareholders, managers, and directors (Ahn and Ludema, 2020). The moment of publishing information about imposing a sanction has a direct negative impact on the capital market (Kirat and Rezaee, 2019).

After the financial crisis of 2008, a plethora of news on financial wrongdoings has desensitized markets to announcements of sanctions against large companies. Reputational losses are nearly nine times the size of fines and are associated with misconduct harming customers or investors but not third parties. Draca et al. (2019) found that the stock returns of firms owned by targeted political elites respond especially sharply to such news, though other listed firms unconnected to these elites also benefit from progress towards sanction relief. These results indicate the 'bluntness' of the sanctions on Iran and provide evidence of their effectiveness in generating economic incentives for elite policymakers to negotiate a deal for sanction relief.

The theoretical impact of sanctions on the stock market was presented by Webb (2020).

Biglaiser and Lektzian (2020) found that the introduction of import sanctions by developed countries has a significant negative impact on stock market valuation in the countries where sanctions are imposed when the targeted states are not already subject to multiple sanctions. As a result, sanctions have a negative effect on stock market value in targeted countries, but their effectiveness is relatively limited in practice due to the overuse of sanctions. There is a marginal decrease in the negative effect on the target's stock market as the number of sanctions increases.

By analyzing the firms belonging to the STOXX Europe 600 index, Ahmed et al. (2022) found that the beginning of the Ukrainian War had a statistically significant negative impact on the abnormal rates of return on the stock prices around the event days, pre-event days, and post-event days, providing strong evidence of the prolonged negative impact of the Russia–Ukraine crisis on the European stock market.

The reaction to the beginning of the Ukrainian War was varied in particular sectors. Ahmed et al. (2022) found that seven of eleven industries (viz., the basic materials, consumer staples, financial, healthcare, industrial, telecommunications, and utilities sectors) experienced negative and significant AARs on the event day. Moreover, while the consumer staples industry had the worst AAR on the event day, the energy industry experienced an insignificant positive AAR. In addition, the financial services industry experienced the most severe effect across the event windows. They observed consistent significant industry-level variation when the CAR was used in the analysis. Furthermore, we observed considerable country-level heterogeneity in the stock price reactions to the crisis. The small- and medium-cap companies experienced more negative abnormal rates of return than the large-cap companies on the event day.

Sanctions and sanction threats should create market uncertainty, which is reflected in stock price volatility, for firms with commercial interests in targeted states. Comparisons are made using stock price data for firms within sectors at the same point in time, within sectors over time, and across sectors over time. The stock prices of firms with commercial interests in targeted states are more volatile than the stock prices of comparable firms without commercial interests in targeted states. These spells of uncertainty not only reflect the costs of sanctions and sanction threats for firms caused by interruptions in commercial activities but represent important costs for firms in and of themselves.

The presented literature and practical knowledge create the need to analyze the impact of the sanctions implemented by the EU as a result of the beginning of the Ukrainian War on the abnormal rates of return on the stock prices of companies. The mentioned topic has not been tested in the literature. It was hypothesized that the implementation of the European Union sanctions related to the Ukrainian War is causing the varied abnormal rates of return on the

stock prices of companies listed on the stock exchanges, taking into consideration the type of sector and the geographical location of the military conflict.

## 3. Methodology

The analysis was prepared using the panel data event study methodology. Data were collected from the Refinitiv Eikon Database. The analysis used the daily data of companies from all sectors listed on the stock exchanges from 1st November 2021 to 28th February 2023. Sectors were divided into subsectors: academic and educational services, basic materials, consumer cyclicals, consumer non-cyclicals, energy, financials, government activity, healthcare, industrials, real estate, technology, and utilities. Next, the sample was divided into the following groups:

- Countries that are neighbors of Russia and Ukraine;
- Countries according to continents;
- European and non-European countries;
- Countries according to the level of economic development.

The classification is presented in Appendixes 1-3. Events were related to the implementation of sanctions by the EU. The analysis used the following event data:

- 02/23/2022—First package of sanctions;
- 02/24/2022—EU leaders agree on further sanctions against Russia;
- 02/25/2022—Second package of sanctions;
- 02/28/2022—Third package of sanctions (first stage);
- 03/02/2022—Third package of sanctions (second stage);
- 03/03/2022—EU prolongs restrictive measures;
- 03/09/2022—Restrictive measures on individuals and new measures targeting Belarus and Russia;
- 03/10/2022—Extended sanctions over territorial integrity;
- 03/15/2022—Fourth package of sanctions;
- 04/08/2022—Fifth package of sanctions;
- 06/03/2022—Sixth package of sanctions;
- 07/21/2022—Seventh package of sanctions;
- 10/06/2022—Eighth package of sanctions;
- 12/16/2022—Ninth package of sanctions;
- 02/25/2023—Tenth package of sanctions.

The analysis used an event window, that is, the moment of the publication of sanctions plus one day after. Research was not prepared for the pre-event window and post-event window because of the high frequency of the events. The presented model used logarithmized daily rates of return on stock prices. As a basic model was used, the market model was described by the following equation:

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t} RM_{i,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ are the logarithmized rates of return on the stock prices of company $i$ in period $t$ and $R_{i,t}$ are the logarithmized rates of return of the benchmark for company $i$ in period $t$.

$$\hat{R}_{i,t} = \bar{R}_{i,t}$$

$$\hat{\alpha}_{i,t} = \frac{1}{T-1}\left(\sum_{t=1}^{T-1} R_{i,t} - \hat{\beta}_{i,t} \sum_{t=1}^{T-1} RM_{i,t}\right)$$

$$\hat{\beta}_{i,t} = \frac{\sum_{t=1}^{T-1}(R_{i,t} - \bar{R}_{i,t})(RM_{i,t} - \overline{RM}_{i,t})}{\sum_{t=1}^{T-1}(R_{i,t} - \bar{R}_{i,t})(RM_{i,t} - \overline{RM}_{i,t})}$$

In the next step, the abnormal rates of return on the stock prices were defined as the differences between the real and forecasted values (limited by the information set in the estimating window ($\Omega_{EW}$)).

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t}\middle|\Omega_{EW}\right)$$

The average abnormal rates of return during period $t$ were estimated according to:

$$\overline{AR}_{i,t} = \frac{\sum_{t=1}^{N} AR_{i,t}}{N}$$

where $N$ is the size of the research sample. The standard deviation ($\hat{\sigma}$) was estimated as follows:

$$\hat{\sigma}_{AR} = \sqrt{\frac{1}{N-1}\sum_{t=1}^{N}(\overline{AR}_{i,t} - \overline{\overline{AR}}_{i,t})}$$

Next, the hypothesis was tested in the pre-event window, event window, and post-event window. The hypothesis was verified using Student's t-test.

$$t_{STAT} = \frac{\frac{1}{N}\sum_{t=1}^{N} AR_{i,t}}{\hat{\sigma}_{AR}}$$

The use of a more advanced model, taking into account the heterogeneity of the variance of the random component and the autocorrelation, would require a longer estimation window.

## 4. Findings

The aim of this paper is to analyze the current impact of the implementation of the European Union sanctions related to the Ukrainian War on the abnormal rates of return on the stock prices of companies listed on the stock exchanges. It was hypothesized that the implementation of the European Union sanctions related to the Ukrainian War is causing the varied abnormal rates of return on the stock prices of companies listed on the stock exchanges, taking into consideration the type of sector and the geographical location of the military conflict. The results of this study related to the impact of all sanctions on the abnormal rates of return are presented in Table 1. The prepared analysis suggests that the abnormal rates of return were noticed during the event window. The implementation of the European sanctions caused decreases in the rates of return on stock prices below the trend for the entire sample. The strongest reaction was noticed for the companies rated on the Asian stock exchanges. A significant reaction was observed for the pre-event window and the post-event window for the first week after the publication of information about the European sanctions. In the case of European companies, significant abnormal rates of return were noticed during the publication of information about the implementation of sanctions. The strongest reactions to sanctions were noticed for companies from countries in the vicinity of the military conflict during the event window. The strongest significant reaction was observed for companies from countries outside Europe. Similar significances of the

implementation of sanctions were observed for companies from high-income and middle-income countries, but the moments of reaction varied. In the case of developed countries, negative abnormal rates of return were observed for the event window, but for the group of entities from developing countries a significant reaction was noticed before and after the publication of information about the implementation of sanctions.

The results suggest that the strongest reaction was noticed for the companies in the vicinity of the military conflict and for the Asian market. The described situation shows that companies from Europe mostly reacted to the European sanctions at the moment of publication, while the rest of the world reacted before and after the mentioned moment. This confirms the opinion that the stock market discounted this information before the publication. In all of the mentioned cases, negative abnormal rates of return were observed.

The analysis of all of the sectors, the results of which are presented in Tables 1 and 2, shows that particular sectors reacted more or less strongly based on the type of information presented. In all of the described sectors, negative abnormal rates of return were noticed. The strongest reaction was observed for the energy sector. Before, during, and after the publication of information, strong negative abnormal rates of return were observed. A similar reaction was observed for the utilities sector, but the strength was lower, and a smaller reaction was observed for European companies. Insignificant reactions were noticed for the government activity, basic materials, and technology sectors. In the academic and educational services and healthcare sectors, significant reactions were noticed before and after the publication of information about sanctions for all analyzed periods. In the case of companies from Europe, a positive reaction was noticed after the information was mentioned, but companies outside Europe reacted before and after this phenomenon in the academic and educational subsector. The healthcare sector's reaction was stronger for companies outside Europe, which reacted negatively before and after the publication of information. In the case of European companies, a positive abnormal reaction to the mentioned publication was observed during and after the publication of information. A significant reaction before, during, and after the first week of the publication of information about sanctions was observed for the consumer cyclicals sector, especially for companies outside Europe. In the case of European companies, a negative reaction was noticed before the publication of information and in the three next weeks after it. At the moment of publication and in the first week after the publication of information about sanctions, a significant negative reaction was observed for the consumer non-cyclicals sector, especially for companies outside Europe. In the case of European companies, the reaction was similar for the cyclicals sector. The financial sector reacted after the publication of information about sanctions, but during the first week we noticed a negative effect and during the next three weeks we noticed a positive reaction, especially for European companies. A negative reaction was observed before the information about sanctions and a positive reaction was observed during the three weeks after the mentioned phenomenon in the case of the industrials sector, especially for non-European companies. A negative reaction after the publication of the mentioned information was observed for the real estate sector, especially for non-European companies. In the case of the European entities, a negative reaction was observed before the mentioned phenomenon.

The presented analysis shows that stronger reactions to the mentioned sanctions were noticed for non-European companies in all sectors. The moment and the type of reaction varied for the particular sectors, which confirms the tested hypothesis.

Table 1. Abnormal rate of return estimation as an effect of the implementation of European Union sanctions according to continent, vicinity, belonging to Europe, the level of development, and the type of sector.

| | **all** | **Continent** | | | **Neighborhood** | | **Europe** | | **Level of development** | | **Sector** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Europe | USA | Asia | No | Yes | No | Yes | High | Medium | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | | | | | | | | | | | event window | | | | | | | | | | | |
| **c** | -0.232* | -0.003* | -0,743 | -0,132 | -0,0038 | -0.385* | -0.449* | -0.003* | -0.372* | -0,102 | -0,00788 | 0,0201 | -0.356*** | -0.312* | -3.94** | 1,134 | -0,0015 | -0.14** | -0,0193 | 0,0768 | 0,115 | -0.24*** |
| | (-2.35) | (-1.98) | (-1.95) | (-1.69) | (-1.93) | (-2.23) | (-2.23) | (-1.98) | (-1.96) | (-1.70) | (-0.63) | -0,58 | (-3.39) | (-2.52) | (-3.26) | -0,93 | (-0.18) | (-2.79) | (-1.23) | -0,9 | -0,2 | (-3.41) |
| ***N*** | 399182 | 125790 | 98112 | 90902 | 94515 | 220289 | 189014 | 125790 | 197148 | 117656 | 1862 | 30436 | 49630 | 22456 | 16394 | 4088 | 42 | 41286 | 64778 | 20146 | 54586 | 8918 |
| | | | | | | | | | | | pre-event window | | | | | | | | | | | |
| **c** | -0,325 | 0,00208 | -0,457 | -0.465*** | 0,0047 | -0,396 | -0,461 | 0,0021 | -0,226 | -0.360*** | -0.062*** | 0,0857 | -1.022*** | 1,521 | -10.9*** | -0,0436 | -0,0087 | 0,374 | -0.0943* | 0,383 | 1,763 | -0.75*** |
| | (-0.78) | -0,14 | (-0.27) | (-3.37) | -0,24 | (-0.53) | (-0.53) | -0,14 | (-0.27) | (-3.38) | (-4.13) | -1,04 | (-4.00) | -0,7 | (-3.44) | (-0.22) | (-0.78) | -0,95 | (-2.34) | -1,19 | -0,66 | (-3.94) |
| ***N*** | 399182 | 125790 | 98112 | 90902 | 94515 | 220289 | 189014 | 125790 | 197148 | 117656 | 1862 | 30436 | 49630 | 22456 | 16394 | 4088 | 42 | 41286 | 64778 | 20146 | 54586 | 8918 |
| | | | | | | | | | | | post-event window 1 | | | | | | | | | | | |
| **c** | -0,421 | -0,0066 | -0,943 | -0.464*** | -0.01* | -0,611 | -0,713 | -0,007 | -0,474 | -0.358*** | -0.059*** | 0,119 | -0.860** | -0.82** | -9.01** | -0.282* | 0,00392 | -0.34** | 0,754 | -0.131** | 0,795 | -0.52*** |
| | (-1.44) | (-1.87) | (-0.80) | (-3.39) | (-2.18) | (-1.16) | (-1.16) | (-1.87) | (-0.81) | (-3.38) | (-4.00) | -1,31 | (-3.15) | (-2.71) | (-2.93) | (-2.03) | -0,38 | (-2.76) | -1,01 | (-3.17) | -0,48 | (-3.33) |
| ***N*** | 399182 | 125790 | 98112 | 90902 | 94515 | 220289 | 189014 | 125790 | 197148 | 117656 | 1862 | 30436 | 49630 | 22456 | 16394 | 4088 | 42 | 41286 | 64778 | 20146 | 54586 | 8918 |
| | | | | | | | | | | | post-event window 2 | | | | | | | | | | | |
| **c** | 0,66 | 0,0147 | 3,24 | -0,608 | 0,0054 | 1,198 | 1,389 | 0,0147 | 1,62 | -0,467 | -0.146* | 10,39 | 0,454 | 4,399 | -18,46 | 3.597** | -0,0202 | -0,505 | 1.849* | -0.372* | 0,533 | -0.63*** |
| | -0,58 | -1,72 | -0,71 | (-1.50) | -0,48 | -0,59 | -0,58 | -1,72 | -0,71 | (-1.49) | (-2.55) | -1,03 | -0,41 | -1,2 | (-1.42) | -2,86 | (-1.50) | (-0.80) | -2,47 | (-2.16) | -0,13 | (-4.69) |
| ***N*** | 399182 | 125790 | 98112 | 90902 | 94515 | 220289 | 189014 | 125790 | 197148 | 117656 | 1862 | 30436 | 49630 | 22456 | 16394 | 4088 | 42 | 41286 | 64778 | 20146 | 54586 | 8918 |

*1—academic and educational services, 2—basic materials, 3—consumer cyclicals, 4—consumer non-cyclicals, 5—energy, 6—financials, 7—government activity, 8—healthcare, 9—industrials, 10—real estate, 11—technology, 12—utilities.* Source: own estimation.

Table 2. Abnormal rate of return estimation as an effect of the implementation of European Union sanctions according to belonging to Europe and the type of sector.

| **Sector** | **1** | **2** | **3** | **4** | **5** | **6** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** | **4** | **5** | **8** | **9** | **10** | **11** | **12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Europe** | No | No | No | No | No | No | No | No | No | No | No | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| | | | | | | | | | | | **event window** | | | | | | | | | | |
| **_cons** | -0,00986 | 0,0356 | -0.658*** | -0.599* | -6.199** | 1,134 | -0.189** | -0,034 | 0,169 | 0,176 | -0.429** | -0,0011 | -0,0055 | 0,00347 | -3,2E-05 | -0,00102 | 0.00155* | -0.000715* | -0,00047 | 0,00193 | -0.087** |
| | (-0.61) | -0,64 | (-3.41) | (-2.52) | (-3.26) | -0,93 | (-2.79) | (-1.21) | -0,9 | -0,2 | (-2.83) | (-0.43) | (-0.88) | -0,77 | (-0.03) | (-0.72) | -1,96 | (-2.11) | (-0.40) | -1,65 | (-2.93) |
| ***N*** | 1442 | 18970 | 26964 | 11690 | 10416 | 4088 | 29988 | 36442 | 9156 | 35574 | 4116 | 420 | 11466 | 22666 | 10766 | 5978 | 11298 | 28336 | 10990 | 19012 | 4802 |
| | | | | | | | | | | | **pre-event window** | | | | | | | | | | |
| | -0.0803*** | 0,048 | -1.876*** | 2,926 | -17.21*** | -0,0436 | 0,512 | -0.164* | 0,849 | 2,707 | -1.36*** | -0,00047 | 0,148 | -0.0054*** | -0.0048** | 0,00135 | 0,00493 | -0.0053*** | -0.0062** | -0.003** | -0.218** |
| | (-4.13) | -0,54 | (-3.99) | -0,7 | (-3.44) | (-0.22) | -0,95 | (-2.28) | -1,2 | -0,66 | (-3.40) | (-0.12) | -0,91 | (-3.31) | (-2.63) | -0,46 | -0,58 | (-7.70) | (-2.98) | (-2.59) | (-2.96) |
| ***N*** | 1442 | 18970 | 26964 | 11690 | 10416 | 4088 | 29988 | 36442 | 9156 | 35574 | 4116 | 420 | 11466 | 22666 | 10766 | 5978 | 11298 | 28336 | 10990 | 19012 | 4802 |
| | | | | | | | | | | | **post-event window 1** | | | | | | | | | | |
| **_cons** | -0.0757*** | 0,202 | -1.582** | -1.571** | -14.19** | -0.282* | -0.469** | 1,332 | -0.286** | 1,219 | -0.878** | -0,00341 | -0,017 | -0,00162 | 0,00101 | 0.0113*** | 0.00487*** | 0,00986 | -0,00274 | 0.00294* | -0.216** |
| | (-3.95) | -1,38 | (-3.15) | (-2.71) | (-2.93) | (-2.03) | (-2.77) | -1 | (-3.13) | -0,48 | (-2.67) | (-1.03) | (-1.18) | (-0.99) | -0,56 | -4,23 | -3,82 | -1,38 | (-1.50) | -2,56 | (-2.93) |
| ***N*** | 1442 | 18970 | 26964 | 11690 | 10416 | 4088 | 29988 | 36442 | 9156 | 35574 | 4116 | 420 | 11466 | 22666 | 10766 | 5978 | 11298 | 28336 | 10990 | 19012 | 4802 |
| | | | | | | | | | | | **post-event window 2** | | | | | | | | | | |
| **_cons** | -0.194** | 16,7 | 0,809 | 8,429 | -29,1 | 3.597** | -0,719 | 3.267* | -0.848* | 0,788 | -0.888*** | 0.0186*** | -0,035 | 0.0329*** | 0.0241*** | 0.0746** | 0.0640*** | 0.0257*** | 0.0245** | 0.0552*** | -0.413* |
| | (-2.63) | -1,03 | -0,4 | -1,19 | (-1.42) | -2,86 | (-0.83) | -2,45 | (-2.24) | -0,13 | (-4.15) | -4,73 | (-0.61) | -6,65 | -6,57 | -3,02 | -15,64 | -9,23 | -3,08 | -21,31 | (-2.43) |
| ***N*** | 1442 | 18970 | 26964 | 11690 | 10416 | 4088 | 29988 | 36442 | 9156 | 35574 | 4116 | 420 | 11466 | 22666 | 10766 | 5978 | 11298 | 28336 | 10990 | 19012 | 4802 |

*1—academic and educational services, 2—basic materials, 3—consumer cyclicals, 4—consumer non-cyclicals, 5—energy, 6—financials, 7—government activity, 8—healthcare, 9—industrials, 10—real estate, 11—technology, 12—utilities.* Source: own calculations.

The next step of the analysis involved testing the current impact of the implementation of European Union sanctions on the abnormal rates of return on stock prices. The results of the analysis are presented in Table 3. The presented analysis shows that the significance of the European Union sanctions and their impact on the abnormal rates of return were noticed, especially during the pre-event window and the event window. The strongest reaction was observed during the first stage of the sanctions. The effect of their implementation was mostly noticed for European companies that were not in the direct vicinity of the military conflict. This shows that the sanctions had a local character. It also suggests that the mentioned effect was mostly observed in European Union countries. The locations of the mentioned countries were also significant. This was mostly observed in the case of European countries and the neighbors of the military conflict that belong to the European Union. As previously mentioned, the sanctions during the first stage of the sanctions policy were the most significant. This was related to the panic in the financial markets and the priority effects. The strongest reaction was noticed as a result of the first and second packages of sanctions and the information about the EU leaders agreeing on further sanctions against Russia. The mentioned effects were observed both before and at the moment of the publication of information about the sanctions. The first package of sanctions was imposed before the beginning of the war and was related to the high probability of the beginning of the mentioned military conflict. The impact of the third package of sanctions was also observed during the first week after the publication of the information. In all of the mentioned cases, negative abnormal rates of return were observed as an effect of these packages for European countries and those that were not in the direct vicinity of the conflict. The strongest significant impact resulted from economic and financial sanctions. The restrictive measures on individuals and new measures targeting Belarus and Russia were not as significant. In some cases, they also threatened the breadth of the capital market without new economic and financial sanctions. At the time of publication, a significant impact related to the information about the extended sanctions over territorial integrity on 10/03/2022 has not been noticed because the financial market discounted that type of sanction. The fourth package of sanctions was not significant at the moment of the publication of the information, but before the news was presented the stock market reacted positively. The fifth package of European Union sanctions was implemented at the same time in the US. As a result, both European and American companies' stock prices reacted. The largest reaction was noticed in the case of high-income countries, including companies from countries that are and are not neighbors of the military conflict. The strongest reaction was noticed in the case of companies that are from countries outside Europe. This can be related to the types of sanctions, which are mostly related to the prohibition of importing coal from Russia. In the case of the sixth package of sanctions, the strongest reaction was noticed before the publication of the information in the sample of American companies and in high-income countries outside Europe. In the case of European companies, a significant reaction was observed after the publication of the information, especially in the case of neighbors of the military conflict and the non-European subsample. The seventh package of sanctions was important for the abnormal rates of return for the pre-event and event windows for European companies and those that were not neighbors of the military conflict. The eighth package of sanctions did not have a significant impact on stock prices. In the case of the ninth package of sanctions, a significant reaction was noticed for European countries, especially those that were not neighbors of the military conflict.

Table 3. Abnormal rate of return estimation as an effect of the implementation of European Union sanctions according to continent, vicinity, belonging to Europe, and the level of development.

| Date | | all | continent | | | neighborhood | | Europe | | level of development | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Europe | USA | Asia | no | yes | no | yes | high | medium |
| | | | | | | pre-event window | | | | | |
| 02/23/2022 | _cons | -0,833 | -0.0404** | -2,148 | -0,631 | -0.0458** | -1,221 | -1,418 | -0.0404** | -1,093 | -0,49 |
| | | (-1.25) | (-3.07) | (-0.82) | (-1.00) | (-2.62) | (-1.02) | (-1.02) | (-3.07) | (-0.84) | (-1.00) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6752 | 15734 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,398 | -0.0350*** | -1,069 | -0,27 | -0.0289*** | -0,595 | -0,685 | -0.0350*** | -0,551 | -0,214 |
| | | (-1.61) | (-6.56) | (-1.12) | (-1.07) | (-4.10) | (-1.35) | (-1.34) | (-6.56) | (-1.16) | (-1.10) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6752 | 15734 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -0,998 | 0,00316 | -2,965 | -0,552 | -0,0059 | -1,544 | -1,805 | 0,00316 | -1,475 | -0,424 |
| | | (-1.64) | -0,24 | (-1.26) | (-0.87) | (-0.34) | (-1.43) | (-1.43) | -0,24 | (-1.26) | (-0.87) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6752 | 15734 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,000236 | -7,061 | -1,913 | -0,0164 | -3,927 | -4,585 | 0,000236 | -3,515 | -1,475 |
| | | -0,58 | -0,01 | (-0.71) | (-0.83) | (-0.28) | (-0.87) | (-0.87) | -0,01 | (-0.71) | (-0.83) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6752 | 15734 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| 02/24/2022 | _cons | -0,831 | -0.0336* | -2,137 | -0,629 | -0.0393* | -1,214 | -1,412 | -0.0336* | -1,084 | -0,488 |
| | | (-1.25) | (-2.55) | (-0.82) | (-1.00) | (-2.24) | (-1.02) | (-1.02) | (-2.55) | (-0.84) | (-1.00) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,376 | -0.0133* | -1,021 | -0,273 | -0,0108 | -0,571 | -0,662 | -0.0133* | -0,515 | -0,214 |
| | | (-1.53) | (-2.50) | (-1.07) | (-1.08) | (-1.54) | (-1.30) | (-1.29) | (-2.50) | (-1.08) | (-1.10) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -1,017 | -0,025 | -2,986 | -0,558 | -0,0327 | -1,56 | -1,818 | -0,025 | -1,502 | -0,431 |
| | | (-1.67) | (-1.90) | (-1.27) | (-0.88) | (-1.87) | (-1.44) | (-1.44) | (-1.90) | (-1.28) | (-0.88) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,0091 | -7,142 | -1,794 | -0,00474 | -3,914 | -4,57 | 0,0091 | -3,55 | -1,383 |
| | | -0,58 | -0,22 | (-0.72) | (-0.83) | (-0.08) | (-0.87) | (-0.87) | -0,22 | (-0.72) | (-0.83) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| 02/25/2022 | _cons | -0,79 | -0.0577*** | -1,913 | -0,647 | -0.0543** | -1,128 | -1,304 | -0.0577*** | -0,985 | -0,506 |
| | | (-1.18) | (-4.38) | (-0.73) | (-1.02) | (-3.10) | (-0.95) | (-0.94) | (-4.38) | (-0.76) | (-1.04) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,406 | 0.0169** | -1,264 | -0,193 | 0,0116 | -0,638 | -0,749 | 0.0169** | -0,62 | -0,146 |
| | | (-1.67) | -3,2 | (-1.34) | (-0.75) | -1,64 | (-1.47) | (-1.48) | -3,2 | (-1.32) | (-0.73) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -1,022 | -0.0421** | -2,906 | -0,634 | -0.0516** | -1,558 | -1,813 | -0.0421** | -1,473 | -0,49 |
| | | (-1.68) | (-3.19) | (-1.23) | (-1.00) | (-2.94) | (-1.44) | (-1.44) | (-3.19) | (-1.26) | (-1.00) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,0321 | -7,168 | -1,654 | 0,021 | -3,865 | -4,516 | 0,0321 | -3,548 | -1,275 |
| | | -0,58 | -0,81 | (-0.73) | (-0.81) | -0,4 | (-0.87) | (-0.87) | -0,81 | (-0.72) | (-0.81) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| 02/28/2022 | _cons | -0,757 | -0,0232 | -1,833 | -0,658 | -0,0249 | -1,09 | -1,267 | -0,0232 | -0,925 | -0,51 |
| | | (-1.14) | (-1.76) | (-0.71) | (-1.04) | (-1.42) | (-0.92) | (-0.92) | (-1.76) | (-0.72) | (-1.05) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,413 | -0.0108* | -1,251 | -0,181 | -0,0136 | -0,632 | -0,736 | -0.0108* | -0,63 | -0,14 |
| | | (-1.70) | (-2.04) | (-1.33) | (-0.70) | (-1.92) | (-1.46) | (-1.46) | (-2.04) | (-1.34) | (-0.70) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -1,053 | -0.0454*** | -2,986 | -0,681 | -0.0537** | -1,614 | -1,877 | -0.0454*** | -1,515 | -0,526 |
| | | (-1.73) | (-3.45) | (-1.27) | (-1.08) | (-3.07) | (-1.49) | (-1.49) | (-3.45) | (-1.29) | (-1.08) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,0573 | -5,565 | -1,404 | 0,0465 | -3,045 | -3,564 | 0,0573 | -2,736 | -1,079 |
| | | -0,58 | -1,67 | (-0.56) | (-0.73) | -1,02 | (-0.68) | (-0.68) | -1,67 | (-0.55) | (-0.73) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| 03/02/2022 | _cons | -1,015 | -0.0272* | -2,955 | -0,573 | -0,0287 | -1,556 | -1,81 | -0.0272* | -1,487 | -0,445 |
| | | (-1.67) | (-2.07) | (-1.25) | (-0.91) | (-1.64) | (-1.44) | (-1.43) | (-2.07) | (-1.27) | (-0.91) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,376 | -0.0109* | -1,052 | -0,249 | -0.0145* | -0,571 | -0,666 | -0.0109* | -0,53 | -0,192 |

| Date | | all | continent | | | neighborhood | | Europe | | level of development | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Europe | USA | Asia | no | yes | no | yes | high | medium |
| | | (-1.54) | (-2.05) | (-1.12) | (-0.98) | (-2.06) | (-1.32) | (-1.32) | (-2.05) | (-1.13) | (-0.98) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -1,012 | -0,0104 | -2,876 | -0,687 | -0,0138 | -1,565 | -1,823 | -0,0104 | -1,439 | -0,53 |
| | | (-1.66) | (-0.77) | (-1.22) | (-1.09) | (-0.77) | (-1.44) | (-1.44) | (-0.77) | (-1.22) | (-1.09) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,0383 | 0,77 | -1,183 | 0,0233 | -0,133 | -0,169 | 0,0383 | 0,404 | -0,908 |
| | | -0,58 | -1,32 | -0,06 | (-0.71) | -0,6 | (-0.02) | (-0.03) | -1,32 | -0,07 | (-0.71) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| | _cons | -1,092 | -0.0398** | -3,161 | -0,681 | -0.0482** | -1,691 | -1,968 | -0.0398** | -1,599 | -0,526 |
| | | (-1.80) | (-3.02) | (-1.34) | (-1.08) | (-2.75) | (-1.56) | (-1.56) | (-3.02) | (-1.36) | (-1.08) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,328 | 0.0194** | -0,894 | -0,256 | 0.0199* | -0,501 | -0,587 | 0.0194** | -0,433 | -0,196 |
| 03/09/2022 | | (-1.33) | -3,17 | (-0.93) | (-1.01) | -2,45 | (-1.14) | (-1.15) | -3,17 | (-0.91) | (-1.01) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -1,013 | 0,0139 | -2,961 | -0,654 | 0,0117 | -1,585 | -1,851 | 0,0139 | -1,465 | -0,505 |
| | | (-1.67) | -1,05 | (-1.26) | (-1.04) | -0,67 | (-1.47) | (-1.47) | -1,05 | (-1.25) | (-1.04) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0,0262 | 7,298 | -0,587 | 0,0158 | 3,016 | 3,506 | 0,0262 | 3,645 | -0,448 |
| | | -0,58 | -1,94 | -0,56 | (-0.56) | -0,89 | -0,52 | -0,52 | -1,94 | -0,56 | (-0.56) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| | _cons | -1,013 | -0,0105 | -2,876 | -0,69 | -0,0139 | -1,566 | -1,825 | -0,0105 | -1,439 | -0,532 |
| | | (-1.66) | (-0.78) | (-1.22) | (-1.09) | (-0.78) | (-1.45) | (-1.45) | (-0.78) | (-1.22) | (-1.09) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,392 | 0,00605 | -1,142 | -0,244 | 0,00439 | -0,608 | -0,71 | 0,00605 | -0,565 | -0,188 |
| 03/10/2022 | | (-1.61) | -1,11 | (-1.21) | (-0.96) | -0,61 | (-1.40) | (-1.41) | -1,11 | (-1.20) | (-0.96) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -0,989 | 0,0092 | -2,885 | -0,627 | 0,00643 | -1,541 | -1,799 | 0,0092 | -1,43 | -0,484 |
| | | (-1.63) | -0,7 | (-1.23) | (-0.99) | -0,37 | (-1.43) | (-1.43) | -0,7 | (-1.22) | (-0.99) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0.0231* | 7,363 | -0,51 | 0,0136 | 3,076 | 3,577 | 0.0231* | 3,676 | -0,389 |
| | | -0,58 | -2,11 | -0,58 | (-0.55) | -0,94 | -0,55 | -0,55 | -2,11 | -0,59 | (-0.55) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| | _cons | -0,966 | 0.0270* | -2,739 | -0,697 | 0,0261 | -1,503 | -1,757 | 0.0270* | -1,347 | -0,537 |
| | | (-1.59) | -2 | (-1.16) | (-1.10) | -1,46 | (-1.39) | (-1.39) | -2 | (-1.15) | (-1.10) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0,386 | 0,00647 | -1,115 | -0,262 | 0,00579 | -0,604 | -0,705 | 0,00647 | -0,551 | -0,203 |
| 03/15/2022 | | (-1.59) | -1,22 | (-1.18) | (-1.04) | -0,82 | (-1.40) | (-1.40) | -1,22 | (-1.18) | (-1.04) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -0,922 | 0,00559 | -2,656 | -0,577 | 0,000807 | -1,418 | -1,656 | 0,00559 | -1,318 | -0,445 |
| | | (-1.52) | -0,42 | (-1.13) | (-0.91) | -0,05 | (-1.31) | (-1.31) | -0,42 | (-1.12) | (-0.91) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | 0.0199*** | 8,579 | -0,171 | 0.0147*** | 3,755 | 4,371 | 0.0199*** | 4,28 | -0,128 |
| | | -0,58 | -7,22 | -0,79 | (-0.30) | -4,44 | -0,77 | -0,77 | -7,22 | -0,79 | (-0.29) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | pre-event window | | | | | |
| | _cons | 0,767 | -0.00276** | 3,329 | 0,0429 | -0,00244 | 1,5 | 1,749 | -0.00276** | 1,655 | 0,0334 |
| | | -0,42 | (-2.62) | -0,45 | -0,42 | (-1.86) | -0,46 | -0,46 | (-2.62) | -0,45 | -0,42 |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | event window | | | | | |
| | _cons | -0.216* | 0.00251** | -0.762* | -0,0345 | 0.00312** | -0.353* | -0.412* | 0.00251** | -0.377* | -0,0268 |
| 04/08/2022 | | (-2.49) | -2,72 | (-2.24) | (-1.92) | -2,58 | (-2.33) | (-2.33) | -2,72 | (-2.23) | (-1.93) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window I | | | | | |
| | _cons | -0,413 | -0,0000366 | -1,377 | -0.0534* | 0,0005 | -0,635 | -0,74 | -0,0000366 | -0,685 | -0.0417* |
| | | (-1.81) | (-0.04) | (-1.54) | (-2.00) | -0,43 | (-1.59) | (-1.59) | (-0.04) | (-1.54) | (-2.02) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | | | | | | post-event window II | | | | | |
| | _cons | 0,66 | -0.0274* | -2,108 | 2,497 | -0,0229 | 0,0857 | 0,107 | -0.0274* | -1,066 | 1,928 |
| | | -0,58 | (-2.07) | (-0.49) | -1,18 | (-1.30) | -0,04 | -0,04 | (-2.07) | (-0.50) | -1,18 |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |

| Date | | all | continent | | | neighborhood | | Europe | | level of development | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Europe | USA | Asia | no | yes | no | yes | high | medium |
| 06/03/2022 | pre-event window | | | | | | | | | | |
| | _cons | -0.678** | 0,000743 | -2.322** | -0,247 | 0,00112 | -1.137** | -1.325** | 0,000743 | -1.155** | -0,191 |
| | | (-2.96) | -0,31 | (-2.63) | (-1.22) | -0,36 | (-2.83) | (-2.83) | -0,31 | (-2.63) | (-1.22) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | event window | | | | | | | | | | |
| | _cons | 0,813 | 0,0108 | 3,495 | -0,108 | 0,0141 | 1,512 | 1,762 | 0,0108 | 1,746 | -0,0834 |
| | | -0,78 | -0,98 | -0,83 | (-1.34) | -0,96 | -0,8 | -0,8 | -0,98 | -0,83 | (-1.34) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window I | | | | | | | | | | |
| | _cons | -0.577* | -0.0186*** | -1,816 | -0,31 | -0.0215*** | -0.938* | -1.092* | -0.0186*** | -0,916 | -0,24 |
| | | (-2.31) | (-8.52) | (-1.85) | (-1.54) | (-7.47) | (-2.10) | (-2.10) | (-8.52) | (-1.87) | (-1.54) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window II | | | | | | | | | | |
| | _cons | 0,66 | -0.0304** | -1,023 | -1,044 | -0.0390** | -0,887 | -1,033 | -0.0304** | -0,529 | -0,805 |
| | | -0,58 | (-3.07) | (-0.30) | (-1.30) | (-2.97) | (-0.57) | (-0.57) | (-3.07) | (-0.31) | (-1.30) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| 07/21/2022 | pre-event window | | | | | | | | | | |
| | _cons | -0,013 | 0.0161*** | 0,161 | -0,231 | 0.0177*** | -0,0222 | -0,0277 | 0.0161*** | 0,0904 | -0,179 |
| | | (-0.05) | -8,18 | -0,16 | (-1.15) | -6,85 | (-0.05) | (-0.05) | -8,18 | -0,19 | (-1.16) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | event window | | | | | | | | | | |
| | _cons | 0,0585 | 0.00738** | -0,351 | 0,649 | 0.00827* | 0,112 | 0,13 | 0.00738** | -0,17 | 0,501 |
| | | -0,32 | -2,62 | (-1.94) | -0,84 | -2,21 | -0,34 | -0,34 | -2,62 | (-1.89) | -0,84 |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window I | | | | | | | | | | |
| | _cons | -0,0637 | 0,00315 | -0,032 | -0,206 | 0,00216 | -0,0985 | -0,116 | 0,00315 | -0,0139 | -0,159 |
| | | (-0.30) | -1,62 | (-0.04) | (-1.51) | -0,85 | (-0.26) | (-0.26) | -1,62 | (-0.03) | (-1.51) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window II | | | | | | | | | | |
| | _cons | 0,66 | 0,0133 | 27,05 | 0,944 | 0,0127 | 12,44 | 14,5 | 0,0133 | 13,47 | 0,73 |
| | | -0,58 | -1,49 | -0,94 | -0,75 | -1,07 | -0,97 | -0,97 | -1,49 | -0,95 | -0,75 |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| 10.06.2022 | pre-event window | | | | | | | | | | |
| | _cons | -1,292 | 0,226 | -5,273 | -0,278 | 0,296 | -2,461 | -2,871 | 0,226 | -2,48 | -0,214 |
| | | (-1.58) | -1,09 | (-1.59) | (-1.74) | -1,07 | (-1.67) | (-1.67) | -1,09 | (-1.50) | (-1.74) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | event window | | | | | | | | | | |
| | _cons | -0,206 | -0,00739 | -2,132 | -0,113 | -0,0105 | -0,996 | -1,161 | -0,00739 | -1,066 | -0,0875 |
| | | (-0.43) | (-1.01) | (-1.61) | (-1.77) | (-1.08) | (-1.68) | (-1.69) | (-1.01) | (-1.61) | (-1.78) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window I | | | | | | | | | | |
| | _cons | -0,508 | -0,0152 | -3,167 | -0,245 | -0,0214 | -1,511 | -1,762 | -0,0152 | -1,587 | -0,187 |
| | | (-0.53) | (-0.83) | (-0.88) | (-1.59) | (-0.88) | (-0.94) | (-0.94) | (-0.83) | (-0.88) | (-1.57) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window II | | | | | | | | | | |
| | _cons | 0,66 | -0,0169 | -9,683 | -0,506 | -0,0362 | -4,515 | -5,269 | -0,0169 | -4,83 | -0,39 |
| | | -0,58 | (-0.23) | (-1.78) | (-1.15) | (-0.37) | (-1.86) | (-1.87) | (-0.23) | (-1.79) | (-1.14) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| 12.16.2022 | pre-event window | | | | | | | | | | |
| | _cons | 4,972 | -0,00923 | 20,43 | -0,00397 | -0,0114 | 9,097 | 10,6 | -0,00923 | 10,16 | -0,00363 |
| | | -0,98 | (-0.69) | -0,99 | (-0.03) | (-0.65) | -0,99 | -0,99 | (-0.69) | -0,99 | (-0.03) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | event window | | | | | | | | | | |
| | _cons | -0,201 | -0.00697** | -0,642 | -0,0604 | -0.0105*** | -0,31 | -0,362 | -0.00697** | -0,324 | -0,0467 |
| | | (-1.13) | (-3.07) | (-0.89) | (-1.80) | (-5.77) | (-0.96) | (-0.96) | (-3.07) | (-0.90) | (-1.80) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window I | | | | | | | | | | |
| | _cons | 4,696 | 0,0223 | 19,26 | -0,0302 | 0,0312 | 8,566 | 9,984 | 0,0223 | 9,6 | -0,0231 |
| | | -1,34 | -0,99 | -1,35 | (-0.79) | -1,04 | -1,35 | -1,35 | -0,99 | -1,35 | (-0.78) |
| | *N* | 28513 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |
| | post-event window II | | | | | | | | | | |
| | _cons | 0,66 | 0,0211 | 33,51 | -0,132 | 0,0217 | 14,87 | 17,33 | 0,0211 | 16,69 | -0,101 |
| | | -0,58 | -1,34 | -0,73 | (-1.31) | -1,04 | -0,73 | -0,73 | -1,34 | -0,74 | (-1.30) |
| | *N* | 399182 | 8985 | 7008 | 6493 | 6751 | 15735 | 13501 | 8985 | 14082 | 8404 |

Source: own estimation.

## 5. Conclusions

The aim of this paper was to analyze the current impact of the implementation of the European Union sanctions related to the Ukrainian War on the abnormal rates of return on the stock prices of companies listed on the stock exchanges. It was hypothesized that the implementation of the European Union sanctions related to the Ukrainian War is causing the varied abnormal rates of return on the stock prices of companies listed on the stock exchanges, taking into consideration the type of sector and the geographical location of the military conflict. The results suggest that the strongest reaction was noticed for companies in the vicinity of the military conflict and for the Asian market. The described situation shows that companies from Europe mostly reacted to the European sanctions at the moment of publication, while the rest of the world reacted before and after the mentioned moment. This confirms the opinion that the stock market discounted this information before the publication. In all of the mentioned cases, negative abnormal rates of return were observed.

The presented analysis shows that a stronger reaction to the mentioned sanctions was noticed for non-European companies in all sectors. The moment and the type of reaction varied for particular sectors, which confirms the tested hypothesis. The strongest negative reaction was observed for the energy sector, followed by the utilities sector.

The findings show that the significance of the European Union sanctions and their impact on the abnormal rates of return were noticed, especially during the pre-event window and event window. The strongest reaction was observed during the first stage of the sanctions. It was related to the panic in the financial markets and the priority effects. The strongest reaction was noticed as a result of the first and second packages of sanctions and the information about the EU leaders agreeing on further sanctions against Russia. The mentioned effects were observed both before and at the moment of the publication of information about sanctions. The effect of their implementation was mostly noticed for European companies and those that were not in the direct vicinity of the military conflict. This shows that the sanctions had a local character. It also suggests that the mentioned effect was mostly observed in European Union countries. The locations of the mentioned countries were also significant. This was mostly observed in the case of European countries and the neighbors of the military conflict that belong to the European Union. It was related to the panic in the financial markets and the priority effects. The strongest reaction was noticed as a result of the first and second packages of sanctions and the information about the EU leaders agreeing on further sanctions against Russia. The mentioned effects were observed both before and at the moment of the publication of information about sanctions. The strongest significant impact resulted from economic and financial sanctions.

These findings can be useful for regulators and governments because they show which of the subsectors are the most sensitive to the presented group of sanctions. They also present the effects of the sanctions on the countries that imposed them. This study can also be used by investors because it indicates the type of sector, the location, the type of sanction, and the timing that generate higher abnormal rates of return on stock prices than the local benchmark. This is useful for building a portfolio. It can show which companies can generate abnormal rates of return as an effect of closing sanctions.

The presented study also has some limitations. In the future, it should be rebuilt using other sanctions. The interesting results will also give a comparison of the effects on the rates of return on stock prices between particular sectors. This study can also be extended to other sanctions presented by, for example, the United States of America. It will also be useful to analyze the average to verify the impact of the mentioned sanctions on the generation of abnormal rates of return compared to the average value before the war.

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Appendix 1. Countries' classification according to being neighbors of Russia and Ukraine, continents, European and non-European countries and countries according to the level of economic development.

| Country | No companies | Continent | Neighbourhood | Europe | Level of development |
|---|---|---|---|---|---|
| Anguilla | 3 | Latin America | No | No | Middle income |
| Antigua and Barbuda | 1 | Latin America | No | No | High income |
| Argentina | 95 | Latin America | No | No | Middle income |
| Armenia | 9 | Europe | No | Yes | Middle income |
| Australia | 2179 | Australia & Pacific | No | No | High income |
| Austria | 173 | Europe | No | Yes | High income |
| Azerbaijan | 1 | Asia | No | No | Middle income |
| Bahamas | 4 | Latin America | No | No | High income |
| Bahrain | 42 | Middle East | No | No | High income |
| Bangladesh | 365 | Asia | No | No | Middle income |
| Barbados | 14 | Latin America | No | No | High income |
| Belgium | 413 | Europe | No | Yes | High income |
| Belize | 3 | Latin America | No | No | Middle income |
| Benin | 1 | Africa | No | No | Middle income |
| Bermuda | 81 | North America | No | No | High income |
| Bolivia | 47 | Latin America | No | No | Middle income |
| Bosnia and Herzegovina | 644 | Europe | No | Yes | Middle income |
| Botswana | 24 | Africa | No | No | Middle income |
| Brazil | 571 | Latin America | No | No | Middle income |
| Brunei Darussalam | 1 | Australia & Pacific | No | No | High income |
| Bulgaria | 312 | Europe | No | Yes | Middle income |
| Burkina Faso | 3 | Africa | No | No | Low income |
| Cambodia | 1 | Africa | No | No | Middle income |
| Canada | 4276 | North America | No | No | High income |
| Cayman Islands | 100 | Latin America | No | No | High income |
| Chile | 195 | Latin America | No | No | High income |
| China | 6511 | Asia | No | No | Middle income |
| Colombia | 68 | Latin America | No | No | Middle income |
| Costa Rica | 8 | Latin America | No | No | Middle income |
| Croatia | 95 | Europe | No | Yes | High income |
| Curacao | 2 | Latin America | No | No | High income |
| Cyprus | 140 | Europe | No | Yes | High income |
| Czech Republic | 26 | Europe | No | Yes | High income |
| Democratic Republic of the Congo | 1 | Africa | No | No | Middle income |

| | | | | | |
|---|---|---|---|---|---|
| Denmark | 497 | Europe | No | Yes | High income |
| Dominican Republic | 2 | Latin America | No | No | Middle income |
| Ecuador | 55 | Latin America | No | No | Middle income |
| Egypt | 261 | Africa | No | No | Middle income |
| El Salvador | 1 | Latin America | No | No | Middle income |
| Estonia | 44 | Europe | Yes | Yes | High income |
| Falkland Islands | 1 | Latin America | No | No | Middle income |
| Faroe Islands | 4 | Europe | No | Yes | High income |
| Finland | 661 | Europe | Yes | Yes | High income |
| France | 2372 | Europe | No | Yes | High income |
| French Guiana | 2 | Latin America | No | No | Middle income |
| Gabon | 1 | Africa | No | No | Middle income |
| Georgia | 1 | Europe | Yes | Yes | Middle income |
| Germany | 2005 | Europe | No | Yes | High income |
| Ghana | 38 | Africa | No | No | Middle income |
| Gibraltar | 9 | Europe | No | Yes | High income |
| Greece | 452 | Europe | No | Yes | High income |
| Greenland | 1 | Europe | No | Yes | High income |
| Guadeloupe | 1 | Latin America | No | No | High income |
| Guam | 1 | Australia & Pacific | No | No | High income |
| Guernsey | 33 | Europe | No | Yes | High income |
| Hong Kong | 1582 | Asia | No | No | High income |
| Hungary | 69 | Europe | Yes | Yes | High income |
| Iceland | 29 | Europe | No | Yes | High income |
| India | 5338 | Asia | No | No | Middle income |
| Indonesia | 857 | Australia & Pacific | No | No | Middle income |
| Iraq | 107 | Middle East | No | No | Middle income |
| Ireland; Republic of | 198 | Europe | No | Yes | High income |
| Isle of Man | 19 | Europe | No | Yes | High income |
| Israel | 681 | Middle East | No | No | High income |
| Italy | 713 | Europe | No | Yes | High income |
| Ivory Coast | 38 | Africa | No | No | Middle income |
| Jamaica | 85 | Latin America | No | No | Middle income |
| Japan | 4050 | Asia | No | No | High income |
| Jersey | 372 | Europe | No | Yes | High income |
| Jordan | 183 | Middle East | No | No | Middle income |
| Kazakhstan | 88 | Asia | No | No | Middle income |

| | | | | | |
|---|---|---|---|---|---|
| Kenya | 63 | Africa | No | No | Middle income |
| Korea; Republic (S. Korea) | 2635 | Asia | No | No | High income |
| Kuwait | 148 | Middle East | No | No | High income |
| Kyrgyzstan | 1 | Asia | No | No | Middle income |
| Laos | 11 | Asia | No | No | Middle income |
| Latvia | 11 | Europe | Yes | Yes | High income |
| Lebanon | 9 | Africa | No | No | Middle income |
| Liechtenstein | 2 | Europe | No | Yes | High income |
| Lithuania | 31 | Europe | Yes | Yes | High income |
| Luxembourg | 150 | Europe | No | Yes | High income |
| Macau | 21 | Asia | No | No | Middle income |
| Macedonia | 153 | Europe | No | Yes | Middle income |
| Malawi | 16 | Africa | No | No | Low income |
| Malaysia | 1096 | Asia | No | No | Middle income |
| Mali | 1 | Africa | No | No | Low income |
| Malta | 52 | Europe | No | Yes | High income |
| Marshall Islands | 1 | Australia & Pacific | No | No | Middle income |
| Martinique | 1 | Latin America | No | No | Middle income |
| Mauritius | 97 | Africa | No | No | Middle income |
| Mexico | 174 | Latin America | No | No | Middle income |
| Monaco | 23 | Europe | No | Yes | High income |
| Mongolia | 165 | Asia | No | No | Middle income |
| Morocco | 75 | Africa | No | No | Middle income |
| Myanmar; formerly Burma | 2 | Asia | No | No | Middle income |
| Namibia | 16 | Africa | No | No | Middle income |
| Netherlands | 444 | Europe | No | Yes | High income |
| New Zealand | 161 | Australia & Pacific | No | No | High income |
| Nicaragua | 1 | Latin America | No | No | Middle income |
| Niger | 1 | Africa | No | No | Low income |
| Nigeria | 188 | Africa | No | No | Middle income |
| Norway | 472 | Europe | Yes | Yes | High income |
| Oman | 117 | Middle East | No | No | High income |
| Pakistan | 531 | Asia | No | No | Middle income |
| Palestine | 48 | Middle East | No | No | Middle income |
| Panama | 20 | Latin America | No | No | High income |
| Papua New Guinea | 4 | Australia & Pacific | No | No | Middle income |
| Peru | 180 | Latin America | No | No | Middle income |

| | | | | | |
|---|---|---|---|---|---|
| Philippines | 287 | Australia & Pacific | No | No | Middle income |
| Poland | 1203 | Europe | Yes | Yes | High income |
| Portugal | 138 | Europe | No | Yes | High income |
| Puerto Rico | 12 | Latin America | No | No | High income |
| Qatar | 50 | Middle East | No | No | High income |
| Republic of Montenegro | 281 | Europe | No | Yes | Middle income |
| Republic of Serbia | 346 | Europe | No | Yes | Middle income |
| Reunion | 3 | Africa | No | No | Middle income |
| Romania | 415 | Europe | Yes | Yes | High income |
| Russia | 1100 | Europe | Yes | Yes | Middle income |
| Rwanda | 5 | Africa | No | No | Low income |
| Saint Lucia | 2 | Latin America | No | No | Middle income |
| Saudi Arabia | 278 | Middle East | No | No | High income |
| Senegal | 4 | Africa | No | No | Middle income |
| Singapore | 686 | Asia | No | No | High income |
| Sint Maarten | 1 | Latin America | No | No | High income |
| Slovak Republic | 70 | Europe | Yes | Yes | High income |
| Slovenia | 113 | Europe | No | Yes | High income |
| South Africa | 330 | Africa | No | No | Middle income |
| Spain | 921 | Europe | No | Yes | High income |
| Sri Lanka | 283 | Asia | No | No | Middle income |
| Sudan | 2 | Africa | No | No | Low income |
| Sweden | 5168 | Europe | No | Yes | High income |
| Switzerland | 789 | Europe | No | Yes | High income |
| Syria | 27 | Middle East | No | No | Middle income |
| Taiwan | 2056 | Asia | No | No | High income |
| Tanzania | 24 | Africa | No | No | Middle income |
| Thailand | 900 | Australia & Pacific | No | No | Middle income |
| Togo | 3 | Africa | No | No | Low income |
| Trinidad and Tobago | 26 | Latin America | No | No | High income |
| Tunisia | 86 | Africa | No | No | Middle income |
| Turkey | 495 | Europe | No | Yes | Middle income |
| Turks and Caicos Islands | 1 | Latin America | No | No | High income |
| Uganda | 10 | Africa | No | No | Low income |
| Ukraine | 87 | Europe | Yes | Yes | Middle income |
| United Arab Emirates | 160 | Middle East | No | No | High income |
| United Kingdom | 2375 | Europe | No | Yes | High income |

| | | | | | |
|---|---|---|---|---|---|
| United States of America | 11837 | North America | No | No | High income |
| Uruguay | 3 | Latin America | No | No | High income |
| Venezuela | 32 | Latin America | No | No | Middle income |
| Vietnam | 1605 | Asia | No | No | Middle income |
| Virgin Islands; British | 26 | Latin America | No | No | High income |
| Virgin Islands; United States | 1 | Latin America | No | No | High income |
| Zambia | 25 | Africa | No | No | Low income |
| Zimbabwe | 59 | Africa | No | No | Middle income |

Source: own elaboration.

Appendix 2. Companies' classification according to sector.

| Subsector name | Subsector name II | Sector name |
|---|---|---|
| Advanced Medical Equipment & Technology | Healthcare Services & Equipment | Healthcare |
| Advertising & Marketing | Cyclical Consumer Services | Consumer Cyclicals |
| Aerospace & Defense | Industrial Goods | Industrials |
| Agricultural Chemicals | Chemicals | Basic Materials |
| Airlines | Transportation | Industrials |
| Airport Operators & Services | Transportation | Industrials |
| Aluminum | Mineral Resources | Basic Materials |
| Apparel & Accessories | Cyclical Consumer Products | Consumer Cyclicals |
| Apparel & Accessories Retailers | Retailers | Consumer Cyclicals |
| Appliances, Tools & Housewares | Cyclical Consumer Products | Consumer Cyclicals |
| Auto & Truck Manufacturers | Automobiles & Auto Parts | Consumer Cyclicals |
| Auto Vehicles, Parts & Service Retailers | Retailers | Consumer Cyclicals |
| Auto, Truck & Motorcycle Parts | Automobiles & Auto Parts | Consumer Cyclicals |
| Banks | Banking & Investment Services | Financials |
| Biotechnology & Medical Research | Pharmaceuticals & Medical Research | Healthcare |
| Blockchain & Cryptocurrency | Financial Technology (Fintech) & Infrastructure | Technology |
| Brewers | Food & Beverages | Consumer Non-Cyclicals |
| Broadcasting | Cyclical Consumer Services | Consumer Cyclicals |
| Business Support Services | Industrial & Commercial Services | Industrials |
| Business Support Supplies | Industrial & Commercial Services | Industrials |
| Casinos & Gaming | Cyclical Consumer Services | Consumer Cyclicals |
| Closed End Funds | Collective Investments | Financials |
| Coal | Energy - Fossil Fuels | Energy |

| | | |
|---|---|---|
| Commercial Printing Services | Industrial & Commercial Services | Industrials |
| Commercial REITs | Real Estate | Real Estate |
| Commodity Chemicals | Chemicals | Basic Materials |
| Communications & Networking | Technology Equipment | Technology |
| Computer & Electronics Retailers | Retailers | Consumer Cyclicals |
| Computer Hardware | Technology Equipment | Technology |
| Construction & Engineering | Industrial & Commercial Services | Industrials |
| Construction Materials | Mineral Resources | Basic Materials |
| Construction Supplies & Fixtures | Cyclical Consumer Products | Consumer Cyclicals |
| Consumer Goods Conglomerates | Consumer Goods Conglomerates | Consumer Non-Cyclicals |
| Consumer Lending | Banking & Investment Services | Financials |
| Consumer Publishing | Cyclical Consumer Services | Consumer Cyclicals |
| Corporate Financial Services | Banking & Investment Services | Financials |
| Courier, Postal, Air Freight & Land-based Logistics | Transportation | Industrials |
| Department Stores | Retailers | Consumer Cyclicals |
| Discount Stores | Retailers | Consumer Cyclicals |
| Distillers & Wineries | Food & Beverages | Consumer Non-Cyclicals |
| Diversified Chemicals | Chemicals | Basic Materials |
| Diversified Industrial Goods Wholesale | Industrial & Commercial Services | Industrials |
| Diversified Investment Services | Banking & Investment Services | Financials |
| Diversified Mining | Mineral Resources | Basic Materials |
| Diversified REITs | Real Estate | Real Estate |
| Drug Retailers | Food & Drug Retailing | Consumer Non-Cyclicals |
| Electric Utilities | Utilities | Utilities |
| Electrical Components & Equipment | Industrial Goods | Industrials |
| Electronic Equipment & Parts | Technology Equipment | Technology |
| Employment Services | Industrial & Commercial Services | Industrials |
| Entertainment Production | Cyclical Consumer Services | Consumer Cyclicals |
| Environmental Services & Equipment | Industrial & Commercial Services | Industrials |
| Financial & Commodity Market Operators & Service Providers | Banking & Investment Services | Financials |
| Financial Technology (Fintech) | Financial Technology (Fintech) & Infrastructure | Technology |
| Fishing & Farming | Food & Beverages | Consumer Non-Cyclicals |
| Food Processing | Food & Beverages | Consumer Non-Cyclicals |
| Food Retail & Distribution | Food & Drug Retailing | Consumer Non-Cyclicals |
| Footwear | Cyclical Consumer Products | Consumer Cyclicals |
| Forest & Wood Products | Applied Resources | Basic Materials |
| Gold | Mineral Resources | Basic Materials |

| | | |
|---|---|---|
| Government & Government Finance | Government Activity | Government Activity |
| Ground Freight & Logistics | Transportation | Industrials |
| Healthcare Facilities & Services | Healthcare Services & Equipment | Healthcare |
| Heavy Electrical Equipment | Industrial Goods | Industrials |
| Heavy Machinery & Vehicles | Industrial Goods | Industrials |
| Highways & Rail Tracks | Transportation | Industrials |
| Home Furnishings | Cyclical Consumer Products | Consumer Cyclicals |
| Home Furnishings Retailers | Retailers | Consumer Cyclicals |
| Home Improvement Products & Services Retailers | Retailers | Consumer Cyclicals |
| Homebuilding | Cyclical Consumer Products | Consumer Cyclicals |
| Hotels, Motels & Cruise Lines | Cyclical Consumer Services | Consumer Cyclicals |
| Household Electronics | Technology Equipment | Technology |
| Household Products | Personal & Household Products & Services | Consumer Non-Cyclicals |
| Independent Power Producers | Utilities | Utilities |
| Industrial Machinery & Equipment | Industrial Goods | Industrials |
| Integrated Hardware & Software | Technology Equipment | Technology |
| Integrated Oil & Gas | Energy - Fossil Fuels | Energy |
| Integrated Telecommunications Services | Telecommunications Services | Technology |
| Investment Banking & Brokerage Services | Banking & Investment Services | Financials |
| Investment Holding Companies | Investment Holding Companies | Financials |
| Investment Management & Fund Operators | Banking & Investment Services | Financials |
| Iron & Steel | Mineral Resources | Basic Materials |
| IT Services & Consulting | Software & IT Services | Technology |
| Legal & Safety Public Services | Government Activity | Government Activity |
| Leisure & Recreation | Cyclical Consumer Services | Consumer Cyclicals |
| Life & Health Insurance | Insurance | Financials |
| Marine Freight & Logistics | Transportation | Industrials |
| Marine Port Services | Transportation | Industrials |
| Medical Equipment, Supplies & Distribution | Healthcare Services & Equipment | Healthcare |
| Mining Support Services & Equipment | Mineral Resources | Basic Materials |
| Miscellaneous Educational Service Providers | Academic & Educational Services | Academic & Educational Services |
| Miscellaneous Fintech Infrastructure | Financial Technology (Fintech) & Infrastructure | Technology |
| Miscellaneous Specialty Retailers | Retailers | Consumer Cyclicals |
| Multiline Insurance & Brokers | Insurance | Financials |
| Multiline Utilities | Utilities | Utilities |
| Mutual Funds | Collective Investments | Financials |
| Natural Gas Utilities | Utilities | Utilities |

| | | |
|---|---|---|
| Non-Alcoholic Beverages | Food & Beverages | Consumer Non-Cyclicals |
| Non-Gold Precious Metals & Minerals | Mineral Resources | Basic Materials |
| Non-Paper Containers & Packaging | Applied Resources | Basic Materials |
| NULL | NULL | NULL |
| Office Equipment | Technology Equipment | Technology |
| Oil & Gas Drilling | Energy - Fossil Fuels | Energy |
| Oil & Gas Exploration and Production | Energy - Fossil Fuels | Energy |
| Oil & Gas Refining and Marketing | Energy - Fossil Fuels | Energy |
| Oil & Gas Transportation Services | Energy - Fossil Fuels | Energy |
| Oil Related Services and Equipment | Energy - Fossil Fuels | Energy |
| Online Services | Software & IT Services | Technology |
| Paper Packaging | Applied Resources | Basic Materials |
| Paper Products | Applied Resources | Basic Materials |
| Passenger Transportation, Ground & Sea | Transportation | Industrials |
| Personal Products | Personal & Household Products & Services | Consumer Non-Cyclicals |
| Personal Services | Personal & Household Products & Services | Consumer Non-Cyclicals |
| Pharmaceuticals | Pharmaceuticals & Medical Research | Healthcare |
| Phones & Handheld Devices | Technology Equipment | Technology |
| Professional & Business Education | Academic & Educational Services | Academic & Educational Services |
| Professional Information Services | Industrial & Commercial Services | Industrials |
| Property & Casualty Insurance | Insurance | Financials |
| Real Estate Rental, Development & Operations | Real Estate | Real Estate |
| Real Estate Services | Real Estate | Real Estate |
| Recreational Products | Cyclical Consumer Products | Consumer Cyclicals |
| Reinsurance | Insurance | Financials |
| Renewable Energy Equipment & Services | Renewable Energy | Energy |
| Renewable Fuels | Renewable Energy | Energy |
| Residential REITs | Real Estate | Real Estate |
| Restaurants & Bars | Cyclical Consumer Services | Consumer Cyclicals |
| Schools, Colleges & Universities | Academic & Educational Services | Academic & Educational Services |
| Semiconductor Equipment & Testing | Technology Equipment | Technology |
| Semiconductors | Technology Equipment | Technology |
| Shipbuilding | Industrial Goods | Industrials |
| Software | Software & IT Services | Technology |
| Specialized REITs | Real Estate | Real Estate |
| Specialty Chemicals | Chemicals | Basic Materials |
| Specialty Mining & Metals | Mineral Resources | Basic Materials |

| | | |
|---|---|---|
| Textiles & Leather Goods | Cyclical Consumer Products | Consumer Cyclicals |
| Tires & Rubber Products | Automobiles & Auto Parts | Consumer Cyclicals |
| Tobacco | Food & Beverages | Consumer Non-Cyclicals |
| Toys & Children's Products | Cyclical Consumer Products | Consumer Cyclicals |
| UK Investment Trusts | Collective Investments | Financials |
| Uranium | Uranium | Energy |
| Water & Related Utilities | Utilities | Utilities |
| Wireless Telecommunications Services | Telecommunications Services | Technology |

Source: own elaboration.

Appendix 3. Number of companies according to sector.

| Subsector name | No companies |
|---|---|
| Advanced Medical Equipment & Technology | 997 |
| Advertising & Marketing | 667 |
| Aerospace & Defense | 594 |
| Agricultural Chemicals | 375 |
| Airlines | 222 |
| Airport Operators & Services | 106 |
| Aluminum | 229 |
| Apparel & Accessories | 888 |
| Apparel & Accessories Retailers | 369 |
| Appliances, Tools & Housewares | 347 |
| Auto & Truck Manufacturers | 387 |
| Auto Vehicles, Parts & Service Retailers | 264 |
| Auto, Truck & Motorcycle Parts | 1000 |
| Banks | 885 |
| Biotechnology & Medical Research | 2421 |
| Blockchain & Cryptocurrency | 145 |
| Brewers | 178 |
| Broadcasting | 331 |
| Business Support Services | 1954 |
| Business Support Supplies | 185 |
| Casinos & Gaming | 278 |
| Civic & Social Organizations | 1 |
| Closed End Funds | 225 |
| Coal | 258 |
| Commercial Printing Services | 175 |
| Commercial REITs | 1047 |
| Commodity Chemicals | 1240 |
| Communications & Networking | 893 |
| Computer & Electronics Retailers | 186 |
| Computer Hardware | 429 |
| Construction & Engineering | 2474 |
| Construction Materials | 824 |
| Construction Supplies & Fixtures | 713 |
| Consumer Goods Conglomerates | 255 |
| Consumer Lending | 398 |
| Consumer Publishing | 401 |
| Corporate Financial Services | 467 |
| Courier, Postal, Air Freight & Land-based Logistics | 324 |
| Department Stores | 374 |
| Discount Stores | 58 |
| Distillers & Wineries | 290 |
| Diversified Chemicals | 165 |
| Diversified Industrial Goods Wholesale | 146 |
| Diversified Investment Services | 113 |
| Diversified Mining | 1198 |
| Diversified REITs | 309 |
| Drug Retailers | 183 |
| Electric Utilities | 1179 |
| Electrical Components & Equipment | 1689 |
| Electronic Equipment & Parts | 912 |
| Employment Services | 266 |
| Entertainment Production | 523 |
| Environmental Organizations | 2 |
| Environmental Services & Equipment | 701 |
| Financial & Commodity Market Operators & Service Providers | 89 |

| | |
|---|---|
| Financial Technology (Fintech) | 265 |
| Fishing & Farming | 958 |
| Food Processing | 2160 |
| Food Retail & Distribution | 663 |
| Footwear | 143 |
| Forest & Wood Products | 245 |
| Gold | 871 |
| Government & Government Finance | 8 |
| Government Administration Activities | 1 |
| Ground Freight & Logistics | 331 |
| Healthcare Facilities & Services | 877 |
| Heavy Electrical Equipment | 322 |
| Heavy Machinery & Vehicles | 492 |
| Highways & Rail Tracks | 102 |
| Home Furnishings | 259 |
| Home Furnishings Retailers | 167 |
| Home Improvement Products & Services Retailers | 151 |
| Homebuilding | 317 |
| Hotels, Motels & Cruise Lines | 715 |
| Household Electronics | 201 |
| Household Products | 95 |
| Independent Power Producers | 209 |
| Industrial Machinery & Equipment | 2163 |
| Insurance Funds | 1 |
| Integrated Hardware & Software | 75 |
| Integrated Oil & Gas | 169 |
| Integrated Telecommunications Services | 674 |
| Investment Banking & Brokerage Services | 621 |
| Investment Holding Companies | 586 |
| Investment Management & Fund Operators | 624 |
| Iron & Steel | 1181 |
| IT Services & Consulting | 2095 |
| Legal & Safety Public Services | 2 |
| Leisure & Recreation | 620 |
| Life & Health Insurance | 124 |
| Managed Healthcare | 23 |
| Marine Freight & Logistics | 374 |
| Marine Port Services | 192 |
| Medical Equipment, Supplies & Distribution | 1251 |
| Mining Support Services & Equipment | 173 |
| Miscellaneous Educational Service Providers | 167 |
| Miscellaneous Fintech Infrastructure | 17 |
| Miscellaneous Specialty Retailers | 336 |
| Multiline Insurance & Brokers | 203 |
| Multiline Utilities | 200 |
| Mutual Funds | 27 |
| National Security & International Affairs | 1 |
| Natural Gas Utilities | 214 |
| Non-Alcoholic Beverages | 198 |
| Non-Gold Precious Metals & Minerals | 291 |
| Non-Paper Containers & Packaging | 446 |
| NULL | 1110 |
| Office Equipment | 173 |
| Oil & Gas Drilling | 101 |
| Oil & Gas Exploration and Production | 1008 |
| Oil & Gas Refining and Marketing | 529 |
| Oil & Gas Transportation Services | 205 |
| Oil Related Services and Equipment | 433 |

| | |
|---|---|
| Online Services | 1161 |
| Paper Packaging | 226 |
| Paper Products | 324 |
| Passenger Transportation, Ground & Sea | 257 |
| Pension Funds | 2 |
| Personal Products | 407 |
| Personal Services | 195 |
| Pharmaceuticals | 2300 |
| Phones & Handheld Devices | 119 |
| Professional & Business Education | 97 |
| Professional Information Services | 159 |
| Property & Casualty Insurance | 210 |
| Real Estate Rental, Development & Operations | 3008 |
| Real Estate Services | 372 |
| Recreational Products | 514 |
| Reinsurance | 32 |
| Renewable Energy Equipment & Services | 472 |
| Renewable Fuels | 190 |
| Residential REITs | 237 |
| Restaurants & Bars | 545 |
| Schools, Colleges & Universities | 45 |
| Semiconductor Equipment & Testing | 377 |
| Semiconductors | 1018 |
| Shipbuilding | 105 |
| Software | 2552 |
| Specialized REITs | 526 |
| Specialty Chemicals | 636 |
| Specialty Mining & Metals | 851 |
| Textiles & Leather Goods | 1012 |
| Tires & Rubber Products | 265 |
| Tobacco | 138 |
| Toys & Children's Products | 172 |
| UK Investment Trusts | 9 |
| Uranium | 99 |
| Water & Related Utilities | 273 |
| Wireless Telecommunications Services | 313 |

Source: own elaboration.