

A Work Project, presented as part of the requirements for the Award of a Master's degree
in International Finance from the Nova School of Business and Economics.

THE IMPACT OF THE RUSSO-UKRAINIAN CONFLICT ON
THE AUSTRIAN STOCK MARKET

ALEXANDRA LUPINEK

Work project carried out under the supervision of:

Virginia Gianinazzi

January 2024

THE IMPACT OF THE RUSSO-UKRAINIAN CONFLICT ON
THE AUSTRIAN STOCK MARKET *

Alexandra Lupinek

January 2024

ABSTRACT

This study examines Austria's stock market reaction to the Russo-Ukrainian war using an event study approach. First, Austria experienced higher negative abnormal returns (ARs) compared to its non-NATO European counterparts. On the country level, the analysis of ARs before and after Russia's invasion of Ukraine also delivered significant negative results. The analysis on an industry level highlights that the financial sector suffered the most from the outbreak of the war. The firm-specific cross-sectional examination indicates mixed results, with large corporates and highly rentable firms recording statistically significant negative and positive reactions, respectively, after February 24, 2022 – the event day.

Keywords: Russo-Ukrainian Conflict, Event Study, Crisis, War, Stock Market Return

***Acknowledgements**

Throughout the writing of my work project, I have received a great deal of assistance.

First and foremost, I would like to thank my supervisor, Ms. Virginia Gianinazzi for advising me on the topic selection and for providing insightful research expertise.

Furthermore, I would like to express my gratitude to my tennis colleagues for sharing valuable feedback from their experience with their theses.

Finally, I would like to acknowledge my family, for being always very supportive, and my friends, who were crucial during my academic path.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

1 INTRODUCTION

1.1 The Russo-Ukrainian War

Ukraine experienced centuries of changing borders through war over land and power (Riabchuk 2016). After the collapse of the Soviet Union in the 1990s, democratic optimism gained foothold. Ukraine emerged as one of the newly formed nations; since its first election in 1991, it became globally recognized as an independent country (Dyczok 1994). However, the first 20 years of independence left Ukraine in a status of unfinished transition and degradation, without a national idea or common identity, and a divided society marked by dissatisfaction and inertia (Korostelina 2013), consequently making it prone to conflict. The main events of Ukraine's arduous attempts to establish its independence can be seen in Figure 1. In the aftermath, one fundamental dividing line between pro-Russians and pro-Europeans drove Ukraine's politics further apart. In 2013, Viktor Yanukovich, the pro-Russian president at that time, decided against signing the association agreement with the European Union (EU), leading to protests that culminated in a mass demonstration on Maidan Nezalezhnosti in Kyiv (Onuch and Sasse 2016). After having been deposed from his office, a transitional government followed, giving Vladimir Putin a cue to act. After a questionable referendum and the occupation of the Crimean Peninsula by Russian soldiers, Russia annexed Crimea on March 18, 2014. From this date onwards, discrepancies in attitudes, especially around identity, and political participation, between Eastern and Western regions kept building up (Kulyk 2016; Onuch and Sasse 2016). Since spring 2021, there has been a massive build-up of Russian troops along the Ukrainian border. The aggregating events leading up to the beginning of the war are shown in Figure 2. On February 24, 2022, Vladimir Putin launched a large-scale military offensive in Ukraine. This marks the start of the Russo-Ukrainian war that continues to date (Figure 3). The Russo-Ukrainian conflict has led to growing international tensions (Shen and Hong 2023) and shows substantial repercussions on financial markets (Boubaker et al. 2023).

1.2 The Austrian Financial Market

Financial markets are the driving force behind economic growth ([Bassanini and Scarpetta 2003](#)). The Austrian financial market is crucial for the country's economic prospects. Due to Austria's geographic location and strong international economic ties, it also holds substantial importance internationally, particularly in the Central and Eastern European (CEE) region ([OENB 2023](#)). These ties make it of great interest to analyze how the country's capital market has been impacted by the Russo-Ukrainian war.

The capital market in Austria is primarily facilitated through the Vienna Stock Exchange (VSE) acting as a conduit for capital flows within and across borders contributing to the broader financial ecosystem ([Beck, Levine, and Loayza 2000](#)). The Austrian Traded Index (ATX) constitutes the primary Austrian share index, displaying the price development of the 20 largest and most liquid Austrian Blue-Chip firms. The focus of this study, however, will be the Wiener Börse Index (WBI), the overall market index that currently covers a total of 60 companies that are listed on the Official Market of the VSE and, therefore, better reflects the development of the entire Austrian stock market ([VSE 2023](#)). Unlike the widely adapted stock classification systems, such as the Global Industry Classification Standard (GICS) or Industry Classification Benchmark (ICB), the VSE differentiates eight industry sectors with 36 subsectors. A list of all companies captured by the WBI by industry allocation, as well as an overview of the industry composition, are displayed in [Table 1](#), [Table 2](#) and [Figure 4](#).

Regarding the Russo-Ukrainian war, initial studies have been conducted in order to analyze the conflict's various effects on international financial markets. This study contributes to the existing literature by analyzing how the economics of Austria as a developed, neutral, and non-aligned European state with strong ties to CEE countries has been affected by the Russo-Ukrainian war.

1.3 Austria's Ties with Russia and Ukraine

1.3.1 Historical Background

Political, cultural, and economic interactions have shaped the historical relationship of Austria with Russia and Ukraine. All newly formed states that emerged from the disintegration of the Habsburg Monarchy after World War I in 1918, including Austria, Ukraine and the Soviet Union, had to deal with complex issues of independence, territorial claims and political identities (Gerwarth and Ungor 2015). Due to political instability, internal conflicts, and economic difficulties, Ukraine lost its sovereignty again in 1920 and got incorporated into the Soviet Union (Himka 1994). During the Cold War (1947-1991) relations were shaped by geopolitical tensions between the ideological blocs of the West and the East (Bischof and Karlhofer 2013). Austria itself became formally sovereign and neutral when it signed its State Treaty in 1955 and committed itself not to become involved in any military alliances (Stourzh 1982). However, Austria served as an essential transit route for refugees and emigrants during the Cold War. Further, Austria's geographical proximity to the Iron Curtain indirectly influenced its relationship with the Soviet Union, causing economic ties with Eastern European countries to build up slowly (Kubijovič 1984). Since Ukraine's independence in 1991, Austria has supported Ukraine in its rapprochement with the EU and advocated for its sovereignty; diplomatic relations and economic cooperations have intensified. Diplomatic contacts and trade relations with Russia have also strengthened (Bischof and Karlhofer 2013), making it to one of Austria's most important trading partners, continuing to date (OENB 2023).

1.3.2 Economic Relations

1.3.2.1 Russia

While most countries have tried to reduce foreign trade relations since the beginning of the war, Austria is still a major player in the Russian market, particularly in the energy and financial sector (Hilpert 2023). The bilateral foreign trade between Austria and Russia increased by

+51.30% to EUR 10.09bn (in 2022) – primarily due to the increase of Austrian imports of fossil fuels from Russia. Austria's foreign trade deficit rose sharply by +140.00% in 2022. In the first half of 2023, however, the effects of sanctions became evident. Trade with Russia slumped by -37.10% to EUR 2.35bn, and the trade deficit decreased by -43.70% to EUR 1.37bn ([AußenwirtschaftsCenter Moskau 2023](#)). Still to date, many Austrian companies hold a strong presence in Russia, particularly in the financial and energy sector. To be precise, financial institutions have a strong presence in CEE. For instance, Raiffeisen Bank International (RBI) has been one of the most successful banks on the Russian financial market. Since Russia invaded Ukraine, nothing has changed. On the contrary, in 2022, RBI recorded an all-time profit of EUR 3.60bn. Moreover, Austria's energy dependency on Russia is enormous. Due to the existing 50-year-old cooperation between the energy companies "Gazprom" and "OMV", Austria has limited intentions of letting go of Russia as a gas and oil supplier ([Hilpert 2023](#)). While other European nations cut their dependence on Russian gas by more than half in 2022 to 19.00%, Austria still purchased 60.00% of its gas from Russia, compared to 80.00% at the pre-invasion level ([Karnitschnig 2023](#)).

Due to Austria's heavy dependence on Russia, its stock market may have been affected more intensely than other countries. This research, therefore, also serves as a reference for Austrian companies and policymakers to evaluate the reasonability of the country's reliance on the Russian Federation.

1.3.2.2 Ukraine

Economic linkages between Austria and Ukraine have increased in recent years; however, with an import share of 0.60% (EUR 1.18bn) and an export share of 0.30% (EUR 0.50bn), Austria's dependence on the Ukrainian economy is limited compared to other trading partners ([Statistik Austria 2022](#)). Active FDI leveled at EUR 615.00mn in 2022 (-28.15%); passive FDI has not been reported ([OENB 2023](#)).

2 LITERATURE REVIEW

2.1 Conflicts and Wars affecting Financial Markets' Performance

Though academic interest in evaluating implications of black swan events such as natural disasters (Czura and Klonner 2023), financial crises (Claessens, Kose, and Terrones 2010) or terrorist attacks (Ahmad et al. 2022) on financial markets has been flourishing recently, the scientific evidence of military operations and their effects on financial markets is still relatively scarce. In a systematic literature review, Pandey, Lucey, and Kumar (2023) display the current state of contributions focusing on border disputes, conflicts, and wars affecting financial markets.

Concerning common stock market reactions, Hudson and Urquhart (2014) report a negative impact on the British stock market during World War II, so do Bradford and Robison (1997) when analyzing the Iraqi invasion of Kuwait. Schneider and Troeger (2006) contrast the Israel-Palestinian conflict, the US alliance led against Iraq, and the Ex-Yugoslavian wars. They assert that stock markets' reactions are largely dependent on the severity of an anticipated event and the collective expectation to what extent it will materialize.

In 2004, Chen and Siems concluded that capital markets tended to become more resilient to military attacks throughout history. A huge body of current literature, however, shows that networks of financial markets evolve during crises (Kumari, Kumar, and Kumar Pandey 2023; Boubaker, Jouini, and Lahiani 2016). The rising number of financial products, the increased technology deployment, and complicated dynamics amongst various markets have increased the complexity of financial markets, making them more vulnerable and a single conflict's effects attribution less detachable. Multiple studies have researched the intricacy of financial markets, showcasing the diverse reactions in times of crisis (Aswani 2017; Zhang and Sun 2023; Wu 2020; Tabak, Dalla Riva e Silva, and Silva 2022). Jacobs (2016) adds that market reactions are not always driven by rational calculations based on risk and return; various

cognitive biases, emotions, cultural and social factors influencing investors' decisions exacerbate the complexity of financial markets.

That is why, to understand the exact implications, it is crucial to perform thorough analyses for each event on a standalone basis; this also applies to the Russo-Ukrainian conflict.

2.2 The Russo-Ukrainian War and its Impact on Financial Markets

The Russo-Ukrainian war is a relatively recent event for which only limited research has been conducted. Indeed, the conflict between Russia and Ukraine has been prevalent for almost a decade; nonetheless, Russia's invasion of Ukraine intensified uncertainty for economic, financial and geopolitical conditions on a global scale (Kumari, Kumar, and Kumar Pandey 2023). Literature shows that after Putin launched the "special military operations" on February 24, 2022, financial markets instantly reacted to the escalating geopolitical situation.

Most prevalent studies focus on equity markets' reactions especially around the start of the war. In their event study approach, Yousaf, Patel, and Yarovaya (2022) identify a strong negative impact of Russia's military actions on most of the G20 and other selected stock markets. Boubaker et al. (2022) show that stock market indices of emerging markets were less adversely affected than developed market indices. Kamal, Ahmed, and Hasan (2023) investigate the effect of the Russo-Ukrainian war on the Australian stock market, identifying high-growth, illiquid, and export-oriented firms as being most prone to the conflict, though with varying magnitude across industries.

Furthermore, Lo et al. 2022 identify that commodity markets have significantly reacted to the Russo-Ukrainian conflict. They report that decreasing stock returns and increasing volatility are intensifying with the country's dependence on Russian commodities. Several studies analyze the spill-over effects of rising energy prices on other sectors (Yagi and Managi 2023), explaining the increasing emphasis that policymakers put on energy markets during the conflict. Evidence from institutional investors is still scarce. In a global study, Boubaker et al. (2022)

identify that European banks suffered the most from the war, particularly Russian-listed banks or foreign tiers with high orientation in Russia (Martins, Correia, and Gouveia 2023).

Existing literature does not show precise results of the Russo-Ukrainian war consequences on capital markets but demonstrates high volatility – especially in the energy and financial sector. As Austria’s stock market has a strong orientation towards these industries, and due to Austria's distinct, relatively pro-Russian stance, it is interesting to examine the impact of the conflict on Austria in greater detail.

3 PROBLEM STATEMENT, RELEVANCE AND RESEARCH HYPOTHESES

The focus of this study is on the Austrian stock market. Previous studies analyzed European markets’ reactions to the conflict and identified that the ATX experienced significantly higher negative ARs compared to its European counterparts. Kumari, Kumar, and Kumar Pandey (2023) also highlight that non-NATO nations' stock markets were more adversely impacted than those of NATO nations. Austria has strong ties and interlinkages to CEE, with its economy closely tied to the region and marked by intensive cooperation and collaboration (OENB 2023). Besides, the country finds itself geographically closer to the conflict region than any other non-NATO member state. Therefore, I first and foremost hypothesize the following:

[H1] Compared to its European non-NATO peers, Austria’s stock market is expected to experience higher negative market reactions during the Russo-Ukrainian conflict.

Continuing, Austria’s firms listed on the VSE majorly fall within the scope of the following sectors – Financials (FI) and Basic Industries (BI) (VSE 2023). Given that Austria is heavily reliant on gas supply from Russia, and the war disrupts global supply chains, the energy sector is expected to experience high volatility. Resulting inflationary scenarios, hiking interest rates and overall deteriorating financial conditions propose that financial institutions likewise experienced a downturn.

[H2] Companies falling within the scope of Financials and Basic Industries are associated with the most considerable losses.

Moreover, investors' decisions on financial markets are not based on pure rationality but are influenced by economic and behavioral arguments (Jacobs 2016). According to the "Uncertainty Theory", a lack of predictability of economic events and political developments can lead to increased fluctuation and volatility in financial markets. The higher the uncertainty, the more cautious and quickly investors react to new information, increasing market volatility (Boubaker et al. 2022). Since the exact effects are difficult to predict, financial markets tend to be more volatile before and at the start of a war event.

[H3] Stock market reaction is associated with being highest at the announcement date of Putin's special military operations and less pronounced after the start of the war.

The corporate landscape of Austria is diverse. Factors such as industry and country exposure, or financial key performance indicators (KPIs) determine the heterogeneity of different reactions of companies regarding the conflict.

[H4] Stock market reaction varies across firm-specific characteristics.

To the best of my knowledge, no study focusing on the reaction of Austria's financial market to the conflict has been conducted. This study, therefore, complements the extant literature demonstrating stock market reactions based on a market and industry-level as well as on firm-specific characteristics. It tackles the critical void by demonstrating war-related actions and their impact on the financial market of Austria.

4 DATA

This paper investigates the effect of the Russo-Ukrainian war on the performance of publicly traded firms listed on the VSE based on the STOXX Europe 600, and the WBI – the overall Austrian market index. The daily stock prices of all 60 companies comprised in the WBI and the indices that are in focus of this study are obtained from the VSE and Yahoo Finance (YF).

Initially, I collected the returns of all companies encompassed in the WBI. However, I only consider the stocks that actively traded during the estimation window, thus limiting the sample to 39 companies. Continuing, due to the lack of price data, I eliminated eight further companies, ending up with a sample size of 31 corporations. Despite the significant reduction in the number of companies, the sample still reflects around 97% of Austria's equity market based on market capitalization of February 24, 2022. For the cross-sectional analysis, KPIs from the balance sheet positions of corporates' financial statements year-end 2021 were derived. Past returns and volatility of past returns are calculated based on the daily stock returns.

5 METHODOLOGY

5.1 Event study, event date, estimation window and event window

These days, a set of literature evaluates the significance of events based on an event study approach (Boubaker, Farag, and Nguyern 2015; Rai, Kumar, and Rai 2021). Hence, this project uses the standard event study method to capture Austria's stock market reaction (Fama et al. 1969). First, a significant event must be determined to perform the event study. Since Russia's president Vladimir Putin officially announced the "special military operations" on February 24, 2022, this date marks the beginning of the conflict and is, therefore, following Boubaker et al. (2022), set as the event date (t). According to Mackinlay (1997), the estimation window could fall within 90 and 250 days. To avoid seasonality, the estimation window is set to 250 days ($t-266$ to $t-16$). The immediate impact of the conflict will become best visible considering a short event window of 13 days ($t-6$ to $t+6$). The reference index WBI experienced an extreme negative fall from February 11, 2022, at EUR 1,566.33 points to EUR 1,440.10 on February 23, 2022. Thus, a 10-day break between the two windows is accounted for in order not to distort results with any information potentially leaking prior to the official start of the war (Figure 5). To test the robustness of results, a shorter estimation window of 90 days ($t-106$ to $t-16$) and an intermediate estimation window of 180 days ($t-196$ to $t-16$) are likewise tested

on the overall market level (included in [Table 3](#) and [Table 4](#)). Additionally, to determine whether financial markets already reacted once the likelihood of the war aggregated and whether short-term effects reversed once the initial shock abated, an extended event window from $t-15$ to $t+15$ days is evaluated on the country level ([Table 5](#)). Further, I only consider trading days in this analysis.

5.1.1 Event Study Approach on the Overall Market Reaction

First, Austria's overall stock market reaction to the Russo-Ukrainian war on a European level – compared to non-NATO members – will be examined. Further, in this study, I follow the OLS market model for the estimation of the expected returns:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} + \varepsilon_{i,t} \quad (1)$$

Where R_{it} is the logarithmic daily return of European stock indices (WBI, MSE, CPR, OMXHLS, OMXSPI, ISEQ) on day (t), and R_{mt} is the logarithmic return of the benchmark index STOXX Europe 600 on day (t).

$$R_{it} = \text{LN}(P_t/P_{t-1}) \quad (2)$$

The parameters of the market model (α and β) are calculated by OLS regression using the defined estimation window of 250 days (90 and 180 days).

In the following, the abnormal returns are derived by comparing the actual daily returns with the estimates of the daily returns given the formula below:

$$AR_{it} = R_{it} - E(R_{it}) \quad (3)$$

Where, AR_{it} constitutes the abnormal return of the index (i) on day (t).

Based on the estimated AR_{it} , the cumulative abnormal returns (CARs) for each index over the event window from $T1$ to $T2$ are derived by aggregating the abnormal returns.

$$CAR_{i, T1-T2} = \sum_{t=T1}^{T2} AR_{it} \quad (4)$$

Next, concerning the analysis on a country level, the same set of calculations and formulas is applied (1-4), regressing the stocks' returns of the selected 31 companies against the

benchmark index's estimation window returns. For this, I defined the WBI as the benchmark index.

The average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) are then calculated by aggregating the abnormal returns of each stock:

$$AAR_{st} = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (5)$$

Where AAR_{st} shows the average abnormal returns on day (t) and N is the number of stocks.

The cumulative average abnormal returns follow the equation below, summing the $AAR_{st,t}$.

$$CAAR_{st, T1 - T2} = \sum_{t=T1}^{T2} AAR_{st,t} \quad (6)$$

Additionally, when regressing the individual stock returns against the market proxy, the event study will be tested following the [Fama and French \(1993\)](#) three-factor model; the FF3 abnormal residual returns are measured following the subsequent regression equation:

$$R_{it} = \alpha + \beta_1 R_{mt} + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{i,t} \quad (7)$$

Where R_{it} is the logarithmic daily return of the individual stocks on day (t), R_{mt} is the logarithmic return of the benchmark index WBI, SMB is the small-minus-big market capitalization factor, and HML is the high-minus-low book-to-value risk factor.

To test whether mean values deviate statistically significantly from each other, a statistical t-test is applied. After testing the returns' distribution for normality (Jarque-Bera, skewness and kurtosis, and additional statistical metrics are summarized in [Table 6](#)) ([Jarque and Bera 1987](#)), I additionally check statistical significance by performing the adjusted standardized cross-section test of [Kolari and Pynnoenen \(2010\)](#) (K&P), and supplement my parametric-tests with the non-parametric Wilcoxon ([1945](#)) signed-rank test (WRank) in case of non-normality.

5.1.2 Event Study on an Industry Level

After clustering all companies following VSE's sector classification, the same set of steps as in the previous chapter is applied, regressing the returns of the companies making up one industry against the WBI, the benchmark index.

5.1.3 Event Study on Firm-Specific Variables

Based on the KPIs drawn and calculated from the financial statements of the relevant firms, tercile portfolios are built upon the following variables: size (total assets), liquidity (current ratio), leverage (leverage ratio), rentability (return on assets) and growth (book-to-market). Based on these portfolios, the same steps and formulas as on the overall market and industry level are pursued following the MM (1-6). The study also serves as a robustness check for the cross-sectional analysis that will be introduced in the next chapter.

5.2 Cross-Sectional Analysis

Further, to derive cross-sectional drivers of abnormal returns, I estimate the following equation using the OLS regression model of the CARs and a few firm-specific variables:

$$\begin{aligned} \text{CAR}_{ij} = & \beta_0 + \beta_1 \ln(\text{size}_{ij}) + \beta_2 \text{BTM}_{ij} + \beta_3 \text{CACL}_{ij} + \beta_4 \text{ROA}_{ij} + \\ & \beta_5 \text{TDTA}_{ij} + \beta_6 \text{EXP}_{ij} + \beta_7 \text{VOL}_{ij} + \beta_8 \text{PAST}_{ij} + \varepsilon_{ij} \end{aligned} \quad (8)$$

Where the β factors represent the sensitivity coefficients, the CAR_{ij} the cumulative abnormal returns, i the size of the event window and j the sample of the underlying 31 firms. The exact definitions of the variables are provided in [Table 7](#). According to previous studies, firm-specific characteristics can explain variances in abnormal returns ([Martins, Correia, and Gouveia 2023](#); [Boubaker et al. 2022](#)). For this, firm size, book-to-market (BTM), liquidity (CACL), rentability (ROA) and leverage (TDTA) are controlled for in this regression analysis. Following [Dang et al. \(2017\)](#), the amount of total assets is used as a size proxy. BTM is relied on as a risk metric as it reflects to what extent a firm has tied up its value in book assets relative to its market value, with high BTM firms indicating lower market expectations for future profitability and being more likely associated with financial distress or lower growth prospects ([Fama and French 1993](#)). The liquidity ratio is determined as current assets divided by current liabilities; for banks, the liquidity coverage ratio (LCR) is used as a default. [Bates, Kahle, and Stulz \(2009\)](#) show that liquidity acts as a buffer in times of economic and political uncertainty, ensuring a

company can sustain its performance. Higher profitability and rentability are indicators of higher management efficiency as firms with an elaborated level of ROA are expected to better sustain fluctuations caused by the Russo-Ukrainian conflict (Kang and Stulz 1997). Based on the ratio of total debt to total assets, highly leveraged firms are expected to experience greater operational uncertainty (Boubaker et al. 2022; Abbassi, Kumari, and Pandey 2022). Further, a firm's exposure to Russia is considered a relevant factor. I also control for the effects of past returns and stock volatility as a large set of existing literature evidences that those factors impact firm-specific returns (Boubaker et al. 2022).

6 RESULTS

6.1 Abnormal Returns on a European Level

6.1.1 Evidence from the Abnormal Returns

In Table 8 the ARs of stock indices from non-NATO countries on the EUROSTOXX600 based on the MM are summarized. In the pre-event period, ARs are significantly negative (<0.05) only for Austria's WBI. To be more precise, on February 21, 2022, and February 22, 2022 – the days on which the independence of Dunesk and Luhansk region was announced – negative results were most pronounced with t-2: -1.39% and t-3: -1.29%. On the event day, Cyprus, Ireland and Austria experienced negative ARs; however, at a significant level only concerning Austria (t: -3.15%). Whereas Ireland and Malta, both with little to no exposure to the CEE region ($\beta_{\text{Ireland}}: -0.17$, $\beta_{\text{Malta}}: +0.02$), did not experience any significant results in the post-event period, Sweden surprised with a positive AR of +4.77% on t+3 ($\beta_{\text{Sweden}}: +0.40$) (Figure 6). Surprisingly, with its stock market not much linked to the CEE market index ($\beta_{\text{Cyprus}}: +0.01$), Cyprus was marked by significant negative ARs in the post-event window (t+1: -4.28%, t+3: -2.26%, t+4: -2.50%). This can be partially explained by the war's impact on the country's export of services (mainly tourism) and FDI (Sakkas 2023), that were highly driven by Russians. However, the worst results were recorded by Austria ($\beta_{\text{Austria}}: +0.45$),

with ARs from t+2 to t+4 negative and significant at a 1% level (t+2: -2.59%, t+3: -4.57%, t+4: -1.70%) (Figure 7). Overall, the results align with previous studies such as Kumari, Kumar, and Kumar Pandey (2023), indicating that Austria's adverse stock market reaction was more substantial compared to the one of its European non-NATO peers.

6.1.2 Evidence from the Cumulative Abnormal Returns

Kumari, Kumar, and Kumar Pandey (2023) analyzed the vulnerability of European stock markets to the Russo-Ukrainian war and identified negative CARs in event windows of all lengths for Austria's ATX (ranging from [-5;1] to [+1;30]). I identify similar results based on the WBI (Table 9). Apart from the two days prior to the start of the war [-2;-1] [-1;-1], all CARs are significantly negative. In the post-event window, I find even more negative CARs except for t+1, thereby disclosing investors' uncertainty (Figure 8). This originates from Austria's high exposure to the CEE market ($\beta_{\text{Austria}}: +0.45$), particularly in the financial and energy sector (Figure 4). The Betas of +0.50 (β_{FI}) and +0.65 (β_{BI}) to the Central Eastern European total market index (TMI) highlight that Austrian companies belonging to these two industries are more exposed to the region than the other sectors that are relatively little correlated to the CEE TMI ($\beta_{\text{IG\&S}} = +0.36$, $\beta_{\text{CP}} = +0.21$, $\beta_{\text{T\&T}} = +0.28$, $\beta_{\text{UT}} = +0.44$) (Figure 9). Following Malta's and Ireland's little exposure to CEE, it is no surprise that these two countries did not experience any significant CARs during the event window. Cyprus' significant adverse reaction in the post-event period provides an outlook for future research within the scope of small economies' equity markets' reaction subsequent geopolitical crises. The insignificant and mixed performance of Sweden and Finland – given their comparably high exposure to CEE ($\beta_{\text{Sweden}}: +0.40$, $\beta_{\text{Finland}}: +0.50$) – may result from the fact that these two countries already pursued NATO membership in the pre-event period. Further, Russia's share in Sweden's import and export numbers accounted for only 1.4% each in 2021; with most of its oil being imported from Norway (AHK Sweden 2022). Finland historically had a higher interaction with Russia

but has already worked for ages on reducing one-sided energy dependence (AHK Finland 2022), thereby limiting the direct impact, and explaining its comparably more stable performance.

6.2 Abnormal Returns on a Country Level

6.2.1 Evidence from the Average Abnormal Returns

Table 3 presents the AARs of WBI's 31 constituent stocks (against the WBI) in the selected 13-day-event window. Figure 10 graphically displays the development of (C)AARs over the event window. Overall, the constituent stocks did not react as negatively as previously supposed. Notably, I identify a negative stock market reaction on the event day t , though without statistical significance. This implies that, on average, individual investors did not experience such accentuated fear or pessimistic sentiment on day t compared to what the overall market sentiment conveyed.

During the pre-event window ($t-6$ to $t-1$), I observe mixed AARs, which suggests investors' uncertainty about the upcoming effects of the Russo-Ukrainian crisis. Only on February 21, 2022, negative AAR values are significant on a 10% level ($t-3$ – MM: -0.53%, FF: -0.49%), indicating that investors reacted more extremely to the recognition of the independence of the Donetsk and Luhansk region compared to the extent to which the actual announcement of Russia's special military operation on February 24, 2022, materialized (t – MM: -0.27%, FF: -0.35%).

Similar divergent results become evident in the post-event period. In $t+3$, a remarkable positive abnormal return of +1.58% can be observed. However, this AAR may be attributed to the fact that Russia's intensification of offensive military operations had a much greater impact on the returns of the WBI, which experienced an even greater decline on March 1, 2022, than on the sample's average stock return. This finding would suggest that the fear and uncertainty experienced by investors dissipated. However, again, in $t+5$ (MM: -0.72%, FF3: -0.71%) and

t+6 (MM: -0.77%, FF3: -0.83%), the market experienced significant negative AARs indicating, that the overall sentiment of Austria's population questioning to what extent the war would affect the country, and how its neutrality would play a role during the conflict, was likewise reflected on Austria's stock market.

To avoid being deceived by these results, I complement this study with more in-depth analyses of how different industries and corporations reacted to the Russo-Ukrainian conflict.

6.2.2 Evidence from the Cumulative Average Abnormal Returns

Further, I also estimate the CAARs of the listed stocks of the WBI for a defined period surrounding the event date (Table 4). Following the argumentation of the AARs, I find negative CAARs before and around the event date, though not statistically significant. In the post-event period and event windows around t, significant positive CAARs for parametric and non-parametric tests can be observed; with the highest values identifiable in the following windows: [-4;4], [-3;3] [1;3] and [1;4]. These mixed results lead me to conclude that uncertainty was rising during pre-event days, but fluctuations similarly palpable during post-event days.

6.3 Abnormal Returns on an Industry Level

6.3.1 Evidence from the Average Abnormal Returns

In this part, I use the industry classification published on the VSE in order to cluster firms into different industries (Table 2). Table 12 presents the industry-wide AARs that explain how stocks of various industries reacted to the Russo-Ukrainian crisis. The developments of AARs for each sector (including the company level) are shown in Figure 11 to Figure 17.

I find that three industry groups experienced negative AARs [Financials (FI), Basic Industries (BI), Consumer Products (CP)] on the event day, while the other three sectors [Utilities (UT), Technology & Telecom (TT), Industrial Goods & Services (IG&S)] were marked by positive AARs. However, only FI with -4.28% (MM) and -4.09% (FF3) and UT with +8.10% (MM) and +7.49% (FF3) proved to be statistically significant.

Looking at the post-event window of UT, large fluctuations between significant positive (t+2 – MM: +6.64%) and negative AARs (t+3 – MM: -7.14%) can be noticed. The industry covers Austria’s primary power generation and energy supply companies that use both, gas as well as renewable forms of energy. The highly conversational topic and politicians’ reassurance of energy safety might be attributed to the latter. This is opposed to Austria’s heavy reliance on Russia’s gas, potentially causing investors’ negative reactions.

Following expectations, FI was negatively affected by Russia’s invasion. [Martins, Correia, and Gouveia \(2023\)](#) state that foreign banks with high exposure to Russia showed a higher negative stock market reaction. Amongst them, we find RBI with an exposure of USD 22.9bn to Russia. Further, a high β_{FI} of +0.50 highlights FI’s exposure to systemic risk. In the pre-event window (t-6 to t-1), the industry suffered from negative AARs indicating that investors interpreted the increasing likelihood of war as a high-risk event, reducing their investments in such a war-sensitive industry ([Liu, Longstaff, and Pan 2003](#)). Especially on February 24, 2022, FI experienced significant negative AARs (< 0.01) of -4.28% (MM) and -4.09% (FF3) indicating investors’ preoccupation of their investments while also fearing the consequences of financial sanctions. The post-event window was manifested by hefty fluctuations highlighting the insecurity that was dominating the industry.

Moving on to the BI section, a closer look shows that the AAR for February 24, 2022, with -1.04% (MM), is the highest negative AAR of the 13-day-event window, though statistically insignificantly different from 0. The statistical significance that becomes evident from the sample are positive AARs in the post-event period (t+2 to t+4 MM; t+1 to t+4 FF3) with abnormal returns up to +3.38% (MM) and +3.41% (FF3). Global oil prices experienced an upward trend for 14 consecutive calendar days till February 28, 2022. Since energy companies gained from the spike in oil prices that followed Russia’s invasion, these results are not surprising ([Figure 18](#)). The Beta coefficient of 0.43 from OMV and SBO against crude oil prices

supports the argument that companies directly linked to commodities tend to move in line with crude oil prices (Figure 19). To continue, 80% of Austria's oil comes from Kazakhstan, Libya and Iraq (Der Standard 2022) implying that Austria's commodity dependence on Russia is majorly driven by gas imports.

The remaining three sectors – T&T, IG&S, CP – experienced positive and negative reactions post-event. Thus, this data does not provide a clear indication of which effect – the widespread belief that the consumer staples industry and the service sector are relatively immune to economic downturns (Landier and Thesmar 2020) or evidence that showcases that the Russo-Ukrainian conflict disrupted global supply chains (Ahmad et al. 2022) – outweighed the other.

6.3.2 Evidence from the Cumulative Average Abnormal Returns

Figure 20 and Figure 21 display the industry-specific CAARs surrounding the event period. The high exposure of FI becomes evident again, with negative CAARs in every event window (Table 13), being most negative from t-6 to t+6 with -10.47% (MM) and -10.31% (FF3).

In the BI sector, negative CAARs can be observed in the pre-event window. Following the trend of AARs, statistical significance, nevertheless, only results from positive AARs in the post-event window, ranging from +2.48% [1;2] up to +8.12% [1;4] (FF3) (Table 14).

During the pre-event period, UT experienced significant positive CAARs across all event windows, accelerating up to +7.74% (MM) or +8.89% (FF3) in [-6;-1] (Table 15). However, in the post-event period, UT displays significant negative CAARs [1;2] [1;3] [1;4] [1;5] with the last one summing up to -8.51% (MM) or -9.63% (FF3). The extremely negative CAARs in the post-event phase might indicate an uprising fear of investors on supply shortages or disruptions in energy supply. Importing 80% of its gas from Russia makes investors' sentiment reasonable. Nevertheless, intensified promises of securitization of safe energy supply from Austrian politicians, Russia's income dependence from commodity supplies and decades of Austria's

dependence on Russia's oil and gas may have again alleviated any uncertainties from investors over time.

In the post-event period, T&T was the only sector not experiencing any significant movements. All other industries, apart from FI, recorded significant returns, though directed towards positive levels; CP [1;2] [1;3] [1;4], IG&S [1;3] [1;4] and BI [all windows] (Table 16, Table 17 and Table 18).

Overall, findings indicate industry-wide variations in (C)AARs across the event period.

6.4 Abnormal Returns on Firm-specific Variables

6.4.1 Evidence From the Cross-Sectional Analysis

Table 19 and Table 20 show the results of CARs regressed against a set of firm-specific variables. The CARs are calculated according to the MM, given the results are similar to FF3.

Further, though the correlation matrix (Table 21) and the variance inflation factor (VIF) (Table 22) show little correlation amongst factors and thereby indicate that multicollinearity is not affecting the model's results, their robustness is tested using robust standard errors (Table 20 indicates similar results for both analyses). From a model perspective, this is reasonable as the Breusch-Pagan test indicates heteroskedasticity in post-event date windows. The dispersion of data points across all event windows can be seen in Figure 22.

In line with the theory of size anomaly that small-cap firms outperform large-cap stocks in the long run (Abbassi, Kumari, and Pandey 2022), size is negatively associated with CARs across almost any event window, though significant only in post-event windows [1;2] [1;3] [1;4]. This indicates that larger firms experienced lower invasion-induced positive returns or higher negative returns than smaller firms.

In line with the argumentation of Fama and French (1993) that high-BTM firms are more risk-sensitive, the coefficients across all windows are negative; however, at insignificant levels.

The liquidity metric shows mixed results. While a negative relationship to CARs becomes evident in the pre-invasion phase, a positive influence on CARs is visible in the post-event date period. On February 24, 2022, the more liquid firms were the worst performing ones.

Concomitantly, in line with expectations, corporates with efficient use of resources (based on ROA) are positively associated with post-invasion CARs even at a 5% significance level [1;4] [1;5] [1;6]. However, negative deviations can be noticed during pre- and around-event date windows, though at a statistically insignificant level.

Leverage is negatively associated with pre-event date CARs (Abbassi, Kumari, and Pandey 2022). Continuing, as opposed to prior literature, the situation during post-event windows looked different, with leveraged firms having experienced more positive invasion-induced returns, particularly on t+1.

Firms exposed to Russia either financially or operationally did not perform statistically significantly different from firms without a direct connection to Russia. This may originate from the fact that the war and its geopolitical tensions had an impact on global economies.

Concluding with the control variables PAST and VOL, unlike evidenced by Boubaker et al. (2022) or Pandey and Kumar (2022), past returns and volatility cannot predict cumulative abnormal returns, at least not at a statistically significant level.

Summarizing, different firm-specific variables may have caused firms to react differently to the Russo-Ukrainian war, though at less significant levels than hypothesized.

6.4.2 Evidence From the Event Study Approach

Table 23 and Table 24 present the AARs and CAARs for small, medium and large firms based on their total assets. Before the event date, results were mixed. However, in line with the cross-sectional analysis, larger firms experienced negative CAARs, whereas smaller firms recorded significantly positive CAARs in the post-event date period (Figure 23).

The growth-based AARs and CAARs are presented in [Table 25](#), [Table 26](#) and [Figure 24](#). During the pre-event window, no significant AARs and CAARs can be discovered. In the post-event window, value stocks experienced negative CAARs; however, significant at a 1% level only during [1;6]. Looking at event windows spreading around t , high-BTM firms experienced large, significantly negative CAARs, indicating their higher vulnerability to the conflict ([Fama and French 1993](#)). Companies falling within the sphere of either growth- or value-stocks reaped significant positive CAARs in prolonged windows around the event day t .

The results of the liquidity-based portfolios are as miscellaneous as indicated by the cross-sectional study. High-liquidity firms withstood the volatile market conditions in a more stable manner compared to companies with lower current ratios ([Table 27](#) and [Table 28](#)). Though, both groups experienced positive CAARs across all event windows. Noticeable is the highly negative significant AAR for illiquid firms on $t+5$ of -1.52%. Further, it is eye-catching that firms with current ratios between 1.35 and 1.70 experienced significant negative AARs on the event date and in the post-event period ([Figure 25](#)). This might be explained by the fact that this tercile portfolio includes companies such as RBI or Erste Bank Group. The FI sector, with the highest market exposure, had the most negative performance during the conflict period.

In line with the cross-sectional analysis, highly leveraged firms experienced significant CAARs in the pre-invasion period, with a reversed picture in the post-event phase, facing a significant positive AAR of +1.90% on $t+1$. On t , highly leveraged firms experienced a significant AAR of -3.21%. Overall, firms with low total debt to total assets ratios outperformed those with high ratios as shown in [Table 29](#), [Table 30](#) and [Figure 26](#) ([Abbassi, Kumari, and Pandey 2022](#)).

Concluding with the rentability factor, low-rentability firms experienced the most significant negative downturns across almost all event windows. One remarkable aspect is that the portfolio of medium-rentability firms performed better than the one of high-rentability firms, particularly

in the post-event period (Table 31, Table 32, Figure 27). This trend might be explained by the fact that high-rentability firms often undergo riskier projects, whereas companies with medium rentability pursue a more stable and financially flexible business model.

7 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

There are several potential limitations associated with this study. Although this project provides insight into how Austria's stock market reacted to the start of the Russo-Ukrainian war, results must be interpreted cautiously as analyses tend to lose power with smaller sample sizes. Despite data limitations, analyzing smaller economies' reactions to the conflict is interesting.

Moreover, the companies included vary tremendously in size. The WBI weighs all companies according to their market capitalization. Nevertheless, in an event study approach, it is common to weigh companies equally. Consequently, in an equally weighted portfolio of an average investor, the results of companies with high market capitalization are downplayed, whereas the effects of less capitalized ones are reinforced. However, this approach is justified as the prioritization of individual companies and any biases stemming from factors such as size are avoided (Khotari and Warner 2004).

Continuing, findings may suffer from confounding effects of other events during the reported period. However, given the intensity of the war event, the findings are firmly attributable to the geopolitical tensions triggered by the conflict. Other variables that impact share prices, such as inflation or exchange rate, are not controlled for in this study.

Hence, having considered a leap period, investors may have already anticipated the war so that markets in the pre-event period could have already partially priced in the increasing likelihood of the conflict's outbreak.

Moreover, examining additional critical events during the war period to test the persistence of the conflict and its impact on the market is a captivating avenue. Notably, the WBI

experienced another drop in September 2022. Investigating whether this correlates with the war or if the same industries or companies were disproportionately affected adds intrigue. Such an analysis could uncover nuanced relationships, shedding light on the enduring repercussions of the conflict and the dynamics of Austria's equity market.

Concluding, in this study, every industry is examined on a standalone basis. Future studies could focus on the cross-industry spillovers of the war. Moreover, equity capital made up only 43% of total investments in Austria in 2022. Therefore, I urge future studies to analyze the reaction of other asset classes to the war.

8 CONCLUSION AND IMPLICATIONS

This study's focus is on Austrian stockholders' reaction to the Russo-Ukrainian conflict around February 24, 2022. Following economic and behavioral patterns, I expected the market to react negatively to Russia's military operations. The study proves that Austria's reaction was more negative than that of any other European non-NATO country.

[Brune et al. \(2014\)](#) find that in cases in which we notice a pre-war phase, the increasing likelihood of a conflict's outbreak tends to decrease stock prices, while the ultimate outburst of a war increases them. Contrarily, I hypothesized negative ARs to be most significant on the event date. This hypothesis was confirmed by the data on a country level. Surprisingly, if reactions were negative, effects were more potent in the post-event than in the pre-event period. Overall, however, results across event windows are mixed.

The volatility of Austria's equity market performance becomes particularly evident on an industry level. As predicted, FI was most negatively affected on the event date. BI also experienced negative returns before February 24, 2022; however, at statistical insignificant levels. In the post-event period, BI experienced significant positive AARs due to rising commodity prices. The UT sector was the most volatile one, with high positive AARs in the pre-event and significant negative AARs in the post-event period.

On the firm level, size and value stocks negatively reacted to the market across almost all event windows. Whereas leverage negatively impacted firms before the event day, unexpectedly, a positive influence can be recognized in the post-event period. Liquid and efficient firms suffered most before the outbreak of the war but reversed their performance in the post-event period. Volatility, past returns and exposure to Russia did not have any significant impact on a company's performance.

The findings have implications for a set of parties. First, the results provide insight for investors into how to allocate investments across industries in order to diversify war-associated risks optimally.

Governments and policymakers get a sense of how industries and companies are most severely impacted by geopolitical crises. Setting the right incentives is essential to send clear and risk-mitigating signals to markets, reduce uncertainty and temper the risks of a likely recession or spillover effects to other markets.

Further, corporate financial analysts can use this study as a reference to evaluate a company's financial performance to adjust major KPIs in order to be more robust in times of turbulence. Especially Austrian banks and insurance companies should work on introducing adequate risk management. For these institutions, this study could also be indicative towards a more geographical business diversification.

Finally, the project aims to serve as a catalyst to advance research in smaller economies. Due to the frequent emergence of political tensions and quick spillovers across markets any study that analyzes the implications of conflicts and wars on financial markets is value-additive.

9 REFERENCES

- Abbassi, Wajih, Vineeta Kumari, and Dharen Kumar Pandey. 2022. "What Makes Firms Vulnerable to the Russia-Ukraine Crisis?" *Journal of Risk Finance* 24 (1): 24–39. <https://doi.org/10.1108/JRF-05-2022-0108>.
- AHK Sweden. 2022. "So Trifft Der Krieg Die Schwedische Wirtschaft," November. <https://www.handelskammer.se/de/nyheter/so-trifft-der-krieg-die-schwedische-wirtschaft#:~:text=Es%20sind%20vor%20allem%20die,SEK%20im%20Jahr%202021>.
- Ahmad, Tanveer, Shahzad Hussain, Muhammad Akbar, and Ajid Ur Rehman. 2022. "Impact of Terrorism on Stock Market: Evidence from Developed and Developing Markets." *International Journal of Disaster Risk Reduction*, no. 70. <https://doi.org/10.1016/j.ijdr.2022.102786>.
- Aswani, Jitenda. 2017. "Impact of Global Financial Crisis on Network of Asian Stock Markets." *Algorithmic Finance* 6 (3–4): 79–91. <https://doi.org/DOI:10.3233/AF-170192>.
- AußenwirtschaftsCenter Moskau. 2023. "Wirtschaftsbericht Russische Föderation." <https://www.wko.at/noe/aussenwirtschaft/russische-foederation-wirtschaftsbericht.pdf>.
- Bassanini, Andrea, and Stefano Scarpetta. 2003. "The Driving Forces of Economic Growth: Panel Data Evidence for the OECD Countries." *OECD Economic Studies* 33. https://doi.org/10.1787/eco_studies-v2001-art10-en.
- Bates, Thomas W., Kathleen M. Kahle, and Rene M. Stulz. 2009. "Why Do U.S. Firms Hold So Much More Cash than They Used To?" *The Journal of Finance* 64 (5): 1985–2021.
- Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. "Finance and the Sources of Growth." *Journal of Financial Economics* 58 (1–2): 261–300. [https://doi.org/10.1016/S0304-405X\(00\)00072-6](https://doi.org/10.1016/S0304-405X(00)00072-6).
- Bischof, Günter, and Ferdinand Karlhofer. 2013. "Austria's International Position after the End of the Cold War." *University of New Orleans Press*, no. 22: 1–4. <https://doi.org/10.2307/j.ctt1n2txd9.1>.
- Boubaker, Sabri, Hisham Farag, and Duc Khuong Nguyen. 2015. "Short-Term Overreaction to Specific Events: Evidence from an Emerging Market." *Research in International Business and Finance* 35: 153–65. <https://doi.org/10.1016/j.ribaf.2014.10.002>.
- Boubaker, Sabri, John W. Goodell, Dharen Kumar Pandey, and Vineeta Kumari. 2022. "Heterogeneous Impacts of Wars on Global Equity Markets: Evidence from the Invasion of Ukraine." *Finance Research Letter* 48. <https://doi.org/10.1016/j.frl.2022.102934>.
- Boubaker, Sabri, Jocelyn Jouini, and Atef Lahiani. 2016. "Financial Contagion Between the US and Selected Developed and Emerging Countries: The Case of the Subprime Crisis." *The Quarterly Review of Economics and Finance* 61: 14–28. <https://doi.org/10.1016/j.qref.2015.11.001>.
- Boubaker, Sabri, Nga Nguyen, Vu O. Trinh, and Than Vu. 2023. "Market Reaction to the Russian Ukrainian War: A Global Analysis of the Banking Industry." *Review of Accounting and Finance* 22 (1): 123–53. <https://doi.org/10.1108/RAF-10-2022-0294>.

- Bradford, Bruce M., and H. David Robison. 1997. "Abnormal Returns, Risk, and Financial Statement Data: The Case of the Iraqi Invasion of Kuwait." *Journal of Economics and Business* 49 (2): 193–204. [https://doi.org/10.1016/S0148-6195\(97\)81515-9](https://doi.org/10.1016/S0148-6195(97)81515-9).
- Brune, Amelie, Thorsten Hens, Marc Oliver Rieger, and Mei Wang. 2014. "The War Puzzle: Contradictory Effects of International Conflicts on Stock Markets" 62: 1–21. <https://doi.org/10.1007/s12232-014-0215-7>.
- Chen, Andrew H., and Thomas F. Siems. 2004. "The Effects of Terrorism on Global Capital Markets." *Economics of Peace and Security Journal* 20 (2): 349–66. <https://doi.org/10.1016/j.ejpoleco.2003.12.005>.
- Claessens, Stijn, Ayhan Kose, and Marco E. Terrones. 2010. "How Do Business and Financial Cycles Interact?" *Journal of International Economics* 87 (1): 178–90. <https://doi.org/10.1016/j.jinteco.2011.11.008>.
- Czura, Kristina, and Stefan Klonner. 2023. "Financial Market Responses to a Natural Disaster: Evidence from Credit Networks and the Indian Ocean Tsunami." *Journal of Development Economics* 160. <https://doi.org/10.1016/j.jdeveco.2022.102996>.
- Dang, Chonhyu, Zhichuan Li, Frank Yang, and Chen Yang. 2017. "Measuring Firm Size in Empirical Corporate Finance." *Journal of Banking and Finance*. <http://dx.doi.org/10.2139/ssrn.2345506>.
- Der Standard. 2022. "Österreich Bezieht Kaum Noch Öl Aus Russland," April 21, 2022. <https://www.derstandard.at/story/2000135070582/oesterreich-bezieht-kaum-noch-oel-aus-russland>.
- Dyczok, Marta. 1994. "Ukraine: The Road to Independence." *History of European Ideas* 19 (1–3): 471–77. [https://doi.org/10.1016/0191-6599\(94\)90249-6](https://doi.org/10.1016/0191-6599(94)90249-6).
- Fama, Eugene, and Kennet French. 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *Economics* 33 (1): 3–56. <http://www.jstor.org/stable/2729691>.
- Gerwarth, Robert, and Ugur Ungor. 2015. "The Collapse of the Ottoman and Habsburg Empires and the Brutalisation of the Successor States." *Journal of Modern European History* 13 (2): 226–48. <https://doi.org/10.17104/1611-8944-2015-2-226>.
- Hilpert, Britta. 2023. "Gewinne Trotz Sanktionen - Der Rubel Rollt Für Österreichs Wirtschaft." *ZDFheute*, March 12, 2023. <https://www.zdf.de/nachrichten/wirtschaft/oesterreich-unternehmen-sanktionen-ukraine-krieg-russland-100.html>.
- Himka, John-Paul. 1994. "The National and the Social in the Ukrainian Revolution of 1917-1920: The Historiographical Agenda." *Archiv Für Sozialgeschichte* 34: 95–110.
- Hudson, Robert, and Andrew Urquhart. 2014. "War and Stock Markets: The Effect of World War Two on the British Stock Market." *International Review of Financial Analysis* 40: 166–77. <https://doi.org/10.1016/j.irfa.2015.05.015>.
- Jacobs, Heiko. 2016. "Market Maturity and Mispricing." *Journal of Financial Economics* 122 (2): 270–87. <https://doi.org/10.1016/j.jfineco.2016.01.030>.
- Jarque, Carlos M., and Anil K. Bera. 1987. "A Test for Normality of Observations and Regression Residuals." *International Statistical Review* 55 (2): 167–71. <https://doi.org/10.2307/1403192>.

- Kamal, Md Rajib, Shaker Ahmed, and Mostafa Mdonzur Hasan. 2023. "The Impact of the Russia-Ukraine Crisis on the Stock Market: Evidence from Australia." *Pacific-Basin Finance Journal*, no. 79. <https://doi.org/10.1016/j.pacfin.2023.102036>.
- Kang, Jun-Koo, and Rene M. Stulz. 1997. "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan." *Journal of Financial Economics* 46: 3–28. [http://dx.doi.org/10.1016/S0304-405X\(97\)00023-8](http://dx.doi.org/10.1016/S0304-405X(97)00023-8).
- Karnitschnig, Matthew. 2023. "How Austria Became Putin's Alpine Fortress." *Politico*, May 6, 2023. <https://www.politico.eu/article/austria-russia-vladimir-putin-alpine-fortress-ukraine/>.
- Khotari, S.P., and Jerodl B. Warner. 2004. "Econometrics of Event Studies." *Handbook of Corporate Finance: Empirical Corporate Finance*. <http://dx.doi.org/10.2139/ssrn.608601>.
- Kolari, James W., and Seppo Pynnoenen. 2011. "Nonparametric Rank Tests for Event Studies." *Journal of Empirical Finance* 18 (5): 953–71. <https://doi.org/10.1016/j.jempfin.2011.08.003>.
- Korostelina, Karina V. 2013. "Ukraine Twenty Years after Independence: Concept Models of the Society." *Communist and Post-Communist Studies* 46 (1): 53–64. <https://doi.org/10.1016/j.postcomstud.2012.12.008>.
- Kubijovič, Volodimir. 1984. "Encyclopedia of Ukraine." *University of Toronto Press* 1 (1).
- Kulyk, Volodymyr. 2016. "National Identity in Ukraine: Impact of Euromaidan and the War." *Europe-Asia Studies* 68 (4): 588–608. <https://doi.org/10.1080/09668136.2016.1159665>.
- Kumari, Vandana, Gopal Kumar, and Deepak Kumar Pandey. 2023. "Are the European Union Stock Markets Vulnerable to the Russia-Ukraine War?" *Journal of Behavioral and Experimental Finance* 37. <https://doi.org/10.1016/j.jbef.2023.100793>.
- Landier, Augustin, and David Thesmar. 2020. "Earnings Expectations in the COVID Crisis." In *Working Paper*. FIN-2020-1377. <http://dx.doi.org/10.2139/ssrn.3587394>.
- Liu, Jun, Francis A. Longstaff, and Jun Pan. 2003. "Dynamic Asset Allocation with Event Risk." *The Journal of Finance* 58 (1): 231–59. <https://doi.org/10.1111/1540-6261.00523>.
- Lo, Gaye-Del, Isaac Marcellin, Théophile Bassène, and Babacar Sène. 2022. "The Russo-Ukrainian War and Financial Markets: The Role of Dependence on Russian Commodities." *Finance Research Letters* 50. <https://doi.org/10.1016/j.frl.2022.103194>.
- Mackinlay, A. Craig. 1997. "Event Studies in Economics and Finance." *Journal of Economic Literature* 35 (1): 13–39.
- Martins, Antonio Miguel, Pedro Correia, and Ricardo Gouveia. 2023. "Russia-Ukraine Conflict: The Effect on European Banks' Stock Market Returns." *Journal of Multinational Financial Management* 67. <https://doi.org/10.1016/j.mulfin.2023.100786>.
- OENB. 2023. "Fakten Zu Österreich Und Seinen Banken: Stand April 2023," 2023. <https://www.oenb.at/Publikationen/Finanzmarkt/Fakten-zu-Oesterreich-und-seinen-Banken.html>.

- Onuch, Olga, and Gwendolyn Sasse. 2016. "The Maidan in Movement: Diversity and the Cycles of Protest." *Europe-Asia Studies* 68 (4): 588–608. <https://doi.org/10.1080/09668136.2016.1159665>.
- Pandey, Dharen Kumar, and Rahul Kumar. 2022. "Russia-Ukraine War and the Global Tourism Sector: A 13-Day Tale." *Current Issues in Tourism*, 692–700. <https://doi.org/10.1080/13683500.2022.2081789>.
- Pandey, Dharen, Brian M. Lucey, and Satish Kumar. 2023. "Border Disputes, Conflicts, War, and Financial Markets Research: A Systematic Review." *Research in International Business and Finance* 65. <https://doi.org/10.1016/j.ribaf.2023.101972>.
- Rai, V., Dharen Kumar, and Pandey Rai. 2021. "Does Privatization of Public Sector Banks Affect Stock Prices? An Event Study Approach on the Indian Banking Sector Stocks." *Asian Journal of Accounting Research* 7 (1): 71–83. <https://doi.org/10.1108/AJAR-06-2021-0078>.
- Riabchuk, Mykola. 2016. "Ukrainians as Russia's Negative 'Other': History Comes Full Circle." *Communist and Post-Communist Studies* 49 (1): 75–85.
- Sakkas, Stelios. 2023. "Cyprus and the EU Sanctions on Russia: Macroeconomic Impacts and Policy Recipes for a Sustained Recovery," 2023. <https://www.lse.ac.uk/Hellenic-Observatory/Research/Cyprus-Projects-2022-2023/Cyprus-and-the-EU-Sanctions-on-Russia-macroeconomic-impacts-and-policy-recipes-for-a-sustained-recovery>.
- Schneider, Gerald, and Vera E. Troeger. 2006. "War and the World Economy: Stock Market Reactions to International Conflicts." *Journal of Conflict Resolution* 50 (5): 623–45. <https://doi.org/10.1177/0022002706290430>.
- Shen, Lihua H., and Yanran R. Hong. 2023. "Can Geopolitical Risks Excite Germany Economic Policy Uncertainty: Rethinking in the Context of the Russia-Ukraine Conflict." *Finance Research Letters* 51. <https://doi.org/10.1016/j.frl.2022.103420>.
- Statistik Austria. 2022. "Außenhandel 2022 Zweistellig Gewachsen." <https://www.statistik.at/fileadmin/announcement/2023/03/20230310Aussenhandel2022.pdf>.
- Stourzh, Gerald. 1982. "Austrian State Treaty (1955)." *War and Neutrality Peace Treaties (A-M)*, 41–45. <https://doi.org/10.1016/B978-0-444-86234-1.50022-9>.
- Tabak, Benjamin Miranda, Igor Bettanin Dalla Riva e Silva, and Thiago Christiano Silva. 2022. "Analysis of Connectivity between the World's Banking Markets: The COVID-19 Global Pandemic Shock." *The Quarterly Review of Economics and Finance* 84: 324–36. <https://doi.org/10.1016/j.qref.2022.03.002>.
- VSE. 2023. "Vienna Stock Exchange." <https://www.wienerborse.at/>.
- Wilcoxon, Frank. 1945. "Individual Comparisons by Ranking Methods." *Biometrics Bulletin* 6 (1). <http://www.jstor.org/stable/3001968>.
- Wu, Fei. 2020. "Stock Market Integration in East and Southeast Asia: The Role of Global Factors." *International Review of Financial Analysis* 67. <https://doi.org/10.1016/j.irfa.2019.101416>.
- Yagi, Michiyuki, and Shunsuke Managi. 2023. "The Spillover Effects of Rising Energy Prices Following 2022 Russian Invasion of Ukraine." *Economic Analysis and Policy* 77: 680–95. <https://doi.org/10.1016/j.eap.2022.12.025>.

Yousaf, Imran, Ritesh Patel, and Larisa Yarovaya. 2022. “The Reaction of G20+ Stock Markets to the Russia-Ukraine Conflict ‘black-Swan’ Event: Evidence from Event Study Approach.” *Journal of Behavioral and Experimental Finance* 35. <https://doi.org/10.1016/j.jbef.2022.100723>.

Zhang, Chao, and Meihong Sun. 2023. “Comprehensive Analysis of Global Stock Market Reactions to the Russia-Ukraine War.” *Applied Economics Letters* 30 (18): 2673–80. <https://doi.org/10.1080/13504851.2022.2103077>.

10 APPENDIX

10.1 Tables

Table 1: Composition of the Wiener Börse Index (including industry clustering and market capitalization)

Name	Ticker	ISIN	Country	Sector	Sub-Sector	Market Capitalization per 24.02.2022*
ERSTE GROUP BANK AG	EBS	AT0000652011	AT	Financials	Banking	61,905,862.01
RAIFFEISEN BANK INTERNAT. AG	RBI	AT0000606306	AT	Financials	Banking	59,019,622.27
OMV AG	OMV	AT0000743059	AT	Basic Industries	Oil & Gas	56,602,156.81
VOESTALPINE AG	VOE	AT0000937503	AT	Basic Industries	Mining & Metals	27,745,162.29
IMMOFINANZ AG	IIA	AT0000A21KS2	AT	Financials	Real Estate	26,755,535.15
VERBUND AG KAT. A	VER	AT0000746409	AT	Utilities	Electric Utilities	25,465,326.93
WIENERBERGER AG	WIE	AT0000831706	AT	Basic Industries	Construction Materials	21,453,234.35
BAWAG GROUP AG	BG	AT0000BAWAG2	AT	Financials	Banking	17,302,877.09
AT&S AUSTRIA TECH.&SYSTEMTECH.	ATS	AT0000969985	AT	Technology & Telecom	Technology Hardware & Equipment	11,729,303.66
ANDRITZ AG	ANDR	AT0000730007	AT	Industrial Goods & Services	Industrial Engineering & Machinery	11,546,605.99
UNIQA INSURANCE GROUP AG	UQA	AT0000821103	AT	Financials	Insurance	8,597,415.46
OESTERREICHISCHE POST AG	POST	AT0000APOST4	AT	Industrial Goods & Services	Transportation	5,784,703.92
LENZING AG	LNZ	AT0000644505	AT	Basic Industries	Chemicals	5,747,117.91
CA IMMOBILIEN ANLAGEN AG	CAI	AT0000641352	AT	Financials	Real Estate	4,591,015.77
S IMMO AG	SPI	AT0000652250	AT	Financials	Real Estate	4,515,225.91
MAYR-MELNHOF KARTON AG	MMK	AT0000938204	AT	Industrial Goods & Services	Packaging	4,181,953.44
DO & CO AKTIENGESSELLSCHAFT	DOC	AT0000818802	AT	Consumer Products	Food, Beverage & Tobacco	3,839,881.16
TELEKOM AUSTRIA AG	TKA	AT0000720008	AT	Technology & Telecom	Telecommunications	3,665,433.27
EVN AG	EVN	AT0000741053	AT	Utilities	Multi-Utilities	3,518,019.45
SCHOELLER-BLECKMANN OILFIELD EQUIPMENT AG	SBO	AT0000946652	AT	Basic Industries	Oil & Gas	2,963,833.81
VIENNA INSURANCE GROUP AG	VIG	AT0000908504	AT	Financials	Insurance	2,720,299.70
PORR AG	POS	AT0000609607	AT	Basic Industries	Construction	1,586,395.38
STRABAG SE	STR	AT0000000STR1	AT	Basic Industries	Construction	1,471,408.32
ZUMTOBEL GROUP AG	ZAG	AT0000837307	AT	Industrial Goods & Services	Electrical Equipment	1,222,077.66
SEMPERIT AG HOLDING	SEM	AT0000785555	AT	Industrial Goods & Services	Other Industrial Goods	1,117,232.11
FLUGHAFEN WIEN AG	ELU	AT000000VIE62	AT	Industrial Goods & Services	Transportation	1,100,498.81
FACC AG	FACC	AT00000FACC2	AT	Industrial Goods & Services	Aerospace & Defense	1,014,008.48
PALFINGER AG	PAL	AT0000758305	AT	Industrial Goods & Services	Industrial Engineering & Machinery	793,644.68
POLYTEC HOLDING AG	PYT	AT0000A00XX9	AT	Consumer Products	Automobiles & Parts	698,254.69
UBM DEVELOPMENT AG	UBS	AT0000815402	AT	Financials	Real Estate	482,775.72
AGRANA BETEILIGUNGS-AG	AGR	AT0000AGRANA3	AT	Consumer Products	Food, Beverage & Tobacco	480,424.37
ADDIKO BANK AG	ADKO	AT0000ADDIKO0	AT	Financials	Banking	364,440.13
KAPSCH TRAFFICOM AG	KTCG	AT0000KAPSCH9	AT	Technology & Telecom	Technology Hardware & Equipment	348,154.55
ROSENBAUER INTERNATIONAL AG	ROS	AT0000922554	AT	Industrial Goods & Services	Industrial Engineering & Machinery	308,768.43
OBERBANK AG ST	OBS	AT0000625108	AT	Financials	Banking	269,558.43
AMAG AUSTRIA METALL AG	AMAG	AT000000AMAG3	AT	Basic Industries	Mining & Metals	268,163.35
MARINOMED BIOTECH AG	MARI	ATMARINOMED6	AT	Health Care	Biotechnology	248,639.40
RHI MAGNESITA	RHIM	NL0012650360	AT	Industrial Goods & Services	Industrial Engineering & Machinery	229,084.47
FREQUENTIS AG	FQT	ATFREQUENT09	AT	Industrial Goods & Services	Aerospace & Defense	139,412.98
PIERER MOBILITY AG	PMAG	AT0000KTM02	AT	Consumer Products	Automobiles & Parts	88,393.84
WARIMPEX FINANZ- UND BETEILIGUNGS AG	WXF	AT0000827209	AT	Financials	Real Estate	75,536.08
SUNMIRROR AG	RORI	CH0396131929	AT	Basic Industries	Mining & Metals	24,883.00
BANK FUER TIROL UND VBG AG ST	BTS	AT0000625504	AT	Financials	Banking	19,153.09
CLEEN ENERGY AG	CLEN	AT0000A1PY49	AT	Industrial Goods & Services	Electrical Equipment	13,620.00
FRAUENTHAL HOLDING AG	FKA	AT0000762406	AT	Industrial Goods & Services	Industrial Holdings	11,520.13
SW UMWELTECHNIK AG	SWUT	AT0000808209	AT	Industrial Goods & Services	Industrial Engineering & Machinery	8,506.64
BKS BANK AG ST	BKS	AT0000624705	AT	Financials	Banking	5,660.25
STADLAUER MALZFABRIK AG	STM	AT0000797303	AT	Consumer Products	Food, Beverage & Tobacco	3,755.48
OTTAKRINGER GETRAENKE AG VZ	OTV	AT0000758032	AT	Consumer Products	Food, Beverage & Tobacco	2,419.78
WOLFORD AG	WOL	AT0000834007	AT	Consumer Products	Personal Products	2,028.60
GURKTALER AG VZ	GAGV	AT0000A0Z9H1	AT	Consumer Products	Food, Beverage & Tobacco	1,564.47
OTTAKRINGER GETRAENKE AG ST	OTS	AT0000758008	AT	Consumer Products	Food, Beverage & Tobacco	1,415.30
AUSTRIACARD HOLDINGS AG	ACAG	AT0000A325L0	AT	Technology & Telecom	Software & IT Services	0.00
BURGENLAND HOLDING AG	BHD	AT0000640552	AT	Financials	Diversified Financials	0.00
JOSEF MANNER & COMP. AG	MAN	AT0000728209	AT	Consumer Products	Food, Beverage & Tobacco	0.00
LINZ TEXTIL HOLDING AG	LTH	AT0000723606	AT	Consumer Products	Personal Products	0.00
RATH AG	RAT	AT0000767306	AT	Technology & Telecom	Technology Hardware & Equipment	0.00
WIENER PRIVATBANK SE	WPB	AT0000741301	AT	Financials	Banking	0.00
GURKTALER AG ST	GAGS	AT0000A0Z9G3	AT	Consumer Products	Food, Beverage & Tobacco	0.00
MASCHINENFABRIK HEID AG	HED	AT0000690151	AT	Technology & Telecom	Technology Hardware & Equipment	0.00

382,051,984.97

Notes: Companies written in bold make up the company sample basket that will be tested in this project. The selection is based on the quality and availability of financial data; companies that were not traded or had only limited trading history over the estimation period were eliminated. Companies that show EUR 0.00 market capitalization did not display any trading activity on February 24, 2022.

Table 2: Sector and Subsector Classification of the Vienna Stock Exchange

Sector	Subsector
Basic Industries	Oil & Gas
	Mining & Metals
	Paper & Forestry
	Chemicals
	Construction
	Construction Materials
Industrial Goods & Services	Industrial Engineering & Machinery
	Transportation
	Electrical Equipment
	Packaging
	Aerospace & Defense
	Industrial Holdings
	Other Industrial Goods
	Other Industrial Services
Consumer Products	Automobiles & Parts
	Food, Beverage & Tobacco
	Household Products & Furniture
	Personal Products
Consumer Services	Leisure Products
	Media
	Leisure & Gambling
	Tourism & Travel
Health Care	Retailing
	Pharmaceuticals
	Biotechnology
Utilities	Health Care Equipment & Services
	Electric Utilities
	Gas & Water Utilities
Financials	Multi-Utilities
	Banking
	Insurance
	Real Estate
Technology & Telecom	Diversified Financials
	Telecommunications
	Software & IT Services
	Technology Hardware & Equipment

Table 3: AARs of the stocks of the WBI regressed against the WBI index over the event period

250-day estimation window					180-day estimation window					90-day estimation window				
Event Window	AAR	t-test	K&P	WRank	Event Window	AAR	t-test	K&P	WRank	Event Window	AAR	t-test	K&P	WRank
-6					-6					-6				
MM	0.26%	0.3665	0.4829	0.2170	MM	0.28%	0.3231	0.4256	0.1959	MM	0.28%	0.3594	0.4661	0.2098
FF3	0.27%	0.3473	0.4708	0.2098	FF3	0.29%	0.3123	0.4075	0.1701	FF3	0.27%	0.3668	0.4625	0.2244
-5					-5					-5				
MM	-0.35%	0.2276	0.2560	0.2170	MM	-0.34%	0.2444	0.3076	0.2027	MM	-0.35%	0.2564	0.4014	0.2557
FF3	-0.31%	0.2715	0.2870	0.2990	FF3	-0.29%	0.3057	0.3505	0.3369	FF3	-0.33%	0.2799	0.4035	0.2990
-4					-4					-4				
MM	0.30%	0.3055	0.4229	0.2244	MM	0.31%	0.2889	0.4438	0.2397	MM	0.29%	0.3389	0.4539	0.2557
FF3	0.39%	0.1713	0.3647	0.1583	FF3	0.41%	0.1559	0.3536	0.1124	FF3	0.38%	0.2171	0.3903	0.1641
-3					-3					-3				
MM	-0.53%	0.0718*	0.4321	0.6664	MM	-0.52%	0.0751*	0.4865	0.6807	MM	-0.54%	0.0863*	0.4820	0.6664
FF3	-0.49%	0.0930*	0.4817	0.7688	FF3	-0.47%	0.1043	0.5578	0.8141	FF3	-0.52%	0.0933*	0.5157	0.6242
-2					-2					-2				
MM	0.67%	0.0203**	0.4707	0.3469	MM	0.69%	0.0186**	0.4301	0.2990	MM	0.67%	0.0302**	0.3929	0.3674
FF3	0.68%	0.0176**	0.4658	0.3082	FF3	0.70%	0.0154**	0.4199	0.2900	FF3	0.66%	0.0317**	0.4092	0.3886
-1					-1					-1				
MM	-0.15%	0.6096	0.5864	0.2811	MM	-0.13%	0.6553	0.6731	0.2900	MM	-0.14%	0.6530	0.7846	0.2811
FF3	-0.16%	0.5806	0.5687	0.2557	FF3	-0.14%	0.6275	0.6498	0.2990	FF3	-0.17%	0.5813	0.7225	0.2640
0					0					0				
MM	-0.27%	0.3814	0.5494	0.9844	MM	-0.30%	0.3492	0.5696	0.9531	MM	-0.33%	0.3472	0.6016	0.9844
FF3	-0.35%	0.2521	0.5251	0.9219	FF3	-0.37%	0.2475	0.5502	0.9531	FF3	-0.47%	0.1793	0.5522	0.8600
1					1					1				
MM	0.41%	0.1608	0.3242	0.3176	MM	0.46%	0.1218	0.3196	0.2990	MM	0.47%	0.1437	0.3634	0.2557
FF3	0.42%	0.1541	0.3603	0.3369	FF3	0.46%	0.1168	0.3636	0.2990	FF3	0.48%	0.1304	0.4181	0.2725
2					2					2				
MM	0.51%	0.0854*	0.8978	0.2557	MM	0.51%	0.0861*	0.8667	0.2640	MM	0.49%	0.1228	0.8328	0.2640
FF3	0.22%	0.4601	0.9238	0.5178	FF3	0.22%	0.4771	0.9334	0.5435	FF3	0.14%	0.6858	0.9234	0.7539
3					3					3				
MM	1.58%	0.0000***	0.0392**	0.0061***	MM	1.55%	0.0000***	0.0635*	0.0077***	MM	1.51%	0.0001***	0.0911*	0.0077***
FF3	1.58%	0.0000***	0.0397**	0.0057***	FF3	1.57%	0.0000***	0.0604*	0.0051***	FF3	1.46%	0.0001***	0.1062	0.0097***
4					4					4				
MM	0.28%	0.3346	0.9197	0.7539	MM	0.29%	0.3097	0.9119	0.7243	MM	0.28%	0.3558	0.9260	0.7390
FF3	0.36%	0.2032	0.8307	0.5435	FF3	0.39%	0.1765	0.8057	0.5698	FF3	0.36%	0.2360	0.8388	0.5967
5					5					5				
MM	-0.72%	0.0127**	0.4483	0.0159**	MM	-0.70%	0.0164**	0.4531	0.0177**	MM	-0.70%	0.0233**	0.4589	0.0197**
FF3	-0.71%	0.0138**	0.4494	0.0230**	FF3	-0.69%	0.0171**	0.4507	0.0208**	FF3	-0.70%	0.0233**	0.4550	0.0187**
6					6					6				
MM	-0.77%	0.0092***	0.1573	0.0655*	MM	-0.78%	0.0095***	0.1812	0.0548*	MM	-0.80%	0.0140**	0.2430	0.0778*
FF3	-0.83%	0.0048***	0.1606	0.0478**	FF3	-0.83%	0.0052***	0.1871	0.0415**	FF3	-0.90%	0.0058***	0.2312	0.0548*

Notes: This table presents the average abnormal returns (AARs) of the 31 stocks belonging to the WBI index on the WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. While the t-test is more likely to indicate significant results in the pre-event period, statistical tests are more aligned in the post-event window. Short-term and medium-term estimation windows are likewise tested. The results of those two studies align with the results of the main study based on a 250-day estimation window, thereby proving the results' robustness. The grey fields indicate the values that result in significant values different from the main 250-day estimation window.

Statistical test: Due to its simplicity, the t-test is majorly adopted in event studies testing for significance. However, results are sensitive to cross-sectional and event-induced volatility, as well as to deviations from normality. The adjusted standardized cross-section test of Kolari and Pynnoenen (2010) (K&P) is robust against the way in which ARs are distributed across the (cumulated) event window and accounts for event-induced volatility, serial- and cross-sectional correlation. The Wilcoxon test (WRank) takes into account both, the sign and the magnitude of ARs (Wilcoxon 1945). Despite its non-normality assumption, a critical interpretation of results is needed in small sample sizes that include extreme values.

The underlying factors for the OLS are drawn from the Kenneth Fama & French homepage.

https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html, Accessed 25.09.2023.

For the FF3, the factors are likewise drawn from the Kenneth Fama & French homepage. Due to the "European" focus in this study, the European market factors, comprising the following countries: Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Portugal and Sweden – are chosen.

https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_5developed.html,

Accessed 25. September 2023.

Table 4: CAARs of the stocks of the WBI regressed against the WBI index over the event period

250-day estimation window					180-day estimation window					90-day estimation window				
Event Window	CAAR	t-test	K&P	WRank	Event Window	CAAR	t-test	K&P	WRank	Event Window	CAAR	t-test	K&P	WRank
Before the event period					Before the event period					Before the event period				
[-15;-1]					[-15;-1]					[-15;-1]				
MM	1.76%	0.1378	0.5411	0.3031		2.04%	0.0830*	0.4755	0.1944		1.91%	0.1312	0.5003	0.2159
FF3	2.23%	0.0572*	0.4176	0.0966*		2.53%	0.0294**	0.3083	0.0560*		2.17%	0.0827*	0.3825	0.1023
[-10;-1]					[-10;-1]					[-10;-1]				
MM	0.72%	0.4570	0.8893	0.4848		0.87%	0.3673	0.9742	0.3817		0.76%	0.4618	0.9170	0.4438
FF3	0.99%	0.3004	0.9643	0.2593		1.17%	0.2197	0.7786	0.1809		0.86%	0.4003	0.8225	0.3133
[-6;-1]					[-6;-1]					[-6;-1]				
MM	0.21%	0.7771	0.9568	0.7684		0.29%	0.6939	0.8256	0.6758		0.22%	0.7784	0.7673	0.7109
FF3	0.38%	0.5958	0.8678	0.5482		0.49%	0.4979	0.7064	0.4781		0.29%	0.7056	0.7212	0.6423
[-5;-1]					[-5;-1]					[-5;-1]				
MM	-0.05%	0.9382	0.5811	0.7997		0.00%	0.9945	0.6764	0.8610		-0.06%	0.9358	0.7886	0.8053
FF3	0.12%	0.8603	0.7015	0.9459		0.20%	0.7596	0.8315	0.9033		0.02%	0.9775	0.8359	0.8977
[-4;-1]					[-4;-1]					[-4;-1]				
MM	0.30%	0.6192	0.8246	0.7743		0.34%	0.5682	0.7254	0.7139		0.29%	0.6494	0.6336	0.8205
FF3	0.43%	0.4645	0.7134	0.5781		0.50%	0.4004	0.5782	0.5314		0.35%	0.5794	0.5692	0.7383
[-3;-1]					[-3;-1]					[-3;-1]				
MM	0.00%	0.9994	0.7413	0.8646		0.03%	0.9467	0.8442	0.8979		0.00%	0.9951	0.9075	0.7989
FF3	0.04%	0.9398	0.7897	0.9130		0.09%	0.8626	0.9111	0.9710		-0.03%	0.9593	0.8930	0.7782
[-2;-1]					[-2;-1]					[-2;-1]				
MM	0.53%	0.2039	0.7118	0.9637		0.56%	0.1794	0.6429	0.9079		0.54%	0.2227	0.5622	0.9916
FF3	0.52%	0.2009	0.7179	0.9692		0.56%	0.1722	0.6459	0.8802		0.49%	0.2546	0.6074	0.9692
[-1;-1]					[-1;-1]					[-1;-1]				
MM	-0.15%	0.6146	0.5864	0.2811		-0.13%	0.6594	0.6731	0.2900		-0.14%	0.6563	0.7846	0.2811
FF3	-0.16%	0.5857	0.5687	0.2557		-0.14%	0.6319	0.6498	0.2990		-0.17%	0.5848	0.7225	0.2640
Around and at the event					Around and at the event					Around and at the event				
[0;0]					[0;0]					[0;0]				
MM	-0.27%	0.3870	0.5494	0.9844		-0.30%	0.3544	0.5696	0.9531		-0.33%	0.3509	0.6016	0.9844
FF3	-0.35%	0.2563	0.5251	0.9219		-0.37%	0.2511	0.5502	0.9531		-0.47%	0.1770	0.5522	0.8600
[-1;1]					[-1;1]					[-1;1]				
MM	-0.01%	0.9877	0.6755	0.8466		0.03%	0.9501	0.7389	0.7812		0.00%	0.9965	0.7918	0.8197
FF3	-0.09%	0.8525	0.6398	0.9009		-0.04%	0.9383	0.7017	0.8256		-0.16%	0.7725	0.7047	0.9100
[-2;2]					[-2;2]					[-2;2]				
MM	1.17%	0.0835*	0.9339	0.2419		1.23%	0.0717*	0.8714	0.2072		1.16%	0.1135	0.7979	0.2292
FF3	0.81%	0.2252	0.9974	0.3892		0.88%	0.1911	0.9406	0.3455		0.64%	0.3717	0.9210	0.5018
[-3;3]					[-3;3]					[-3;3]				
MM	2.22%	0.0102**	0.8104	0.0430**		2.25%	0.0105**	0.7426	0.0372**		2.13%	0.0297**	0.7008	0.0427**
FF3	1.90%	0.0255**	0.8439	0.0665*		1.97%	0.0230**	0.7736	0.0597*		1.58%	0.1010	0.8105	0.1133
[-4;4]					[-4;4]					[-4;4]				
MM	2.80%	0.0049***	0.6072	0.0301**		2.85%	0.0047***	0.5442	0.0251**		2.71%	0.0165**	0.4893	0.0295**
FF3	2.66%	0.0066***	0.5998	0.0304**		2.77%	0.0054***	0.5200	0.0274**		2.32%	0.0369**	0.5306	0.0548*
[-5;5]					[-5;5]					[-5;5]				
MM	1.73%	0.1158	0.9865	0.3466		1.82%	0.1005	0.9128	0.3077		1.66%	0.1794	0.8590	0.3179
FF3	1.64%	0.1300	0.9687	0.3061		1.79%	0.1021	0.8746	0.2880		1.28%	0.2911	0.9146	0.4253
[-6;6]					[-6;6]					[-6;6]				
MM	1.21%	0.3204	0.9479	0.5654		1.32%	0.2798	0.8620	0.5101		1.14%	0.4078	0.8087	0.4909
FF3	1.07%	0.3719	0.9354	0.5332		1.24%	0.3055	0.8318	0.5041		0.65%	0.6302	0.8570	0.6710
[-10;10]					[-10;10]					[-10;10]				
MM	1.83%	0.2504	0.9728	0.5261		2.12%	0.1753	0.8686	0.4048		1.88%	0.2852	0.8304	0.4458
FF3	1.79%	0.2535	0.9277	0.5268		2.13%	0.1674	0.7956	0.3966		1.39%	0.4233	0.8535	0.5691
[-15;15]					[-15;15]					[-15;15]				
MM	2.76%	0.1702	0.6073	0.4744		3.33%	0.0808*	0.5032	0.3030		3.06%	0.1558	0.5176	0.3332
FF3	2.85%	0.1506	0.5376	0.4234		3.47%	0.0655*	0.3995	0.2507		2.63%	0.2155	0.4888	0.4005
After the event period					After the event period					After the event period				
[1;1]					[1;1]					[1;1]				
MM	0.41%	0.1664	0.3242	0.3176		0.46%	0.1265	0.3196	0.2990		0.47%	0.1475	0.3634	0.2557
FF3	0.42%	0.1559	0.3603	0.3369		0.46%	0.1176	0.3636	0.2990		0.48%	0.1267	0.4181	0.2725
[1;2]					[1;2]					[1;2]				
MM	0.92%	0.0268**	0.4146	0.1076		0.97%	0.0201**	0.3945	0.1016		0.95%	0.0304**	0.4132	0.0959*
FF3	0.64%	0.1170	0.5173	0.2431		0.68%	0.0956*	0.5168	0.2459		0.62%	0.1496	0.5697	0.3144
[1;3]					[1;3]					[1;3]				
MM	2.49%	0.0000***	0.0506*	0.0026***		2.51%	0.0000***	0.0496**	0.0025***		2.47%	0.0000***	0.0600*	0.0021***
FF3	2.22%	0.0000***	0.0781*	0.0061***		2.25%	0.0000***	0.0829*	0.0066***		2.08%	0.0003***	0.1084	0.0103**
[1;4]					[1;4]					[1;4]				
MM	2.77%	0.0000***	0.0876*	0.0049***		2.81%	0.0000***	0.0846*	0.0042***		2.75%	0.0001***	0.0937*	0.0043***
FF3	2.58%	0.0000***	0.1207	0.0082***		2.64%	0.0000***	0.1213	0.0076***		2.44%	0.0003***	0.1461	0.0117**
[1;5]					[1;5]					[1;5]				
MM	2.05%	0.0025***	0.1194	0.1010		2.11%	0.0020***	0.1192	0.0890*		2.05%	0.0056***	0.1287	0.0841*
FF3	1.88%	0.0050***	0.1696	0.1253		1.95%	0.0039***	0.1734	0.1193		1.74%	0.0166**	0.2121	0.1597
[1;6]					[1;6]					[1;6]				
MM	1.28%	0.0909*	0.3120	0.4156		1.33%	0.0797*	0.2874	0.3987		1.25%	0.1306	0.2707	0.3748
FF3	1.04%	0.1609	0.3812	0.5205		1.11%	0.1382	0.3636	0.5099		0.83%	0.3048	0.3980	0.6191
[1;10]					[1;10]					[1;10]				
MM	1.39%	0.1477	0.2280	0.6056		1.55%	0.1051	0.2020	0.5207		1.45%	0.1575	0.2048	0.5331
FF3	1.16%	0.2183	0.2873	0.8131		1.33%	0.1589	0.2660	0.7132		1.00%	0.3207	0.3270	0.8308
[1;15]					[1;15]					[1;15]				
MM	1.27%	0.2731	0.2556	0.7817		1.59%	0.1681	0.2172	0.6347		1.48%	0.2277	0.2367	0.6545
FF3	0.98%	0.3925	0.3316	0.9974		1.30%	0.2531	0.2956	0.8123		0.93%	0.4396	0.3793	0.9960

Notes: This table presents the cumulative average abnormal returns (CAARs) of the 31 stocks belonging to the WBI index regressed against the WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. It becomes evident that K&P does not deliver any significant results; its power may diminish in case model specifications are not met, for instance, if high event-induced volatility or abnormal returns are prevalent in the estimation window. To continue, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominates parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests. A short-term (90 days) and a medium-term (180 days) estimation window is likewise tested. The grey fields indicate the values that result in significant values different from the main 250-day estimation window. Overall, the results for the medium-term window equal the results of the 250-day estimation window, with a higher significance only in [1;2] during the event window (for the t-test). Concerning the short estimation window of 90 days, results tend to appear slightly less significant. However, this does not minimize the robustness of our results, and could stem from the fact that parts of the probability of a possible crisis had already been priced in by markets in the weeks and months before the "real" event date. The CAARs for longer event windows turned insignificant in the post-event period indicating that the initial "extreme" market reactions started smoothening out.

Table 5: Robustness test - AARs of the stocks of the WBI regressed against the WBI index over an event window of 31 days

<i>t</i>	AAR	<i>t</i> -test	K&P	WRank	<i>t</i>	AAR	<i>t</i> -test	K&P	WRank
-15									
MM	0.57%	0.0487**	0.3776	0.5306	MM	0.41%	0.1608	0.3242	0.3176
FF3	0.69%	0.0185**	0.3097	0.2319	FF3	0.42%	0.1541	0.3603	0.3369
-14									
MM	-0.18%	0.5211	0.4540	0.3176	MM	0.51%	0.0854*	0.8978	0.2557
FF3	-0.19%	0.5058	0.4631	0.4217	FF3	0.22%	0.4601	0.9238	0.5178
-13									
MM	0.21%	0.4739	0.5569	0.3994	MM	1.58%	0.0000***	0.0392**	0.0061***
FF3	0.25%	0.3730	0.4711	0.3369	FF3	1.58%	0.0000***	0.0397**	0.0057***
-12									
MM	0.10%	0.7241	0.9735	0.9687	MM	0.28%	0.3346	0.9197	0.7539
FF3	0.21%	0.4630	0.8215	0.6807	FF3	0.36%	0.2032	0.8307	0.5435
-11									
MM	0.35%	0.2324	0.2762	0.1416	MM	-0.72%	0.0127**	0.4483	0.0159**
FF3	0.28%	0.3329	0.3578	0.2725	FF3	-0.71%	0.0138**	0.4494	0.0230**
-10									
MM	-0.43%	0.1398	0.1445	0.0745*	MM	-0.77%	0.0092***	0.1573	0.0655*
FF3	-0.37%	0.1995	0.1400	0.0714*	FF3	-0.83%	0.0048***	0.1606	0.0478**
-9									
MM	0.51%	0.0746*	0.3327	0.1124	MM	-0.13%	0.6564	0.6917	0.5435
FF3	0.54%	0.0595*	0.3202	0.0524*	FF3	-0.06%	0.8304	0.7695	0.6242
-8									
MM	-0.30%	0.3041	0.2052	0.3272	MM	0.26%	0.3639	0.4783	0.6664
FF3	-0.22%	0.4478	0.3193	0.4331	FF3	0.29%	0.3190	0.4498	0.6807
-7									
MM	0.72%	0.0128**	0.0477**	0.0108**	MM	0.04%	0.9098	0.7145	0.9064
FF3	0.65%	0.0246**	0.1005	0.0121**	FF3	0.05%	0.8835	0.7215	0.5967
-6									
MM	0.26%	0.3665	0.4829	0.2170	MM	-0.06%	0.8405	0.8366	0.9531
FF3	0.27%	0.3473	0.4708	0.2098	FF3	-0.16%	0.5868	0.7324	0.8446
-5									
MM	-0.35%	0.2276	0.2560	0.2170	MM	-0.06%	0.8258	0.9022	0.7989
FF3	-0.31%	0.2715	0.2870	0.2990	FF3	-0.14%	0.6212	0.8265	0.5832
-4									
MM	0.30%	0.3055	0.4229	0.2244	MM	-0.06%	0.8463	0.8706	0.7989
FF3	0.39%	0.1713	0.3647	0.1583	FF3	-0.04%	0.8935	0.8602	0.7539
-3									
MM	-0.53%	0.0718*	0.4321	0.6664	MM	-0.31%	0.2834	0.3440	0.2319
FF3	-0.49%	0.0930*	0.4817	0.7688	FF3	-0.18%	0.5405	0.5722	0.5832
-2									
MM	0.67%	0.0203**	0.4707	0.3469	MM	0.86%	0.0033***	0.1237	0.0268**
FF3	0.68%	0.0176**	0.4658	0.3082	FF3	0.78%	0.0078***	0.1945	0.0478**
-1									
MM	-0.15%	0.6096	0.5864	0.2811	MM	-0.55%	0.0573*	0.1492	0.0599*
FF3	-0.16%	0.5806	0.5687	0.2557	FF3	-0.61%	0.0332**	0.1188	0.0415**
0									
MM	-0.27%	0.3814	0.5494	0.9844					
FF3	-0.35%	0.2521	0.5251	0.9219					

Notes: This table presents the average abnormal returns (AARs) of the 31 stocks belonging to the WBI index regressed against the WBI, the market index, for each day of the prolonged 31-day event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent, and 10 percent levels, respectively. The AARs from the longer event window show that the market did not react significantly in the prolonged pre-invasion event window (before t-6). Further, from t+6 onwards, the negative effects tended to fade out. However, in t+15, another significant negative AAR is visible. Concluding, the initial reaction to Russia's invasion was strongest in the immediate aftermath. However, volatility and uncertainty remained in the market.

Table 6: Performance Statistics

Financials	EBS.VI	RBL.VI	BG.VI	VIG.VI	IIA.VI	UQA.VI
Observations	250	250	250	250	250	250
Skewness	-0.0553	0.2483	0.0018	-0.5551	0.5896	-0.1097
Kurtosis	0.8090	5.5084	0.8560	2.5454	1.9991	2.2140
Jarque-Bera	6.9449	318.6410	7.6330	80.3300	56.1097	51.5618
p_value	0.0310**	0.0000***	0.0220**	0.0000***	0.0000***	0.0000***
max return	4.89%	10.37%	4.84%	3.99%	5.20%	5.21%
min return	-5.29%	-7.19%	-5.35%	-5.54%	-3.17%	-4.89%
spread (max-min)	10.17%	17.56%	10.19%	9.53%	8.37%	10.10%
average	0.20%	0.19%	0.17%	0.08%	0.15%	0.11%
median	0.20%	0.20%	0.19%	0.21%	0.17%	0.13%
drawdown	-67.49%	-95.84%	-37.14%	-27.00%	-75.83%	-29.24%

Basic Industries	OMV.VI	VOE.VI	STR.VI	SBO.VI	POS.VI	LNZ.VI	WIE.VI
Observations	250	250	250	250	250	250	250
Skewness	-0.7747	-0.3340	0.1656	0.0877	-0.3493	-0.2600	-0.8600
Kurtosis	2.6054	0.6569	1.4747	0.7588	1.4619	1.1305	4.8047
Jarque-Bera	95.7146	9.1432	23.7976	6.3178	27.3461	16.1296	271.2923
p_value	0.0000***	0.0103**	0.0000***	0.0425**	0.0000***	0.0003***	0.0000***
max return	4.77%	4.07%	5.49%	7.87%	6.90%	5.96%	4.42%
min return	-9.80%	-5.76%	-6.21%	-6.58%	-6.58%	-7.36%	-6.97%
spread (max-min)	14.57%	9.84%	11.70%	14.45%	13.48%	13.32%	11.39%
average	0.18%	-0.01%	0.19%	0.04%	-0.07%	-0.03%	0.05%
median	0.29%	-0.06%	0.25%	-0.13%	0.14%	0.00%	0.12%
drawdown	-43.79%	-78.55%	-22.71%	-41.36%	-62.47%	-113.72%	-59.15%

Utilities	VER.VI	EVN.VI
Observations	250	250
Skewness	-0.6086	0.1351
Kurtosis	2.1021	0.8201
Jarque-Bera	61.4628	7.7663
p_value	0.0000	0.0206
max return	6.11%	5.69%
min return	-9.38%	-4.32%
spread (max-min)	15.49%	10.02%
average	0.07%	0.11%
median	0.19%	0.21%
drawdown	-49.80%	-55.62%

Industrial Goods & Services	ANDR.VI	FLU.VI	SEM.VI	ZAG.VI	FACC.VI	PAL.VI	RHIM.VI	POST.VI	MMK.VI	ROS.VI
Observations	250	250	250	250	250	250	250	250	250	250
Skewness	-0.3339	-0.0110	0.8945	0.4942	0.2957	-0.1711	-0.0543	0.0165	0.3535	-0.0142
Kurtosis	3.2426	0.4875	4.6220	0.9088	3.1080	0.6395	0.7133	0.2551	2.4682	0.8576
Jarque-Bera	114.1709	2.4810	255.8663	18.7779	104.2659	5.4799	5.4221	0.6890	68.6626	7.6690
p_value	0.0000***	0.2892	0.0000***	0.0001***	0.0000***	0.0646*	0.0665*	0.7086	0.0000***	0.0216**
max return	5.79%	4.84%	12.72%	7.30%	10.72%	5.03%	7.74%	3.39%	6.41%	6.06%
min return	-8.13%	-6.72%	-6.53%	-5.35%	-10.86%	-6.55%	-7.94%	-3.87%	-4.53%	-5.81%
spread (max-min)	13.92%	11.56%	19.25%	12.65%	21.58%	11.59%	15.68%	7.27%	10.94%	11.87%
average	0.07%	-0.01%	0.03%	0.09%	-0.05%	-0.02%	-0.02%	0.05%	0.04%	0.03%
median	0.15%	-0.17%	-0.05%	-0.11%	-0.23%	-0.14%	0.00%	0.11%	0.12%	0.22%
drawdown	-34.69%	-25.99%	-81.13%	-50.33%	-60.94%	-68.84%	-99.65%	-53.49%	-37.84%	-65.37%

Technology & Telecom	TKA.VI	ATS.VI
Observations	250	250
Skewness	-0.0873	1.2484
Kurtosis	0.8114	5.2826
Jarque-Bera	7.1752	355.6197
p_value	0.0277**	0.0000***
max return	3.44%	16.00%
min return	-3.51%	-7.35%
spread (max-min)	6.95%	23.36%
average	0.09%	0.21%
median	0.14%	0.14%
drawdown	-27.11%	-82.16%

Consumer Products	DOC.VI	PYT.VI	AGR.VI	PMAG.VI
Observations	250	250	250	250
Skewness	-0.2623	0.1353	-0.1213	0.7720
Kurtosis	2.2342	1.6528	0.7876	2.8310
Jarque-Bera	54.8608	29.2174	7.0747	108.3161
p_value	0.0000***	0.0000***	0.0291**	0.0000***
max return	7.93%	7.44%	4.17%	6.55%
min return	-10.26%	-6.60%	-3.97%	-3.39%
spread (max-min)	18.19%	14.04%	8.14%	9.94%
average	0.15%	-0.05%	0.01%	0.10%
median	0.07%	0.04%	0.05%	0.00%
drawdown	-32.82%	-102.68%	-35.76%	-53.38%

Notes: The performance statistics are calculated based on the estimation window (t-266 to t-16).

Skewness: With respect to skewness, no trend can be recognized; both positive and negative skewness is prevalent independent of the underlying industry/company tested. A negative skewness occurs when the tail is more pronounced on the left-hand side rather than on the right-hand side. As such, most extreme values are found further to the left. A negative skewness may indicate that investors can expect some small gains, but generally experience few large losses. In case of a positive skewness, investors may find some minor losses, though they may end up realizing large gains - albeit fewer.

Kurtosis: Kurtosis is another indicator measuring a distribution tail's weight relative to the center of the distribution. Most companies in the sample follow a platykurtic distribution, indicating that during the estimation window, returns have demonstrated stability and that extreme price movements rarely occurred in the past. When expanding the calculation over the entire conflict period, returns would largely follow a leptokurtic distribution, highlighting the large price movements in equities that the Russo-Ukraine conflict may have triggered.

Jarque-Bera: The Jarque-Bera normality test largely neglects normality in the underlying returns' distribution over the estimation window. This majorly stems from the fact that many industries are prone to seasonality within one year. Further, the beginning of the estimation window also marks the end of many lockdowns posed on society during the Covid-19 pandemic.

Drawdown: Continuing, daily log returns widely range from positives to negatives over the entire year. Overall, negative returns are more pronounced than positive returns. The drawdown calculation covers the period including the post-event period. Interestingly, the biggest peak-to-trough declines occurred in the summer of 2022, a time during which energy uncertainty was propelling investors' insecurity, mainly caused by Russia's cuts in gas supplies.

Table 7: Variable definitions for the cross-sectional analysis

<i>Variable</i>	<i>Abbreviation</i>	<i>Description</i>
Cumulative Abnormal Returns	CAR	Sum of the abnormal returns on all days during the event window
Size	LnTA	Natural log of total assets
Growth	BTM	Ratio of book value to market value
Liquidity	CACL	Ratio of current assets to current liabilities
Leverage	TDTA	Ratio of total debt to total assets
Rentability	ROA	Ratio of net income (after tax) to total assets
Exposure to Russia	EXP	Dummy variable depending on the prevalence of financial investments, operational locations, company branches, etc. in Russia
Past returns	PAST	Average log returns of the last 30 days before the event window begins
Volatility	VOL	Standard deviation of the estimation window log returns

Notes: This table defines the variables of the cross-sectional analysis. All data is derived from the financial statements of each company (as of 31.12.2021, the net income figure was adjusted accordingly for firms following a deviating financial year).

Table 8: ARs of the indices of non-NATO members regressed against EUROSTOXX600

Event Window	Before the event period						Event date	After the event period						
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	
Austria	<i>MM</i>	0.26%	-0.77%	-0.78%	-1.29%	-1.39%	-0.27%	-3.15%	0.23%	-2.59%	-4.57%	-1.70%	2.05%	-0.15%
	<i>t-test</i>	0.6443	0.1718	0.1657	0.0232**	0.0138**	0.6305	0.0000***	0.6915	0.0000***	0.0000***	0.0027***	0.0004***	0.7985
Ireland	<i>MM</i>	0.29%	-1.58%	0.12%	0.36%	0.21%	0.15%	-0.38%	-0.32%	0.23%	-0.30%	0.59%	1.13%	0.03%
	<i>t-test</i>	0.8531	0.3102	0.9388	0.8165	0.8924	0.9229	0.8120	0.8393	0.8814	0.8476	0.7021	0.4721	0.9871
Sweden	<i>MM</i>	-0.48%	-1.44%	-0.98%	-0.64%	1.76%	-0.74%	2.71%	-1.81%	0.60%	4.77%	-1.39%	-2.81%	2.73%
	<i>t-test</i>	0.8260	0.5058	0.6516	0.7677	0.4178	0.7324	0.2268	0.4175	0.7831	0.0311**	0.5226	0.2005	0.2258
Finland	<i>MM</i>	0.45%	-0.68%	0.43%	0.52%	-0.94%	-0.17%	0.42%	-0.34%	-0.61%	-1.69%	0.26%	-0.09%	0.31%
	<i>t-test</i>	0.8109	0.7190	0.8200	0.7847	0.6192	0.9297	0.8297	0.8609	0.7472	0.3821	0.8905	0.9642	0.8760
Malta	<i>MM</i>	1.27%	1.46%	-0.74%	0.77%	-0.07%	-0.29%	0.05%	0.00%	-2.32%	-0.26%	0.06%	2.32%	-0.03%
	<i>t-test</i>	0.0727*	0.0397**	0.2969	0.2778	0.9247	0.6822	0.9415	0.9964	0.0011***	0.7143	0.9315	0.0013***	0.9712
Cyprus	<i>MM</i>	1.70%	0.19%	-0.01%	0.20%	-0.25%	0.27%	-1.27%	-4.28%	2.94%	-2.26%	-2.50%	-0.94%	1.60%
	<i>t-test</i>	0.0265**	0.8069	0.9932	0.7982	0.7413	0.7249	0.1087	0.0000***	0.0002***	0.0039***	0.0012***	0.2229	0.0440**

Notes: This table presents the abnormal returns (ARs) of Austria (WBI), Cyprus (CPR), Ireland (ISEQ), Malta (MSE), Finland (OMXHLS) and Sweden (OMXSPI) regressed on the EUROSTOXX600 index (one of Europe's benchmark indices covering the 600 largest European companies) for each day in the event window. It shows the results of the parametric t-test; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. Over history, returns are normally distributed for what an interpretation of significance based on a t-test is justified, with abnormal returns of the WBI on EUROSTOXX600 being significant at a 1% level on t-3, t-2, t, and t+2, t+3, t+4 and t+5 (on t+5 experiencing strong positive abnormal returns). Significant ARs are also evident for Cyprus.

On the day of the invasion, Finland and Sweden had not been part of the NATO. Both countries were applying to receive NATO membership on 18 May 2022. Finland finally became a member on April 4, 2023. Sweden is still awaiting ratification by Hungary and Turkey (as of November 06, 2023).

Table 9: CARs of the indices of non-NATO members against EUROSTOXX600

Event window	Before the event period						Around and at the event days						After the event period							
	[-6;-1]	[-5;-1]	[-4;-1]	[-3;-1]	[-2;-1]	[-1;-1]	[0;0]	[-1;1]	[-2;2]	[-3;3]	[-4;4]	[-5;5]	[-6;6]	[1;1]	[1;2]	[1;3]	[1;4]	[1;5]	[1;6]	
Austria	<i>MM</i>	-4.23%	-4.49%	-3.72%	-2.94%	-1.66%	-0.27%	-3.15%	-3.19%	-7.17%	-13.03%	-15.50%	-14.22%	-14.11%	0.23%	-2.36%	-6.94%	-8.64%	-6.58%	-6.73%
	<i>t-test</i>	0.0307**	0.0121**	0.0198**	0.0331**	0.1399	0.7337	0.0001***	0.0210**	0.0001***	0.0000***	0.0000***	0.0000***	0.0000***	0.7759	0.0370**	0.0000***	0.0000***	0.0002***	0.0007***
Ireland	<i>MM</i>	-0.45%	-0.74%	0.84%	0.72%	0.36%	0.15%	-0.38%	-0.55%	-0.11%	-0.05%	0.66%	0.21%	0.52%	-0.32%	-0.09%	-0.40%	0.20%	1.33%	1.35%
	<i>t-test</i>	0.9335	0.8809	0.8481	0.8493	0.9074	0.9453	0.8641	0.8838	0.9815	0.9925	0.9206	0.9772	0.9484	0.8841	0.9763	0.9169	0.9638	0.7862	0.8019
Sweden	<i>MM</i>	-2.53%	-2.05%	-0.61%	0.37%	1.02%	-0.74%	2.71%	0.16%	2.51%	6.64%	4.27%	0.02%	2.27%	-1.81%	-1.21%	3.56%	2.17%	-0.64%	2.09%
	<i>t-test</i>	0.7368	0.7651	0.9210	0.9441	0.8144	0.8086	0.3840	0.9762	0.7136	0.4151	0.6438	0.9987	0.8411	0.5601	0.7806	0.5015	0.7225	0.9256	0.7817
Finland	<i>MM</i>	-0.39%	-0.84%	-0.16%	-0.59%	-1.11%	-0.17%	0.42%	-0.09%	-1.64%	-2.81%	-2.11%	-2.88%	-2.12%	-0.34%	-0.95%	-2.64%	-2.38%	-2.46%	-2.16%
	<i>t-test</i>	0.9532	0.8888	0.9767	0.8991	0.7694	0.9501	0.8769	0.9848	0.7839	0.6936	0.7937	0.7488	0.8303	0.8998	0.8024	0.5691	0.6569	0.6806	0.7437
Malta	<i>MM</i>	2.40%	1.13%	-0.32%	0.41%	-0.35%	-0.29%	0.05%	-0.24%	-2.62%	-2.12%	-2.79%	0.98%	2.22%	0.00%	-2.32%	-2.58%	-2.52%	-0.21%	-0.23%
	<i>t-test</i>	0.3290	0.6134	0.8722	0.8112	0.8018	0.7730	0.9581	0.8905	0.2412	0.4267	0.3552	0.7704	0.5480	0.9974	0.1034	0.1363	0.2076	0.9266	0.9249
Cyprus	<i>MM</i>	2.10%	0.39%	0.21%	0.21%	0.02%	0.27%	-1.27%	-5.28%	-2.59%	-4.66%	-7.17%	-7.92%	-4.62%	-4.28%	-1.34%	-3.60%	-6.11%	-7.05%	-5.45%
	<i>t-test</i>	0.4306	0.8712	0.9241	0.9096	0.9913	0.8036	0.2490	0.0051***	0.2835	0.1062	0.0288**	0.0300**	0.2485	0.0001***	0.3824	0.0549*	0.0051***	0.0038***	0.0416**

Notes: This table presents the cumulative abnormal returns (CARs) of the WBI index regressed against the EUROSTOXX600 (one of Europe’s benchmark indices covering the 600 largest European companies) for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. It becomes evident that K&P does not deliver any significant results; its power may diminish in case model specifications are not met, for instance, if high event-induced volatility or abnormal returns are prevalent in the estimation window. To continue, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominates parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 10: Robustness Check - AARs of the WBI stocks regressed against EUROSTOXX600

Event Window	AAR	<i>t-test</i>	<i>K&P</i>	<i>WRank</i>
-6				
MM	0.50%	0.0915*	0.3026	0.0626*
FF3	0.19%	0.5110	0.6342	0.2640
-5				
MM	-0.95%	0.0014***	0.0537*	0.0009***
FF3	-0.60%	0.0365**	0.0873*	0.0378**
-4				
MM	-0.30%	0.3072	0.4251	0.0882*
FF3	-0.43%	0.1307	0.1764	0.0524*
-3				
MM	-1.52%	0.0000***	0.0308**	0.0008***
FF3	-1.26%	0.0000***	0.0249**	0.0082***
-2				
MM	-0.59%	0.0458**	0.2531	0.1416
FF3	-0.39%	0.1721	0.2562	0.2397
-1				
MM	-0.35%	0.2388	0.4354	0.0919*
FF3	-0.35%	0.2208	0.3154	0.0997*
0				
MM	-2.71%	0.0000***	0.0905*	0.0092***
FF3	-1.92%	0.0000***	0.0930*	0.0524*
1				
MM	0.21%	0.4818	0.6481	0.6522
FF3	0.40%	0.1804	0.3792	0.3272
2				
MM	-1.84%	0.0000***	0.1067	0.0255**
FF3	-1.49%	0.0000***	0.0638*	0.0378**
3				
MM	-2.29%	0.0000***	0.0676*	0.0045***
FF3	-2.01%	0.0000***	0.0496**	0.0242**
4				
MM	-1.38%	0.0000***	0.0687*	0.0103**
FF3	-1.26%	0.0000***	0.0439**	0.0159**
5				
MM	1.42%	0.0000***	0.0866*	0.0048***
FF3	1.06%	0.0003***	0.0880*	0.0378**
6				
MM	-0.44%	0.1550	0.5551	0.3570
FF3	-0.30%	0.3178	0.5533	0.5052

Notes: This table presents the average abnormal returns (AARs) of the individual 31 stocks belonging to the WBI index on the EUROSTOXX600 (one of Europe's benchmark indices covering the 600 largest European companies) for each day in the event window. This test was performed to test the robustness of Austria's stock market reaction of the individual WBI stocks regressed against the EUROSTOXX600. Following the set of formulas, in this case, the R_{it} is the logarithmic daily return of the constituent stock (i) of the WBI on t, and AR_{it} is the abnormal return of the individual stock (i) on day (t). K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent, and 10 percent levels, respectively. The results of the t-test and WRank are similar. The t-test is rejecting the null at slightly lower confidence levels (t+2, t+4); in t-4 and t-1, the WRank is rejecting the null, whereas the t-test does not do so. K&P is less likely to reject the null, indicating a potential cross-correlation across stocks and inflation of event-date variance.

Table 11: Robustness Check - CAARs of the WBI stocks regressed against EUROSTOXX600

Before the event period					Around and at the event days					After the event period							
Event Window	CAAR	t-test	K&P	WRank	Event Window	CAAR	t-test	K&P	WRank	Event Window	CAAR	t-test	K&P	WRank			
[-15;-1]	MM	-0.23%	0.8443	0.3119	0.4760	[0;0]	MM	-2.71%	0.0000***	0.0905*	0.0092***	[1;1]	MM	0.21%	0.4875	0.6481	0.6522
	FF3	-1.10%	0.3399	0.9206	0.2140		FF3	-1.92%	0.0000***	0.0930*	0.0524*		FF3	0.40%	0.1851	0.3792	0.3272
[-10;-1]	MM	-3.91%	0.0001***	0.0262**	0.0000***	[-1;1]	MM	-2.84%	0.0000***	0.0980*	0.0223**	[1;2]	MM	-1.63%	0.0002***	0.2452	0.1705
	FF3	-3.93%	0.0000***	0.0024***	0.0001***		FF3	-1.88%	0.0002***	0.1155	0.1535		FF3	-1.09%	0.0090***	0.3628	0.3714
[-6;-1]	MM	-3.22%	0.0000***	0.0913*	0.0001***	[-2;2]	MM	-5.28%	0.0000***	0.0814*	0.0005***	[1;3]	MM	-3.91%	0.0000***	0.0442**	0.0037***
	FF3	-2.86%	0.0001***	0.0501*	0.0004***		FF3	-3.75%	0.0000***	0.0835*	0.0096***		FF3	-3.10%	0.0000***	0.0573*	0.0333**
[-5;-1]	MM	-3.72%	0.0000***	0.0056***	0.0000***	[-3;3]	MM	-9.09%	0.0000***	0.0110**	0.0000***	[1;4]	MM	-5.29%	0.0000***	0.0189**	0.0001***
	FF3	-3.04%	0.0000***	0.0041***	0.0000***		FF3	-7.03%	0.0000***	0.0100**	0.0000***		FF3	-4.36%	0.0000***	0.0226**	0.0016***
[-4;-1]	MM	-2.77%	0.0000***	0.0092***	0.0000***	[-4;4]	MM	-10.76%	0.0000***	0.0055***	0.0000***	[1;5]	MM	-3.87%	0.0000***	0.0421**	0.0178**
	FF3	-2.44%	0.0000***	0.0036***	0.0002***		FF3	-8.72%	0.0000***	0.0032***	0.0000***		FF3	-3.30%	0.0000***	0.0564*	0.0412**
[-3;-1]	MM	-2.47%	0.0000***	0.0088***	0.0001***	[-5;5]	MM	-10.30%	0.0000***	0.0054***	0.0000***	[1;6]	MM	-4.30%	0.0000***	0.0402**	0.0117**
	FF3	-2.01%	0.0001***	0.0070***	0.0011***		FF3	-8.26%	0.0000***	0.0040***	0.0000***		FF3	-3.59%	0.0000***	0.0517*	0.0316**
[-2;-1]	MM	-0.94%	0.0271**	0.2165	0.0229**	[-6;6]	MM	-10.23%	0.0000***	0.0388**	0.0000***	[1;10]	MM	-3.11%	0.0013***	0.0607*	0.1546
	FF3	-0.74%	0.0712*	0.1913	0.0438**		FF3	-8.37%	0.0000***	0.0276**	0.0000***		FF3	-3.02%	0.0012***	0.0605*	0.1058
[-1;-1]	MM	-0.35%	0.2453	0.4354	0.0919*	[-10;10]	MM	-9.73%	0.0000***	0.0245**	0.0000***	[1;15]	MM	-3.38%	0.0040***	0.0586*	0.1353
	FF3	-0.35%	0.2271	0.3154	0.0997*		FF3	-8.87%	0.0000***	0.0059***	0.0000***		FF3	-2.69%	0.0174**	0.0817*	0.1938
					[-15;15]	MM	-6.32%	0.0007***	0.7102	0.0333**							
						FF3	-5.72%	0.0014***	0.3490	0.0293**							

Notes: This table presents the cumulative average abnormal returns (CAARs) of the individual stocks of the WBI index regressed against the EUROSTOXX600 (one of Europe’s benchmark indices covering the 600 largest European companies) for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. The results of the t-test and WRank are similar, in particular in the pre-event period and the days around the event date. In the post-event period, the t-test is rejecting the null at slightly lower confidence levels compared to the WRank. K&P is less likely rejecting the null indicating a potential cross-correlation across stocks and inflation of event-date variance. To continue, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominates parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests. The regression of the 31 constituent stock returns on the EUROSTOXX600 delivers significant negative CAARs across all windows.

Comparing the regression analysis of the two regression approaches 1) regression of the WBI index against EUROSTOXX600 and 2) regression of WBI constituent stocks against EUROSTOXX600 a difference in results becomes evident. The spread widening of AARs between the two approaches was greatest from t-6 to t+6, standing at 388 basis points. This difference results from the fact that the WBI is weighted according to the market capitalization of its companies, whereas the second approach equally weighs all companies encompassed in the study, thereby downplaying the effect of large-cap companies while magnifying the reaction of small-cap companies.

Table 12: Industry-based AARs of the WBI stocks regressed against the WBI index over the event window

Event Window			Pre-event day							Event day	Post-event day					
			-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	
Financials	MM	AAR	-0.96%	-1.10%	0.20%	-0.01%	-0.99%	-0.36%	-4.28%	1.42%	-3.40%	1.21%	-1.57%	1.89%	-2.54%	
		t-test	0.0362**	0.0168**	0.6575	0.9790	0.0301**	0.4297	0.0000***	0.0024***	0.0000***	0.0162**	0.0007***	0.0000***	0.0000***	
		K&P	0.3355	0.1465	0.6542	0.9480	0.5457	0.6222	0.2887	0.2071	0.1891	0.4068	0.0761*	0.3216	0.1497	
	FF3	WRank	0.2489	0.1159	0.3454	0.7532	0.7532	0.4631	0.1730	0.1730	0.1730	0.2489	0.1159	0.3454	0.1159	
		AAR	-1.05%	-1.09%	-0.03%	-0.07%	-0.96%	-0.36%	-4.09%	1.59%	-2.87%	1.14%	-1.66%	1.71%	-2.55%	
		t-test	0.0195**	0.0159**	0.9411	0.8719	0.0331**	0.4226	0.0000***	0.0007***	0.0000***	0.0219**	0.0003***	0.0002***	0.0000***	
		K&P	0.2982	0.1185	0.8933	0.9974	0.5420	0.6178	0.2913	0.1838	0.2354	0.4361	0.0679*	0.3453	0.1472	
		WRank	0.2489	0.1159	0.9165	0.7532	0.7532	0.4631	0.1730	0.1159	0.2489	0.1159	0.2489	0.1159	0.1159	
Basic Industries	MM	AAR	2.05%	-0.88%	-0.45%	0.29%	0.01%	-0.12%	-1.04%	0.97%	1.04%	2.33%	3.38%	-0.71%	-0.20%	
		t-test	0.0005***	0.1305	0.4431	0.6287	0.9837	0.8317	0.1004	0.1027	0.0795*	0.0003***	0.0000***	0.2218	0.7408	
		K&P	0.0002***	0.1206	0.2339	0.5615	0.9680	0.7870	0.4618	0.4954	0.6106	0.1908	0.0003***	0.3750	0.9635	
	FF3	WRank	0.0180**	0.1282	0.2367	0.3980	1.0000	0.6121	0.3980	0.3980	0.3980	0.1763	0.0180**	0.3105	0.8658	
		AAR	1.93%	-0.82%	-0.60%	0.27%	0.07%	-0.14%	-0.92%	1.22%	1.26%	2.23%	3.41%	-0.94%	-0.31%	
		t-test	0.0008***	0.1542	0.2923	0.6332	0.9061	0.8028	0.1366	0.0384**	0.0358**	0.0004***	0.0000***	0.1010	0.5915	
		K&P	0.0002***	0.1563	0.2530	0.5494	0.9040	0.7582	0.5390	0.4261	0.4628	0.1944	0.0003***	0.2618	0.9526	
		WRank	0.0180**	0.1282	0.3980	0.3980	1.0000	0.6121	0.3980	0.3105	0.4990	0.1763	0.0180**	0.3105	0.8658	
Technology & Telecom	MM	AAR	-1.50%	0.50%	1.24%	-0.63%	2.34%	-1.17%	1.89%	-0.74%	0.88%	0.79%	2.54%	-0.94%	-0.92%	
		t-test	0.2524	0.7019	0.3450	0.6374	0.0766*	0.3729	0.1856	0.5810	0.5079	0.5871	0.0539*	0.4735	0.4953	
		K&P	0.0000***	0.6970	0.0095***	0.9186	0.2680	0.0784*	0.9387	0.0000***	0.6459	0.9096	0.0058***	0.0765*	0.5708	
	FF3	WRank	0.1797	0.6547	0.1797	0.6547	0.1797	0.1797	0.1797	0.1797	0.6547	0.6547	0.1797	0.1797	0.6547	
		AAR	-1.23%	0.47%	1.85%	-0.48%	2.24%	-1.16%	1.40%	-1.22%	-0.42%	0.99%	2.75%	-0.43%	-0.85%	
		t-test	0.3329	0.7146	0.1481	0.7082	0.0785*	0.3590	0.3088	0.3481	0.7506	0.4780	0.0319**	0.7335	0.5139	
		K&P	0.0008***	0.6791	0.0000***	0.9808	0.2627	0.0750*	0.8951	0.0003***	0.2028	0.8232	0.0008***	0.3945	0.5433	
		WRank	0.1797	0.6547	0.1797	0.6547	0.1797	0.1797	0.6547	0.1797	0.1797	0.6547	0.1797	0.6547	0.6547	
Utilities	MM	AAR	1.36%	2.51%	0.10%	-0.40%	1.72%	2.44%	8.10%	-1.93%	6.64%	-7.14%	-3.10%	-2.98%	4.81%	
		t-test	0.2282	0.0276**	0.9310	0.7253	0.1296	0.0317**	0.0000***	0.0960*	0.0000***	0.0000***	0.0066***	0.0087***	0.0000***	
		K&P	0.2536	0.2902	0.8257	0.0001***	0.5578	0.0000***	0.0271**	0.0433**	0.0000***	0.0894*	0.0437**	0.0000***	0.2179	
	FF3	WRank	0.1797	0.1797	0.6547	0.1797	0.6547	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	
		AAR	1.69%	2.48%	0.87%	-0.21%	1.61%	2.44%	7.49%	-2.50%	4.96%	-6.90%	-2.81%	-2.37%	4.86%	
		t-test	0.1170	0.0225**	0.4257	0.8473	0.1362	0.0239**	0.0000***	0.0246**	0.0000***	0.0000***	0.0100***	0.0291**	0.0000***	
		K&P	0.1267	0.2508	0.2708	0.0081***	0.5542	0.0000***	0.0278**	0.0034***	0.0000***	0.0747*	0.0408**	0.0000***	0.1819	
		WRank	0.1797	0.1797	0.1797	0.1797	0.6547	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	0.1797	
Consumer Products	MM	AAR	-0.03%	0.34%	-0.49%	-0.23%	1.22%	-0.68%	-0.79%	1.06%	1.45%	1.53%	-0.13%	-1.33%	-1.71%	
		t-test	0.9651	0.6744	0.5398	0.7772	0.1261	0.3921	0.3602	0.1917	0.0739*	0.0817*	0.8744	0.0964*	0.0367**	
		K&P	0.9373	0.2422	0.7626	0.6809	0.4171	0.4100	0.6599	0.2384	0.0669*	0.0845*	0.6666	0.4560	0.1550	
	FF3	WRank	1.0000	0.1441	0.7150	0.7150	0.4652	0.2733	0.4652	0.2733	0.0679*	0.1441	0.7150	0.2733	0.1441	
		AAR	-0.06%	0.43%	-0.35%	-0.15%	1.25%	-0.71%	-0.91%	1.15%	0.97%	1.51%	0.05%	-1.38%	-1.86%	
		t-test	0.9388	0.5949	0.6593	0.8522	0.1177	0.3754	0.2952	0.1607	0.2479	0.0872*	0.9504	0.0870*	0.0240**	
		K&P	0.8631	0.1268	0.8691	0.7299	0.3897	0.3741	0.6266	0.1711	0.3567	0.0820*	0.7504	0.4220	0.1223	
		WRank	1.0000	0.0679*	0.7150	0.7150	0.4652	0.2733	0.4652	0.1441	0.2733	0.1441	0.7150	0.2733	0.1441	
Industrial Goods & Services	MM	AAR	-0.01%	-0.54%	1.04%	-1.53%	1.38%	-0.14%	0.76%	-0.14%	0.79%	3.19%	-0.40%	-1.56%	-0.83%	
		t-test	0.9829	0.3515	0.0750*	0.0097***	0.0185**	0.8149	0.2257	0.8098	0.1798	0.0000***	0.4878	0.0075***	0.1615	
		K&P	0.7772	0.4655	0.2661	0.2934	0.3375	0.5822	0.3865	0.8864	0.4769	0.0001***	0.4855	0.0319**	0.0918*	
	FF3	WRank	0.3329	0.2845	0.0745*	0.5076	0.5076	0.4446	0.5076	0.8785	0.3863	0.0069***	0.5751	0.0166**	0.0926*	
		AAR	0.05%	-0.51%	1.26%	-1.46%	1.37%	-0.15%	0.58%	-0.22%	0.23%	3.23%	-0.27%	-1.45%	-0.89%	
		t-test	0.9378	0.3814	0.0316**	0.0136**	0.0191**	0.8007	0.3541	0.7069	0.7064	0.0000***	0.6476	0.0130**	0.1365	
		K&P	0.6245	0.4704	0.1170	0.3203	0.3449	0.5615	0.4545	0.7462	0.9286	0.0001***	0.5873	0.0629*	0.0595*	
		WRank	0.3329	0.2845	0.0367**	0.5076	0.5076	0.3863	0.5751	0.5751	0.7989	0.0069***	0.7213	0.0284**	0.0593*	

Notes: This table presents the average abnormal returns (AARs) of the stocks belonging to the WBI index on an industry level regressed against the WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

It becomes evident that the K&P test does not deliver significant results; its power may diminish if model specifications are not met. Small sample sizes or high variance across data in the sample could reduce the test's reliability. For the WRank, likewise, a small sample size, the violation of model assumptions or the occurrence of many outliers in the underlying data could potentially diminish its reliability.

Further, due to the equal weight assigned to each company/industry in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than what they obtain in the market index. This must be accounted for in the interpretation. Depending on the direction, a company/industry may have performed better or worse relative to the market. However, this approach is justified as in the event study literature; the focus is almost always on the mean distribution of abnormal returns to understand whether the event is, on average, associated with a change in security holders' wealth (Khotari and Warner 2004). Continuing, equal treatment usually means that the event's impact on the selected companies/industries is considered in the analysis, without any particular weighting or prioritization of individual companies/industries, aimed at preventing any biases stemming from factors such as size.

Table 13: CAARs of the Financials sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period							
Event window	CAAR	<i>t</i> -test	K&P	WRank	Event window	CAAR	<i>t</i> -test	K&P	WRank	Event window	CAAR	<i>t</i> -test	K&P	WRank			
[-15;-1]	MM	-3.75%	0.0581*	0.0330**	0.2746	[0;0]	MM	-4.28%	0.0000***	0.2887	0.1730	[1;1]	MM	1.42%	0.0048***	0.2071	0.1730
	FF3	-5.01%	0.0104**	0.0159**	0.1392		FF3	-4.09%	0.0000***	0.2913	0.1730		FF3	1.59%	0.0014***	0.1838	0.1159
[-10;-1]	MM	-4.36%	0.0072***	0.1836	0.1135	[-1;1]	MM	-3.22%	0.0002***	0.4534	0.6475	[1;2]	MM	-1.98%	0.0045***	0.6146	0.8139
	FF3	-5.05%	0.0016***	0.1379	0.0625*		FF3	-2.86%	0.0008***	0.4805	0.7439		FF3	-1.29%	0.0602*	0.8645	1.0000
[-6;-1]	MM	-3.22%	0.0093***	0.3361	0.2204	[-2;2]	MM	-7.61%	0.0000***	0.3930	0.1779	[1;3]	MM	-0.77%	0.3795	0.9591	0.8446
	FF3	-3.57%	0.0034***	0.2807	0.1199		FF3	-6.69%	0.0000***	0.4262	0.2712		FF3	-0.15%	0.8644	0.8572	0.6791
[-5;-1]	MM	-2.26%	0.0454**	0.3655	0.4165	[-3;3]	MM	-6.41%	0.0000***	0.5619	0.4494	[1;4]	MM	-2.34%	0.0216**	0.7049	0.5677
	FF3	-2.52%	0.0236**	0.3012	0.2623		FF3	-5.63%	0.0001***	0.5913	0.5694		FF3	-1.81%	0.0704*	0.8425	0.6892
[-4;-1]	MM	-1.16%	0.2457	0.7255	0.9090	[-4;4]	MM	-7.77%	0.0000***	0.4876	0.2685	[1;5]	MM	-0.45%	0.6918	0.9809	0.9918
	FF3	-1.43%	0.1480	0.5893	0.6682		FF3	-7.32%	0.0000***	0.4798	0.2837		FF3	-0.10%	0.9297	0.8721	0.8936
[-3;-1]	MM	-1.36%	0.1136	0.6925	0.5566	[-5;5]	MM	-6.98%	0.0001***	0.4443	0.2992	[1;6]	MM	-2.98%	0.0182**	0.7086	0.4993
	FF3	-1.39%	0.1008	0.6706	0.5566		FF3	-6.71%	0.0002***	0.4338	0.3022		FF3	-2.64%	0.0333**	0.8101	0.5505
[-2;-1]	MM	-1.35%	0.0525*	0.5512	0.4328	[-6;6]	MM	-10.47%	0.0000***	0.3803	0.0758*	[1;10]	MM	-2.60%	0.1047	0.6398	0.5412
	FF3	-1.32%	0.0545*	0.5487	0.4328		FF3	-10.31%	0.0000***	0.3634	0.0710*		FF3	-2.39%	0.1288	0.7345	0.5412
[-1;-1]	MM	-0.36%	0.4637	0.6222	0.4631	[-10;10]	MM	-11.23%	0.0000***	0.2618	0.0623*	[1;15]	MM	-1.35%	0.4856	0.7830	0.8801
	FF3	-0.36%	0.4567	0.6178	0.4631		FF3	-11.52%	0.0000***	0.2280	0.0496**		FF3	-0.67%	0.7257	0.9296	0.9375
					[-15;15]	MM	-9.38%	0.0048***	0.2671	0.2018							
						FF3	-9.77%	0.0029***	0.1791	0.1492							

Notes: This table presents the cumulative average abnormal returns (CAARs) of the financials industry belonging to the WBI index regressed against WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

In the case of small sample sizes, statistical significance tests tend to lose power for what must be accounted for in the interpretation of results. The Financials industry shows statistically significant negative returns across all event windows except for February 25, 2022. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 14: CAARs of the Basic Industries sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period				
Event window	CAAR	<i>t</i> -test	K&P	WRank	Event window	CAAR	<i>t</i> -test	K&P	WRank	Event window	CAAR	<i>t</i> -test	K&P	WRank
[-15;-1]					[0;0]					[1;1]				
MM	2.06%	0.4110	0.7928	0.5341	MM	-1.04%	0.1200	0.4618	0.3980	MM	0.97%	0.1251	0.4954	0.3980
FF3	1.14%	0.6411	0.8205	0.6236	FF3	-0.92%	0.1577	0.5390	0.3980	FF3	1.22%	0.0495**	0.4261	0.3105
[-10;-1]					[-1;1]					[1;2]				
MM	2.51%	0.2184	0.0870*	0.2010	MM	-0.19%	0.8596	0.7122	0.9308	MM	2.01%	0.0225**	0.4786	0.2209
FF3	2.04%	0.3066	0.0551*	0.2502	FF3	0.15%	0.8859	0.7770	0.8484	FF3	2.48%	0.0040***	0.3444	0.1240
[-6;-1]					[-2;2]					[1;3]				
MM	0.89%	0.5684	0.0684*	0.6392	MM	0.86%	0.5476	0.9382	0.6232	MM	4.34%	0.0001***	0.1073	0.0630*
FF3	0.71%	0.6422	0.1095	0.6571	FF3	1.48%	0.2881	0.9595	0.5337	FF3	4.71%	0.0000***	0.0623*	0.0386**
[-5;-1]					[-3;3]					[1;4]				
MM	-1.16%	0.4163	0.1937	0.3257	MM	3.47%	0.0558*	0.5392	0.2268	MM	7.72%	0.0000***	0.0215**	0.0072***
FF3	-1.22%	0.3813	0.2268	0.3590	FF3	3.99%	0.0245**	0.4987	0.1908	FF3	8.12%	0.0000***	0.0157**	0.0026***
[-4;-1]					[-4;4]					[1;5]				
MM	-0.27%	0.8283	0.6299	0.7672	MM	6.41%	0.0022***	0.3898	0.0626*	MM	7.01%	0.0000***	0.0311**	0.0218**
FF3	-0.40%	0.7440	0.4989	0.7499	FF3	6.80%	0.0009***	0.3981	0.0456**	FF3	7.18%	0.0000***	0.0268**	0.0134**
[-3;-1]					[-5;5]					[1;6]				
MM	0.17%	0.8736	0.7359	0.8484	MM	4.81%	0.0373**	0.7084	0.3111	MM	6.81%	0.0000***	0.0269**	0.0385**
FF3	0.20%	0.8506	0.7282	0.8757	FF3	5.04%	0.0255**	0.7012	0.2716	FF3	6.87%	0.0000***	0.0236**	0.0310**
[-2;-1]					[-6;6]					[1;10]				
MM	-0.11%	0.8991	0.8422	0.6378	MM	6.66%	0.0096***	0.1652	0.1246	MM	9.06%	0.0000***	0.0125**	0.0364**
FF3	-0.07%	0.9309	0.8720	0.6378	FF3	6.65%	0.0081***	0.1704	0.1089	FF3	8.94%	0.0000***	0.0124**	0.0414**
[-1;-1]					[-10;10]					[1;15]				
MM	-0.12%	0.8421	0.7870	0.6121	MM	10.54%	0.0017***	0.0871*	0.0378**	MM	8.93%	0.0003***	0.0313**	0.0857*
FF3	-0.14%	0.8149	0.7582	0.6121	FF3	10.06%	0.0022***	0.0821*	0.0464**	FF3	9.35%	0.0001***	0.0253**	0.0752*
					[-15;15]									
					MM	9.94%	0.0183**	0.4116	0.1211					
					FF3	9.57%	0.0200**	0.4874	0.1409					

Notes: This table presents the cumulative average abnormal returns (CAARs) of the Basic Industries sector belonging to the WBI index regressed against WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. In the case of small sample sizes, statistical significance tests tend to lose power for what has to be accounted for in the interpretation of results. The BI sector returns statistically significant positive returns in the post-event date period except for February 24, 2022. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 15: CAARs of the Utilities sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period				
Event window	CAAR	t-test	K&P	WRank	Event window	CAAR	t-test	K&P	WRank	Event window	CAAR	t-test	K&P	WRank
[-15;-1]					[0;0]					[1;1]				
MM	3.93%	0.4763	0.9106	0.6733	MM	8.10%	0.0000***	0.0271	0.1797	MM	-1.93%	0.1699	0.0433	0.1797
FF3	8.06%	0.1259	0.2826	0.0937	FF3	7.49%	0.0000***	0.0278**	0.1797	FF3	-2.50%	0.0613	0.0034	0.1797
[-10;-1]					[-1;1]					[1;2]				
MM	6.11%	0.1755	0.5683	0.1560	MM	8.62%	0.0004***	0.0657*	0.1730	MM	4.72%	0.0163**	0.1176	0.4652
FF3	8.35%	0.0522*	0.1708	0.0479**	FF3	7.43%	0.0014***	0.0755*	0.2489	FF3	2.45%	0.1873	0.6138	0.4652
[-6;-1]					[-2;2]					[1;3]				
MM	7.74%	0.0255	0.0000	0.0229	MM	16.98%	0.0000***	0.1025	0.0367**	MM	-2.43%	0.3224	0.0346**	0.7532
FF3	8.89%	0.0071***	0.0000***	0.0096***	FF3	14.00%	0.0000***	0.1378	0.0469**	FF3	-4.44%	0.0577*	0.0000***	0.7532
[-5;-1]					[-3;3]					[1;4]				
MM	6.37%	0.0442**	0.1876	0.0745*	MM	9.44%	0.0173**	0.1209	0.3305	MM	-5.52%	0.0520*	0.0000***	0.4838
FF3	7.20%	0.0172**	0.0968*	0.0284**	FF3	6.90%	0.0670*	0.1830	0.3305	FF3	-7.25%	0.0076***	0.0000***	0.4838
[-4;-1]					[-4;4]					[1;5]				
MM	3.86%	0.1701	0.0178**	0.2626	MM	6.44%	0.1543	0.1215	0.6165	MM	-8.51%	0.0074***	0.0000***	0.2845
FF3	4.71%	0.0787*	0.0002***	0.0929*	FF3	4.95%	0.2494	0.1023	0.4724	FF3	-9.63%	0.0015***	0.0000***	0.2845
[-3;-1]					[-5;5]					[1;6]				
MM	3.76%	0.1210	0.3600	0.3454	MM	5.97%	0.2333	0.3171	0.6148	MM	-3.70%	0.2921	0.2124	0.5829
FF3	3.85%	0.0957*	0.2879	0.3454	FF3	5.06%	0.2883	0.2898	0.4852	FF3	-4.77%	0.1542	0.0397**	0.5303
[-2;-1]					[-6;6]					[1;10]				
MM	4.16%	0.0344**	0.2732	0.1441	MM	12.14%	0.0289**	0.0602*	0.2919	MM	-2.05%	0.6470	0.1202	0.7089
FF3	4.06%	0.0303**	0.2493	0.1441	FF3	11.61%	0.0281**	0.0373**	0.2180	FF3	-2.65%	0.5329	0.0089***	0.6813
[-1;-1]					[-10;10]					[1;15]				
MM	2.44%	0.0783*	0.0000***	0.1797	MM	12.16%	0.0907*	0.4302	0.3388	MM	-0.64%	0.9070	0.2317	0.7499
FF3	2.44%	0.0640*	0.0000***	0.1797	FF3	13.18%	0.0542*	0.2331	0.2276	FF3	-2.85%	0.5821	0.0105**	0.6288
					[-15;15]									
					MM	11.40%	0.2043	0.7210	0.6261					
					FF3	12.70%	0.1377	0.3283	0.3281					

Notes: This table presents the cumulative average abnormal returns (CAARs) of the Utilities industry belonging to the WBI index regressed against WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

In the case of small sample sizes, statistical significance tests tend to lose power for what has to be accounted for in the interpretation of results. The UT sector returns statistically significant positive returns in the pre-event date period and significant negative returns after the event day. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 16: CAARs of the Consumer Products sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period				
Event window	CAAR	t-test	K&P	WRank	Event window	CAAR	t-test	K&P	WRank	Event window	CAAR	t-test	K&P	WRank
[-15;-1]					[0;0]					[1;1]				
MM	2.17%	0.5432	0.5737	0.4181	MM	-0.79%	0.4050	0.6599	0.4652	MM	1.06%	0.2399	0.2384	0.2733
FF3	2.77%	0.4378	0.4677	0.2959	FF3	-0.91%	0.3393	0.6266	0.4652	FF3	1.15%	0.2027	0.1711	0.1441
[-10;-1]					[-1;1]					[1;2]				
MM	0.35%	0.9049	0.6150	0.8613	MM	-0.41%	0.7915	0.6491	0.8753	MM	2.51%	0.0460**	0.0788*	0.0500**
FF3	0.71%	0.8073	0.7454	0.8088	FF3	-0.46%	0.7659	0.6232	0.8753	FF3	2.13%	0.0913*	0.1451	0.0687*
[-6;-1]					[-2;2]					[1;3]				
MM	0.13%	0.9550	0.9728	0.9544	MM	2.26%	0.2676	0.7201	0.3507	MM	4.04%	0.0110**	0.0000***	0.0229**
FF3	0.41%	0.8545	0.6120	0.9772	FF3	1.77%	0.3876	0.7982	0.5016	FF3	3.63%	0.0223**	0.0000***	0.0229**
[-5;-1]					[-3;3]					[1;4]				
MM	0.16%	0.9373	0.9103	1.0000	MM	3.57%	0.1654	0.7201	0.2364	MM	3.92%	0.0329**	0.0286**	0.0703*
FF3	0.47%	0.8179	0.6453	0.9405	FF3	3.12%	0.2249	0.7654	0.2949	FF3	3.68%	0.0450**	0.0421**	0.0703*
[-4;-1]					[-4;4]					[1;5]				
MM	-0.18%	0.9228	0.7891	0.6417	MM	2.95%	0.3161	0.8343	0.4414	MM	2.59%	0.2028	0.0352**	0.2627
FF3	0.04%	0.9811	0.9109	0.6791	FF3	2.82%	0.3389	0.8104	0.4603	FF3	2.31%	0.2571	0.0674*	0.2959
[-3;-1]					[-5;5]					[1;6]				
MM	0.31%	0.8398	0.9658	0.8139	MM	1.96%	0.5475	0.7903	0.5995	MM	0.88%	0.6976	0.3230	0.7317
FF3	0.40%	0.7988	0.9910	0.8139	FF3	1.87%	0.5671	0.7461	0.6323	FF3	0.45%	0.8446	0.4583	0.8192
[-2;-1]					[-6;6]					[1;10]				
MM	0.54%	0.6663	0.5053	1.0000	MM	0.22%	0.9523	0.9014	0.9927	MM	0.11%	0.9686	0.0099***	0.8507
FF3	0.55%	0.6637	0.4885	1.0000	FF3	-0.06%	0.9879	0.8830	0.9202	FF3	-0.36%	0.9001	0.1329	0.9357
[-1;-1]					[-10;10]					[1;15]				
MM	-0.68%	0.4430	0.4100	0.2733	MM	-0.33%	0.9441	0.6982	0.9538	MM	-0.29%	0.9344	0.0156**	0.9589
FF3	-0.71%	0.4267	0.3741	0.2733	FF3	-0.56%	0.9052	0.6923	0.9858	FF3	-0.72%	0.8380	0.1518	0.9530
					[-15;15]									
					MM	1.09%	0.8537	0.7534	0.6826					
					FF3	1.15%	0.8464	0.7190	0.6446					

Notes: This table presents the cumulative average abnormal returns (CAARs) of the Consumer Products industry belonging to the WBI index regressed against WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. In the case of small sample sizes, statistical significance tests tend to lose power for what must be accounted for in the interpretation of results. The CP sector returns statistically significant positive returns in the post-event date period except for February 25, 2022. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 17: CAARs of the Industrial Goods & Services sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period							
Event window	CAAR	<i>t</i> -test	<i>K&P</i>	<i>W</i> Rank	Event window	CAAR	<i>t</i> -test	<i>K&P</i>	<i>W</i> Rank	Event window	CAAR	<i>t</i> -test	<i>K&P</i>	<i>W</i> Rank			
[-15;-1]	MM	2.64%	0.2811	0.6985	0.3555	[0;0]	MM	0.76%	0.2439	0.3865	0.5076	[1;1]	MM	-0.14%	0.8178	0.8864	0.8785
	FF3	3.77%	0.1233	0.3633	0.1161		FF3	0.58%	0.3714	0.4545	0.5751		FF3	-0.22%	0.7165	0.7462	0.5751
[-10;-1]	MM	1.30%	0.5166	0.8774	0.5337	[-1;1]	MM	0.49%	0.6478	0.6409	0.6435	[1;2]	MM	0.65%	0.4487	0.7270	0.5503
	FF3	1.92%	0.3342	0.4462	0.3007		FF3	0.21%	0.8401	0.8150	0.8451		FF3	0.01%	0.9941	0.8563	0.8519
[-6;-1]	MM	0.20%	0.8969	0.9357	0.9648	[-2;2]	MM	2.66%	0.0588*	0.1115	0.2818	[1;3]	MM	3.84%	0.0005***	0.0205**	0.0157**
	FF3	0.56%	0.7109	0.8041	0.8195		FF3	1.81%	0.1949	0.2798	0.5527		FF3	3.24%	0.0030***	0.0796*	0.0519*
[-5;-1]	MM	0.21%	0.8805	0.7851	0.7537	[-3;3]	MM	4.31%	0.0157**	0.3750	0.0786*	[1;4]	MM	3.44%	0.0066***	0.0185**	0.0497**
	FF3	0.52%	0.7098	0.9500	0.9654		FF3	3.59%	0.0435**	0.4918	0.1491		FF3	2.97%	0.0182**	0.0757*	0.1127
[-4;-1]	MM	0.75%	0.5442	0.6950	0.8719	[-4;4]	MM	4.95%	0.0156**	0.0635*	0.0568*	[1;5]	MM	1.88%	0.1791	0.1800	0.4371
	FF3	1.03%	0.4064	0.4724	0.6769		FF3	4.58%	0.0247**	0.0651*	0.0770*		FF3	1.52%	0.2754	0.3622	0.6055
[-3;-1]	MM	-0.29%	0.7874	0.4613	0.5170	[-5;5]	MM	2.85%	0.2078	0.5469	0.4164	[1;6]	MM	1.04%	0.5039	0.4227	0.8655
	FF3	-0.23%	0.8263	0.4884	0.5304		FF3	2.62%	0.2454	0.5501	0.4372		FF3	0.63%	0.6863	0.7114	0.8946
[-2;-1]	MM	1.24%	0.1500	0.4886	0.9108	[-6;6]	MM	2.00%	0.4251	0.6185	0.6198	[1;10]	MM	0.09%	0.9651	0.3034	0.7754
	FF3	1.22%	0.1553	0.5009	0.8519		FF3	1.77%	0.4785	0.5793	0.6698		FF3	-0.25%	0.8997	0.5791	0.5360
[-1;-1]	MM	-0.14%	0.8230	0.5822	0.4446	[-10;10]	MM	2.15%	0.5121	0.4831	0.6935	[1;15]	MM	-0.54%	0.8228	0.4766	0.6424
	FF3	-0.15%	0.8094	0.5615	0.3863		FF3	2.26%	0.4888	0.2133	0.7315		FF3	-1.19%	0.6194	0.9920	0.4171
					[-15;15]	MM	2.87%	0.4868	0.6229	0.6487							
						FF3	3.16%	0.4415	0.3810	0.6132							

Notes: This table presents the cumulative average abnormal returns (CAARs) of the Industrial Goods and Services sector belonging to the WBI index regressed against WBI, the market index, for each day in the event window. *K&P* is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). *W*Rank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. In the case of small sample sizes, statistical significance tests tend to lose power for what must be accounted for in the interpretation of results. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 18: CAARs of the Telecom & Technology sector regressed against the WBI index over the event window

Before the event period					Around and at the event days					After the event period							
Event window	CAAR	<i>t-test</i>	<i>K&P</i>	<i>W</i> Rank	Event window	CAAR	<i>t-test</i>	<i>K&P</i>	<i>W</i> Rank	Event window	CAAR	<i>t-test</i>	<i>K&P</i>	<i>W</i> Rank			
[-15;-1]	MM	9.82%	0.1254	0.3008	0.2989	[0;0]	MM	1.89%	0.2662	0.9387	0.6547	[1;1]	MM	-0.74%	0.6493	0.0000***	0.1797
	FF3	13.10%	0.0346**	0.2438	0.1915		FF3	1.40%	0.3913	0.8951	0.6547		FF3	-1.22%	0.4354	0.0003***	0.1797
[-10;-1]	MM	2.11%	0.6854	0.7358	0.8813	[-1;1]	MM	-0.02%	0.9939	0.6377	0.3454	[1;2]	MM	0.14%	0.9491	0.5909	0.7150
	FF3	3.89%	0.4400	0.7514	0.5503		FF3	-0.98%	0.7160	0.5063	0.3454		FF3	-1.65%	0.4509	0.0000***	0.0679*
[-6;-1]	MM	0.79%	0.8434	0.3048	0.9375	[-2;2]	MM	3.20%	0.3832	0.8988	0.8785	[1;3]	MM	0.93%	0.7433	0.8532	0.9165
	FF3	1.69%	0.6612	0.6489	0.8753		FF3	0.84%	0.8133	0.9578	0.4446		FF3	-0.66%	0.8107	0.1627	0.3454
[-5;-1]	MM	2.29%	0.5313	0.0000***	0.5751	[-3;3]	MM	3.36%	0.4628	0.9430	0.9750	[1;4]	MM	3.47%	0.2912	0.2716	0.2626
	FF3	2.92%	0.4088	0.0000***	0.4446		FF3	1.35%	0.7601	0.9040	0.6378		FF3	2.09%	0.5096	0.6266	0.6744
[-4;-1]	MM	1.79%	0.5832	0.0240**	0.6744	[-4;4]	MM	7.14%	0.1728	0.2712	0.2668	[1;5]	MM	2.53%	0.4888	0.6404	0.5076
	FF3	2.45%	0.4354	0.0000***	0.4838		FF3	5.94%	0.2394	0.2628	0.4204		FF3	1.66%	0.6385	0.8988	0.9594
[-3;-1]	MM	0.54%	0.8468	0.2679	0.9165	[-5;5]	MM	6.70%	0.2479	0.5351	0.3548	[1;6]	MM	1.61%	0.6915	0.6689	0.7537
	FF3	0.60%	0.8245	0.1742	0.9165		FF3	5.98%	0.2858	0.5238	0.5057		FF3	0.81%	0.8374	0.5490	0.8139
[-2;-1]	MM	1.17%	0.6070	0.3713	1.0000	[-6;6]	MM	4.29%	0.5036	0.9720	0.7509	[1;10]	MM	-1.08%	0.8352	0.6533	0.4781
	FF3	1.08%	0.6220	0.3713	1.0000		FF3	3.90%	0.5288	0.9822	0.9292		FF3	-1.50%	0.7637	0.2511	0.3135
[-1;-1]	MM	-1.17%	0.4657	0.0784*	0.1797	[-10;10]	MM	2.92%	0.7252	0.7892	0.7881	[1;15]	MM	-3.58%	0.5704	0.3514	0.1589
	FF3	-1.16%	0.4527	0.0750*	0.1797		FF3	3.79%	0.6367	0.9764	0.9452		FF3	-5.32%	0.3820	0.0127**	0.0937*
					[-15;15]	MM	8.13%	0.4343	0.5783	0.7980							
						FF3	9.18%	0.3605	0.4862	0.8968							

Notes: This table presents the cumulative average abnormal returns (CAARs) of the Telecom & Technology sector belonging to the WBI index regressed against WBI, the market index, for each day in the event window. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively. In the case of small sample sizes, statistical significance tests tend to lose power for what must be accounted for in the interpretation of results. Further, due to the equal weight assigned to each company in the event study approach, positive and negative (cumulative) abnormal returns may receive more or less weight in the event study than they obtain in the market index. Depending on the direction, an industry may have performed better or worse than the market. Concluding, Kolari and Pynnoenen (2011) also state that as stock prices are not normally distributed, the power of non-parametric rank tests dominate parametric tests in event study analyses of abnormal returns on a single day. However, they also highlight that problems arise in the application of non-parametric tests to multiple-day analyses of cumulative abnormal returns (CARs), which have caused researchers to usually rely upon parametric tests.

Table 19: Results of cross-sectional analysis

Variables	LnTA	BTM	CACL	ROA	TDTA	EXP	VOL	PAST	Observations	R ²	Breusch-Pagan	White's test
<u>Before the event period</u>												
[-6;-1]	-0.0069 (0.0071)	0.0048 (0.0140)	-0.0179 (0.0115)	-0.1118 (0.1625)	-0.0712 (0.0557)	0.0059 (0.0201)	1.0748 (2.3416)	-0.2104 (3.8756)	31	0.2444	0.8300 0.3634	31 0.4154
[-5;-1]	-0.0018 (0.0064)	0.0050 (0.0127)	-0.0150 (0.0104)	-0.0885 (0.1467)	-0.0808 (0.0502)	-0.0049 (0.0182)	2.0481 (2.1136)	-1.3778 (3.4983)	31	0.2373	0.1200 0.7290	
[-4;-1]	0.0002 (0.0053)	-0.0050 (0.0104)	-0.0012 (0.0086)	-0.0464 (0.1209)	-0.0800* (0.0414)	0.0051 (0.0150)	1.2632 (1.7426)	0.7082 (2.8843)	31	0.2697	1.9900 0.1587	
[-3;-1]	-0.0008 (0.0053)	-0.0017 (0.0105)	-0.0072 (0.0086)	-0.0464 (0.1213)	-0.0535 (0.0416)	0.0043 (0.0150)	0.7464 (1.7479)	3.3142 (2.8930)	31	0.1887	3.1500 0.0759*	
[-2;-1]	-0.0047 (0.0045)	-0.0032 (0.0089)	0.0025 (0.0073)	-0.2403** (0.1027)	-0.0580 (0.0352)	0.0108 (0.0127)	1.2842 (1.4791)	-0.2984 (2.4481)	31	0.4561	0.3000 0.5864	
[-1;-1]	0.0004 (0.0024)	-0.0007 (0.0047)	0.0004 (0.0039)	-0.1092* (0.0542)	-0.0367* (0.0186)	0.0074 (0.0067)	-0.4560 (0.7816)	0.1117 (1.2936)	31	0.3065	0.7700 0.3788	
<u>Around and at the event days</u>												
[0;0]	-0.0056 (0.0077)	-0.0182 (0.0152)	-0.0223* (0.0125)	-0.1553 (0.1762)	-0.0645 (0.0604)	-0.0058 (0.0218)	3.0107 (2.5394)	-1.3063 (4.2030)	31	0.3451	2.6600 0.1331	
[-1;1]	-0.0077 (0.0084)	-0.0249 (0.0165)	-0.0119 (0.0136)	-0.2636 (0.1915)	-0.0259 (0.0656)	0.0026 (0.0237)	1.6160 (2.7597)	-2.1700 (4.5677)	31	0.2789	2.8100 0.0939*	
[-2;2]	-0.0252* (0.0140)	-0.0270 (0.0276)	-0.0239 (0.0227)	-0.5189 (0.3201)	-0.0510 (0.1096)	-0.0025 (0.0396)	4.5504 (4.6117)	-4.5140 (7.6329)	31	0.3993	5.0700 0.0244**	
[-3;3]	-0.0256 (0.0162)	-0.0270 (0.0321)	-0.0242 (0.0264)	-0.1232 (0.3712)	-0.0531 (0.1271)	0.0032 (0.0460)	2.6657 (5.3478)	2.1048 (8.8513)	31	0.2999	12.8400 0.0003***	
[-4;4]	-0.0234 (0.0165)	-0.0342 (0.0326)	-0.0122 (0.0268)	0.0301 (0.3773)	-0.0820 (0.1292)	0.0016 (0.0467)	4.8899 (5.4366)	3.2231 (8.9983)	31	0.3623	11.6200 0.0007***	
[-5;5]	-0.0272 (0.0212)	-0.0271 (0.0419)	-0.0403 (0.0344)	-0.0590 (0.4846)	-0.1182 (0.1660)	0.0212 (0.0600)	4.5307 (6.9823)	8.0978 (11.5567)	31	0.2985	8.9000 0.0028***	
[-6;6]	-0.0199 (0.0177)	-0.0169 (0.0350)	-0.0228 (0.0288)	0.0017 (0.4049)	-0.0678 (0.1387)	-0.0067 (0.0501)	4.9962 (5.8336)	4.4074 (9.6553)	31	0.2612	6.8200 0.0090***	
<u>After the event period</u>												
[1;1]	-0.0025 (0.0029)	-0.0060 (0.0057)	0.0099** (0.0047)	0.0009 (0.0661)	0.0753*** (0.0226)	0.0011 (0.0082)	-0.9387 (0.9523)	-0.9753 (1.5761)	31	0.4106	0.5600 0.4558	
[1;2]	-0.0148** (0.0061)	-0.0057 (0.0121)	-0.0041 (0.0100)	-0.1233 (0.1403)	0.0715 (0.0481)	-0.0075 (0.0174)	0.2555 (2.0217)	-2.9093 (3.3462)	31	0.3119	1.7200 0.1898	
[1;3]	-0.0192** (0.0069)	-0.0072 (0.0135)	0.0053 (0.0111)	0.0785 (0.1567)	0.0649 (0.0537)	0.0047 (0.0194)	-1.0915 (2.2573)	0.0969 (3.7362)	31	0.3507	8.1800 0.0042***	
[1;4]	-0.0179* (0.0088)	-0.0110 (0.0174)	0.0113 (0.0143)	0.2317 (0.2011)	0.0625 (0.0689)	0.0024 (0.0249)	0.6160 (2.8971)	3.8212 (4.7951)	31	0.3700	9.1200 0.0025***	
[1;5]	-0.0125 (0.0091)	-0.0037 (0.0180)	0.0145 (0.0148)	0.2455 (0.2082)	0.0775 (0.0713)	0.0041 (0.0258)	-0.0627 (2.9991)	7.0917 (4.9639)	31	0.2938	2.4400 0.1181	
[1;6]	-0.0147 (0.0102)	-0.0138 (0.0201)	-0.0001 (0.0165)	0.2082 (0.2323)	0.0175 (0.0796)	0.0211 (0.0288)	0.4452 (3.3471)	9.6145* (5.5399)	31	0.3178	0.6100 0.4336	

Notes: This table represents the cross-sectional estimates for the pre- and post-event date period of Putin's announcement of the special military operations on February 24, 2022, on CARs for the 31 constituent stocks of the WBI. The dependent variables are the companies' CARs for different event windows; before [-6;-1] [-5;-1] [-4;-1] [-3;-1] [-2;-1] [-1,-1], around and at [-6;6] [-5;5] [-4;4] [-3;3] [-2;2] [-1;1] [0;0] and after [1;1] [1;2] [1;3] [1;4] [1;5] [1;6] the event date, calculated based on the market model. The following firm-specific variables are used: LnTA – total assets as size proxy; BTM – book-to-market as risk-metric; CACL – current assets / current liabilities as liquidity figure; TDTA – total debt / total assets as leverage figure; ROA – return on assets as rentability indicator; EXP indicating a firm's exposure to Russia; PAST – log-returns of the 30 days before the invasion date; VOL – standard deviation of log returns during estimation window. Standard errors are provided in parentheses below the coefficient. ***, **, and * indicate significant values at 1 percent, 5 percent, and 10 percent, respectively. Heteroskedasticity was tested for, following White's and Breusch-Pagan's test, the latter rejecting homoscedasticity, particularly in [1,3] [1,4] and the event windows dispersing around the event date. To account for inconsistent variability of residuals across different levels of the independent variables (heteroskedasticity), the OLS regression was adjusted for using robust standard errors (see Table 20).

Table 20: Results of cross-sectional analysis using robust standard errors

Variables	LnTA	BTM	CACL	ROA	TDTA	EXP	VOL	PAST	Observations	R ²
<u>Before the event period</u>										
[-6;-1]	-0.0069 (0.0098)	0.0048 (0.0156)	-0.0179 (0.0101)	-0.1118 (0.1397)	-0.0712 (0.0526)	0.0059 (0.0155)	1.0748 (2.2011)	-0.2104 (3.4129)	31	0.2444
[-5;-1]	-0.0018 (0.0087)	0.0050 (0.0165)	-0.0150* (0.0086)	-0.0885 (0.1298)	-0.0808 (0.0479)	-0.0049 (0.0144)	2.0481 (1.9613)	-1.3778 (3.3330)	31	0.2373
[-4;-1]	0.0002 (0.0068)	-0.0050 (0.0136)	-0.0012 (0.0076)	-0.0464 (0.0861)	-0.0800* (0.0428)	0.0051 (0.0132)	1.2632 (1.4250)	0.7082 (2.4548)	31	0.2391
[-3;-1]	-0.0008 (0.0072)	-0.0017 (0.0116)	-0.0072 (0.0070)	-0.0464 (0.0992)	-0.0535 (0.0395)	0.0043 (0.0119)	0.7464 (1.6206)	3.3142 (2.4329)	31	0.1887
[-2;-1]	-0.0047 (0.0051)	-0.0032 (0.0091)	0.0025 (0.0070)	-0.2403** (0.0888)	-0.0580 (0.0377)	0.0108 (0.0120)	1.2842 (1.3873)	-0.2984 (1.7958)	31	0.4561
[-1;-1]	0.0004 (0.0023)	-0.0007 (0.0031)	0.0004 (0.0031)	-0.1092* (0.0456)	-0.0367* (0.0145)	0.0074 (0.0054)	-0.4560 (0.7056)	0.1117 (1.0818)	31	0.3065
<u>Around and at the event days</u>										
[0;0]	-0.0056 (0.0088)	-0.0182 (0.0132)	-0.0223* (0.0109)	-0.1553 (0.1308)	-0.0645 (0.0495)	-0.0058 (0.0187)	3.0107 (2.8879)	-1.3063 (3.3704)	31	0.3451
[-1;1]	-0.0077 (0.0099)	-0.0249* (0.0136)	-0.0119 (0.0108)	-0.2636 (0.1818)	-0.0259 (0.0503)	0.0026 (0.0170)	1.6160 (2.9480)	-2.1700 (3.4205)	31	0.2789
[-2;2]	-0.0252 (0.0179)	-0.0270 (0.0222)	-0.0239 (0.0197)	-0.5189* (0.2713)	-0.0510 (0.0951)	-0.0025 (0.0269)	4.5504 (4.8378)	-4.5140 (6.2471)	31	0.3993
[-3;3]	-0.0256 (0.0206)	-0.0270 (0.0233)	-0.0242 (0.0207)	-0.1232 (0.2369)	-0.0531 (0.1117)	0.0032 (0.0337)	2.6657 (5.2085)	2.1048 (6.2469)	31	0.2999
[-4;4]	-0.0234 (0.0203)	-0.0342 (0.0229)	-0.0122 (0.0191)	0.0301 (0.1420)	-0.0820 (0.1063)	0.0016 (0.0343)	4.8899 (5.0592)	3.2231 (6.9055)	31	0.3623
[-5;5]	-0.0199 (0.0224)	-0.0169 (0.0255)	-0.0228 (0.0210)	0.0017 (0.1984)	-0.0678 (0.1177)	-0.0067 (0.0393)	4.9962 (5.7312)	4.4074 (8.1184)	31	0.2612
[-6;6]	-0.0272 (0.0270)	-0.0271 (0.0323)	-0.0403 (0.0297)	-0.0590 (0.2869)	-0.1182 (0.1497)	0.0212 (0.0490)	4.5307 (6.5942)	8.0978 (11.3253)	31	0.2985
<u>After the event period</u>										
[1;1]	-0.0025 (0.0032)	-0.0060 (0.0044)	0.0099*** (0.0029)	0.0009 (0.0634)	0.0753*** (0.0181)	0.0011 (0.0078)	-0.9387 (0.8051)	-0.9753 (1.7925)	31	0.4106
[1;2]	-0.0148** (0.0069)	-0.0057 (0.0092)	-0.0041 (0.0096)	-0.1233 (0.1514)	0.0715 (0.0488)	-0.0075 (0.0126)	0.2555 (1.7329)	-2.9093 (4.2088)	31	0.3119
[1;3]	-0.0192*** (0.0068)	-0.0072 (0.0093)	0.0053 (0.0100)	0.0785 (0.1202)	0.0649 (0.0503)	0.0047 (0.0131)	-1.0915 (1.6888)	0.0969 (2.9012)	31	0.3507
[1;4]	-0.0179** (0.0082)	-0.0110 (0.0099)	0.0113 (0.0120)	0.2317** (0.0880)	0.0625 (0.0593)	0.0024 (0.0153)	0.6160 (1.8320)	3.8212 (4.5128)	31	0.3700
[1;5]	-0.0125 (0.0084)	-0.0037 (0.0116)	0.0145 (0.0120)	0.2455** (0.1075)	0.0775 (0.0647)	0.0041 (0.0203)	-0.0627 (2.0956)	7.0917 (5.6800)	31	0.2938
[1;6]	-0.0147 (0.0105)	-0.0138 (0.0141)	-0.0001 (0.0129)	0.2082** (0.0869)	0.0175 (0.0707)	0.0211 (0.0259)	0.4452 (2.3357)	9.6145 (6.6298)	31	0.3178

Notes: This table represents the cross-sectional estimates for the pre- and post-event date period of Putin's announcement of the special military operations on February 24, 2022, on CARs for the 31 constituent stocks of the WBI. The dependent variables are the companies' CARs for different event windows; before [-6;-1] [-5;-1] [-4;-1] [-3;-1] [-2;-1] [-1;-1], around and at [-6;6] [-5;5] [-4;4] [-3;3] [-2;2] [-1;1] [0;0] and after [1;1] [1;2] [1;3] [1;4] [1;5] [1;6], calculated using the market model. The following firm-specific variables are used: LnTA – total assets as size proxy; BTM – book-to-market as risk-metric; CACL – current assets / current liabilities as liquidity figure; TDTA – total debt / total assets as leverage figure; ROA – return on assets as rentability indicator; EXP indicating a firm's exposure to Russia; PAST – log-returns of the 30 days before the invasion date; VOL – standard deviation of log returns during estimation window. Robust standard errors are provided in parentheses below the coefficient. ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent, respectively.

Table 21: Correlation matrix of firm-specific factors

	size	growth	liquidity	exposure	leverage	rentability	past returns	volatility
size	1.0000							
growth	0.2302	1.0000						
liquidity	-0.2090	0.0257	1.0000					
exposure	0.2825	0.2193	-0.0688	1.0000				
leverage	0.5104	0.1602	-0.2665	0.0198	1.0000			
rentability	-0.1891	0.0305	-0.0666	-0.0490	-0.1648	1.0000		
past returns	-0.1948	-0.0564	0.1451	-0.1619	0.0260	-0.1533	1.0000	
volatility	-0.4671	-0.0797	0.3824	0.0287	-0.2934	-0.0496	0.2539	1.0000

Table 22: Variance Inflation factor

	size	growth	liquidity	exposure	leverage	rentability	past returns	volatility	mean VIF
VIF	1.95	1.11	1.25	1.22	1.5	1.12	1.16	1.57	1.36
1/VIF	0.51395	0.89776	0.79935	0.81869	0.66632	0.89534	0.86115	0.63671	

Notes: This table represents the variance inflation factor within the acceptable range, indicating that multicollinearity issues will not affect the OLS regression results.

Table 23: AARs of the size-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Size	Before the event period						Event date	After the event period					
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
small	0.29%	-0.53%	0.80%	-1.60%	2.76%	-0.47%	1.36%	0.07%	1.68%	2.78%	1.42%	-1.34%	0.10%
<i>t-test</i>	0.6524	0.4134	0.2235	0.0154**	0.0000***	0.4705	0.0536*	0.9213	0.0116**	0.0001***	0.0292**	0.0403**	0.8831
<i>K&P</i>	0.6482	0.6283	0.5375	0.3135	0.0260**	0.4075	0.4202	0.9417	0.2063	0.0174**	0.2602	0.2409	0.9294
<i>Wrank</i>	0.5751	0.8785	0.3329	0.2411	0.0218**	0.2845	0.3329	0.8785	0.1688	0.0125**	0.1141	0.0745*	0.9594
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10
medium	0.25%	-0.29%	0.15%	0.11%	-0.33%	-0.44%	-0.80%	0.62%	0.81%	1.41%	-0.07%	-0.88%	-1.44%
<i>t-test</i>	0.5540	0.4885	0.7146	0.8027	0.4278	0.2927	0.0770*	0.1429	0.0569*	0.0024***	0.8730	0.0361**	0.0008***
<i>K&P</i>	0.5388	0.2259	0.5376	0.6789	0.1856	0.2589	0.5676	0.4861	0.0699*	0.1097	0.8840	0.1687	0.2037
<i>Wrank</i>	0.2860	0.2477	0.2860	0.3739	0.0912*	0.1823	0.7897	0.2860	0.0754*	0.1095	0.9292	0.1095	0.0912*
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11
big	0.24%	-0.23%	-0.04%	-0.15%	-0.30%	0.50%	-1.33%	0.53%	-1.00%	0.55%	-0.49%	0.06%	-0.91%
<i>t-test</i>	0.5503	0.5725	0.9157	0.7238	0.4600	0.2244	0.0028***	0.2041	0.0163**	0.2187	0.2322	0.8796	0.0296**
<i>K&P</i>	0.6796	0.3140	0.8422	0.7061	0.5339	0.5047	0.2551	0.2456	0.2808	0.3679	0.4965	0.6720	0.1240
<i>Wrank</i>	0.5076	0.4446	0.9594	0.8785	0.7989	0.7989	0.3329	0.4446	0.6465	0.5076	0.5751	0.5076	0.2845
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the sized-based tercile portfolios formed using the amount of total assets of the financial statements year-ending 2021 of the 31 constituent stocks. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 24: CAARs of the size-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Size	Before the event period						At and round the event period							After the event period					
	[-6:-1]	[-5:-1]	[-4:-1]	[-3:-1]	[-2:-1]	[-1:-1]	[0:0]	[-1:1]	[-2:2]	[-3:3]	[-4:4]	[-5:5]	[-6:6]	[1:1]	[1:2]	[1:3]	[1:4]	[1:5]	[1:6]
small	1.24%	0.95%	1.48%	0.69%	2.29%	-0.47%	1.36%	0.96%	5.40%	6.58%	8.80%	6.93%	7.32%	0.07%	1.74%	4.53%	5.95%	4.62%	4.71%
<i>t-test</i>	0.4679	0.5448	0.2871	0.5665	0.0182**	0.4905	0.0634*	0.4191	0.0007***	0.0011***	0.0001***	0.0066***	0.0097***	0.9246	0.0705*	0.0002***	0.0000***	0.0034***	0.0074***
<i>K&P</i>	0.5592	0.9289	0.5261	0.9800	0.1022	0.4075	0.4202	0.6766	0.0066***	0.2455	0.0286**	0.1894	0.2380	0.9417	0.3446	0.0077***	0.0058***	0.0582*	0.1026
<i>Wrank</i>	0.5658	0.6259	0.4516	0.6884	0.1672	0.2845	0.3329	0.7813	0.0248**	0.0160**	0.0034***	0.0489**	0.0590*	0.8785	0.1560	0.0073***	0.0023***	0.0473**	0.0748*
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
medium	-0.56%	-0.80%	-0.51%	-0.66%	-0.77%	-0.44%	-0.80%	-0.62%	-0.14%	1.37%	1.46%	0.30%	-0.90%	0.62%	1.43%	2.84%	2.77%	1.90%	0.46%
<i>t-test</i>	0.6106	0.4226	0.5643	0.3841	0.2120	0.3127	0.0878*	0.4175	0.8899	0.2800	0.3168	0.8551	0.6167	0.1592	0.0201**	0.0003***	0.0022***	0.0580*	0.6824
<i>K&P</i>	0.7369	0.5126	0.9293	0.6349	0.1601	0.2589	0.5676	0.5076	0.6081	0.7870	0.6305	0.9253	0.8117	0.4861	0.1763	0.0022***	0.0007***	0.0181**	0.1367
<i>Wrank</i>	0.7811	0.4609	0.7794	0.4061	0.0335**	0.1823	0.7897	0.8934	0.9866	0.2565	0.2245	0.7144	0.9197	0.2860	0.0619*	0.0127**	0.0357**	0.2028	0.7039
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
big	0.02%	-0.23%	0.00%	0.05%	0.19%	0.50%	-1.33%	-0.31%	-1.61%	-1.20%	-1.73%	-1.90%	-2.57%	0.53%	-0.47%	0.08%	-0.41%	-0.34%	-1.26%
<i>t-test</i>	0.9878	0.8171	0.9963	0.9497	0.7495	0.2457	0.0040***	0.6798	0.1024	0.3350	0.2260	0.2309	0.1454	0.2241	0.4335	0.9148	0.6448	0.7249	0.2517
<i>K&P</i>	0.8279	0.4730	0.7270	0.7874	0.8369	0.5047	0.2551	0.6931	0.4898	0.6116	0.5357	0.4646	0.5540	0.2456	0.7745	0.8067	0.9955	0.8811	0.7821
<i>Wrank</i>	0.8888	0.7611	0.9893	0.9918	0.9108	0.7989	0.3329	0.8130	0.8130	0.9743	0.7797	0.5639	0.4677	0.4446	0.9702	0.7343	0.9893	0.8431	0.5609
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the CAARs of the sized-based tercile portfolios formed using the amount of total assets of the financial statements year-ending 2021 of the 31 constituent stocks. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 25: AARs of the growth-based tercile portfolios regressed against the WIB index over the event period using the Market Model

	Before the event period						Event date	After the event period					
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
Growth													
<u>high-growth</u>	-0.07%	-0.35%	0.72%	-1.05%	1.61%	-0.15%	0.77%	0.21%	0.69%	1.07%	-0.39%	-1.98%	0.38%
<i>t-test</i>	0.8859	0.5092	0.1689	0.0493**	0.0024***	0.7735	0.1767	0.6877	0.1938	0.0634*	0.4564	0.0002***	0.4814
<i>Kolari</i>	0.7005	0.6512	0.4093	0.3933	0.2374	0.5966	0.8629	0.6540	0.5275	0.4764	0.4945	0.0016***	0.8767
<i>Wrank</i>	0.6465	0.2845	0.7989	0.6465	0.5076	0.6465	0.5076	0.8785	0.5751	0.2845	0.5751	0.0125**	0.7989
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10
<u>medium-growth</u>	0.70%	-0.68%	0.35%	-0.05%	0.76%	0.13%	0.89%	0.66%	1.92%	2.74%	2.08%	-0.93%	-0.23%
<i>t-test</i>	0.1795	0.1988	0.5102	0.9180	0.1499	0.7977	0.1175	0.2164	0.0004***	0.0000***	0.0001***	0.0749*	0.6731
<i>Kolari</i>	0.3571	0.1544	0.2306	0.8230	0.2202	0.5968	0.7546	0.2997	0.0220**	0.0028***	0.0066***	0.1265	0.7743
<i>Wrank</i>	0.3281	0.2860	0.1823	0.7897	0.2860	0.8589	0.5937	0.2860	0.0409**	0.0099***	0.0099***	0.0505*	0.3281
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11
<u>low-growth</u>	0.11%	0.01%	-0.18%	-0.53%	-0.35%	-0.45%	-2.59%	0.34%	-1.24%	0.79%	-1.03%	0.77%	-2.53%
<i>t-test</i>	0.8048	0.9890	0.6780	0.2361	0.4274	0.3040	0.0000***	0.4498	0.0061***	0.1026	0.0198**	0.0796*	0.0000***
<i>Kolari</i>	0.9407	0.7213	0.6369	0.3232	0.5427	0.2385	0.2126	0.5859	0.3031	0.4223	0.1367	0.3508	0.0121**
<i>Wrank</i>	0.5076	0.8785	0.7989	0.5076	0.8785	0.2026	0.1394	0.6465	0.5751	0.5076	0.2411	0.7213	0.0469**
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the growth-based tercile portfolios formed using the book-to-market ratio of the 31 constituent stocks as of year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 26: CAARs of the growth-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Growth	Before the event period						At and round the event period							After the event period					
	[-6:-1]	[-5:-1]	[-4:-1]	[-3:-1]	[-2:-1]	[-1:-1]	[0:0]	[-1:1]	[-2:2]	[-3:3]	[-4:4]	[-5:5]	[-6:6]	[1:1]	[1:2]	[1:3]	[1:4]	[1:5]	[1:6]
high-growth	0.72%	0.79%	1.14%	0.41%	1.46%	-0.15%	0.77%	0.83%	3.13%	3.16%	3.49%	1.16%	1.47%	0.21%	0.91%	1.98%	1.59%	-0.39%	-0.02%
<i>t-test</i>	0.6017	0.5293	0.3091	0.6665	0.0609*	0.7833	0.1938	0.3854	0.0136**	0.0490**	0.0577*	0.5676	0.5171	0.7004	0.2416	0.0437**	0.1606	0.7533	0.9899
<i>Kolari</i>	0.7845	0.9755	0.5597	0.7793	0.4877	0.5966	0.8629	0.9396	0.4613	0.5767	0.3281	0.9122	0.7813	0.6540	0.4252	0.0514*	0.1298	0.6902	0.5992
<i>Wrank</i>	0.7740	0.6535	0.9786	0.8290	0.8519	0.6465	0.5076	0.6583	0.4147	0.2803	0.3077	0.9750	0.9509	0.8785	0.6542	0.1986	0.3332	0.8507	0.8540
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-growth	1.21%	0.51%	1.18%	0.84%	0.89%	0.13%	0.89%	1.68%	4.36%	7.05%	9.47%	7.87%	8.34%	0.66%	2.58%	5.32%	7.40%	6.47%	6.24%
<i>t-test</i>	0.3771	0.6859	0.2890	0.3830	0.2499	0.8058	0.1307	0.0783*	0.0006***	0.0000***	0.0000***	0.0001***	0.0003***	0.2348	0.0009***	0.0000***	0.0000***	0.0000***	0.0000***
<i>Kolari</i>	0.2356	0.8506	0.0770*	0.3218	0.1096	0.5968	0.7546	0.2990	0.0390**	0.0285**	0.0012***	0.0530*	0.0515*	0.2997	0.0181**	0.0014***	0.0004***	0.0013***	0.0014***
<i>Wrank</i>	0.3331	0.5188	0.2118	0.4476	0.4852	0.8589	0.5937	0.3302	0.0242**	0.0018***	0.0001***	0.00059***	0.0104**	0.2860	0.0170**	0.0004***	0.0000***	0.0015***	0.0070***
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
low-growth	-1.40%	-1.51%	-1.52%	-1.33%	-0.80%	-0.45%	-2.59%	-2.71%	-4.30%	-4.03%	-5.25%	-4.47%	-6.89%	0.34%	-0.90%	-0.10%	-1.14%	-0.36%	-2.89%
<i>t-test</i>	0.2262	0.1549	0.1082	0.1007	0.2197	0.3260	0.0000***	0.0009***	0.0001***	0.0030***	0.0008***	0.0097***	0.0004***	0.4695	0.1692	0.9014	0.2342	0.7327	0.0153**
<i>Kolari</i>	0.5361	0.3193	0.1339	0.2704	0.4133	0.2385	0.2126	0.2284	0.2890	0.3140	0.1809	0.2931	0.3087	0.5859	0.5464	0.8249	0.4783	0.7324	0.2861
<i>Wrank</i>	0.6323	0.3516	0.3607	0.2989	0.4330	0.2026	0.1394	0.2369	0.2732	0.4076	0.1986	0.2527	0.1214	0.6465	0.9108	0.7343	0.7368	0.9193	0.3097
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the CAARs of the growth-based tercile portfolios formed using the book-to-market ratio of the 31 constituent stocks as of year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 27: AARs of the liquidity-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Liquidity	Before the event period						Event date	After the event period					
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
low-liquidity	0.66%	0.33%	0.05%	-0.21%	0.34%	0.74%	2.51%	-0.43%	2.03%	0.62%	-0.70%	-1.52%	0.51%
<i>t-test</i>	0.1573	0.4870	0.9077	0.6604	0.4715	0.1161	0.0000***	0.3747	0.0000***	0.2352	0.1383	0.0014***	0.2883
<i>Kolari</i>	0.1454	0.7109	0.7431	0.9254	0.7886	0.2756	0.1235	0.5680	0.0906*	0.5550	0.4802	0.0076***	0.6787
<i>Wrank</i>	0.1141	0.8785	0.5076	0.9594	0.7989	0.4446	0.0745*	0.4446	0.1141	0.3329	0.2411	0.0166**	0.9594
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-liquidity	-0.05%	-0.24%	0.47%	-0.84%	0.02%	-1.00%	-4.33%	0.97%	-1.80%	1.71%	-0.23%	0.15%	-1.64%
<i>t-test</i>	0.9120	0.5621	0.2594	0.0463**	0.9703	0.0161**	0.0000***	0.0224**	0.0000***	0.0002***	0.5763	0.7207	0.0001***
<i>Kolari</i>	0.8829	0.4776	0.2925	0.3390	0.8714	0.0156**	0.0225**	0.2061	0.1820	0.1773	0.7668	0.7083	0.0932*
<i>Wrank</i>	0.5337	0.3281	0.1549	0.5937	0.9292	0.0329**	0.0128**	0.1823	0.2132	0.1823	0.5337	0.5337	0.0912*
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11
high-liquidity	0.19%	-1.15%	0.35%	-0.50%	1.74%	-0.09%	1.41%	0.64%	1.51%	2.39%	1.82%	-0.88%	-1.10%
<i>t-test</i>	0.7523	0.0613*	0.5677	0.4152	0.0048***	0.8777	0.0336**	0.3029	0.0150**	0.0004***	0.0031***	0.1463	0.0773*
<i>Kolari</i>	0.7517	0.1173	0.8669	0.8096	0.1267	0.9670	0.3633	0.3137	0.0565*	0.0140**	0.1532	0.3529	0.2627
<i>Wrank</i>	0.9594	0.1688	0.6465	0.9594	0.1141	0.7989	0.3329	0.3863	0.0926*	0.0218**	0.0593*	0.0926*	0.1688
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the liquidity-based tercile portfolios formed using the current assets to current liabilities ratio of the 31 constituent stocks based on the financial statements year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 28: CAARs of the liquidity-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Liquidity	Before the event period						At and around the event period						After the event period						
	[-6;-1]	[-5;-1]	[-4;-1]	[-3;-1]	[-2;-1]	[-1;-1]	[-6;6]	[-5;5]	[-4;4]	[-3;3]	[-2;2]	[-1;1]	[0;0]	[1;1]	[1;2]	[1;3]	[1;4]	[1;5]	[1;6]
low-liquidity	1.92%	1.25%	0.92%	0.87%	1.08%	0.74%	4.94%	3.77%	4.96%	5.60%	5.19%	2.82%	2.51%	-0.43%	1.61%	2.22%	1.53%	0.01%	0.52%
<i>t-test</i>	0.1212	0.2686	0.3578	0.3146	0.1228	0.1332	0.0156**	0.0403**	0.0029***	0.0001***	0.0000***	0.0012***	0.0000***	0.3955	0.0213**	0.0119**	0.1342	0.9931	0.6798
<i>Kolari</i>	0.1157	0.4919	0.4156	0.4144	0.3821	0.2756	0.0674*	0.1693	0.0153**	0.0221**	0.1403	0.1293	0.1235	0.5680	0.2658	0.1237	0.2211	0.7623	0.5723
<i>Wrank</i>	0.2792	0.7246	0.7167	0.8774	0.7652	0.4446	0.2265	0.3514	0.0770*	0.0264**	0.0473**	0.1109	0.0745*	0.4446	0.4781	0.1204	0.3823	0.8811	0.9004
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-liquidity	-1.64%	-1.60%	-1.36%	-1.83%	-0.99%	-1.00%	-6.82%	-5.14%	-5.04%	-5.28%	-6.15%	-4.36%	-4.33%	0.97%	-0.83%	0.87%	0.64%	0.79%	-0.85%
<i>t-test</i>	0.1303	0.1085	0.1250	0.0167**	0.1081	0.0209**	0.0002***	0.0016***	0.0006***	0.0000***	0.0000***	0.0000***	0.0000***	0.0281**	0.1737	0.2573	0.4712	0.4252	0.4424
<i>Kolari</i>	0.4840	0.3534	0.3462	0.1988	0.4292	0.0156**	0.2998	0.2918	0.2811	0.2007	0.1483	0.0246**	0.0225**	0.2061	0.7871	0.7069	0.8167	0.6820	0.9427
<i>Wrank</i>	0.5044	0.3395	0.5134	0.1891	0.2360	0.0329**	0.0820*	0.1575	0.2232	0.1680	0.0401**	0.0504*	0.0128**	0.1823	0.9353	0.4476	0.6915	0.8276	0.6525
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
high-liquidity	0.53%	0.34%	1.49%	1.14%	1.64%	-0.09%	6.32%	7.23%	9.26%	7.09%	5.20%	1.95%	1.41%	0.64%	2.15%	4.55%	6.36%	5.48%	4.37%
<i>t-test</i>	0.7381	0.8150	0.2531	0.3090	0.0700*	0.8831	0.0170**	0.0025***	0.0000***	0.0002***	0.0005***	0.0801*	0.0409**	0.3241	0.0173**	0.0001***	0.0000***	0.0002***	0.0079***
<i>Kolari</i>	0.9690	0.4097	0.4090	0.3930	0.1767	0.9670	0.2359	0.0420**	0.0002***	0.0108**	0.0001***	0.0363**	0.3633	0.3137	0.0785*	0.0006***	0.0004***	0.0040***	0.0356**
<i>Wrank</i>	0.9121	0.9269	0.4436	0.4284	0.3135	0.7989	0.0964*	0.0266**	0.0008***	0.0037***	0.0183**	0.3389	0.3329	0.3863	0.0333**	0.0018***	0.0003***	0.0062***	0.0469**
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the CAARs of the liquidity-based tercile portfolios formed using the current assets to current liabilities ratio of the 31 constituent stocks based on the financial statements year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 29: AARs of the leverage-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Leverage	Before the event period						Event date	After the event period					
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
<u>low-leverage</u>	0.53%	-0.67%	0.31%	-0.12%	0.64%	0.16%	1.49%	-0.45%	1.26%	2.26%	-0.01%	-0.65%	0.09%
<i>t-test</i>	0.3128	0.2036	0.5532	0.8202	0.2202	0.7556	0.0088***	0.3979	0.0179**	0.0001***	0.9896	0.2146	0.8658
<i>Kolari</i>	0.3844	0.4881	0.8165	0.8278	0.5794	0.9594	0.4601	0.7018	0.1097	0.1070	0.7537	0.4891	0.9704
<i>Wrank</i>	0.5751	0.8785	0.7213	0.3863	0.7989	0.6465	0.1688	0.2845	0.1394	0.0926*	0.7989	0.2845	0.9594
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10
<u>medium-leverage</u>	0.54%	0.56%	0.55%	-0.74%	1.66%	0.12%	0.79%	-0.16%	1.72%	1.55%	1.20%	-1.57%	0.25%
<i>t-test</i>	0.2938	0.2781	0.2887	0.1593	0.0015***	0.8159	0.1585	0.7682	0.0012***	0.0068***	0.0208**	0.0025***	0.6338
<i>Kolari</i>	0.1301	0.3913	0.1294	0.2355	0.0236**	0.8546	0.9714	0.7641	0.2673	0.2086	0.1076	0.0000***	0.8263
<i>Wrank</i>	0.1095	0.7221	0.1095	0.3281	0.0754*	0.5337	0.8589	0.8589	0.1823	0.1549	0.1549	0.0044***	0.7221
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11
<u>high-leverage</u>	-0.31%	-1.04%	0.00%	-0.70%	-0.38%	-0.75%	-3.21%	1.90%	-1.58%	0.92%	-0.45%	0.14%	-2.77%
<i>t-test</i>	0.4863	0.0233**	0.9915	0.1255	0.4088	0.0981*	0.0000***	0.0001***	0.0007***	0.0670*	0.3214	0.7585	0.0000***
<i>Kolari</i>	0.5840	0.0135**	0.9308	0.4701	0.5633	0.1790	0.1643	0.0157**	0.2522	0.2915	0.3705	0.6744	0.0049***
<i>Wrank</i>	0.7213	0.0125**	0.7213	0.5751	0.5076	0.0745*	0.0469**	0.0284**	0.4446	0.1688	0.5751	0.7213	0.0069***
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the leverage-based tercile portfolios formed using the total debt to total assets ratio of the 31 constituent stocks based on the financial statements for year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 30: CAARs of the leverage-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Leverage	Before the event period						At and round the event period							After the event period					
	[-6;-1]	[-5;-1]	[-4;-1]	[-3;-1]	[-2;-1]	[-1;-1]	[-6;6]	[-5;5]	[-4;4]	[-3;3]	[-2;2]	[-1;1]	[0;0]	[1;1]	[1;2]	[1;3]	[1;4]	[1;5]	[1;6]
low-leverage	0.85%	0.33%	0.99%	0.68%	0.80%	0.16%	4.86%	4.24%	5.55%	5.25%	3.11%	1.20%	1.49%	-0.45%	0.81%	3.08%	3.07%	2.42%	2.51%
<i>t-test</i>	0.5326	0.7933	0.3726	0.4757	0.2993	0.7662	0.0321**	0.0375**	0.0026***	0.0011***	0.0141**	0.2081	0.0117**	0.4184	0.2922	0.0018***	0.0069***	0.0541*	0.0740*
<i>Kolari</i>	0.2890	0.9617	0.4900	0.3103	0.6841	0.9594	0.2197	0.3153	0.1032	0.1011	0.2470	0.5573	0.4601	0.7018	0.3742	0.0058***	0.0866*	0.2659	0.3282
<i>Wrank</i>	0.3167	0.3929	0.3399	0.3185	0.5755	0.6465	0.1160	0.1286	0.0306**	0.0168**	0.1284	0.4048	0.1688	0.2845	0.5257	0.0627*	0.1254	0.3368	0.3850
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-leverage	2.70%	2.15%	1.59%	1.04%	1.78%	0.12%	6.48%	5.68%	6.69%	4.94%	4.13%	0.76%	0.79%	-0.16%	1.56%	3.11%	4.31%	2.74%	2.99%
<i>t-test</i>	0.0466**	0.0823*	0.1480	0.2705	0.0203**	0.8232	0.0039***	0.0048***	0.0003***	0.0019***	0.0010***	0.4222	0.1734	0.7770	0.0406**	0.0013***	0.0001***	0.0273**	0.0312**
<i>Kolari</i>	0.0116**	0.1083	0.0228**	0.4642	0.0227**	0.8546	0.0315**	0.0633*	0.0202**	0.1880	0.2675	0.9845	0.9714	0.7641	0.5831	0.1376	0.0717*	0.1784	0.1024
<i>Wrank</i>	0.1139	0.2988	0.3627	0.7009	0.3065	0.5337	0.1354	0.1716	0.0313**	0.1335	0.1969	0.8233	0.8589	0.8589	0.3548	0.0784*	0.0236**	0.2580	0.3729
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
high-leverage	-3.17%	-2.86%	-1.82%	-1.83%	-1.13%	-0.75%	-8.23%	-5.14%	-4.25%	-3.80%	-4.02%	-2.06%	-3.21%	1.90%	0.32%	1.23%	0.79%	0.92%	-1.84%
<i>t-test</i>	0.0080***	0.0091***	0.0602*	0.0287**	0.0949*	0.1139	0.0000***	0.0038***	0.0079***	0.0064***	0.0003***	0.0136**	0.0000***	0.0001***	0.6344	0.1453	0.4227	0.3958	0.1307
<i>Kolari</i>	0.1408	0.0400**	0.2114	0.3257	0.3953	0.1790	0.2151	0.2189	0.3475	0.4168	0.3582	0.3298	0.1643	0.0157**	0.7677	0.5585	0.7745	0.6046	0.8578
<i>Wrank</i>	0.0353**	0.0254**	0.1833	0.1156	0.1005	0.0745*	0.0330**	0.2002	0.5263	0.6334	0.3719	0.6733	0.0469**	0.0284**	0.2627	0.0978*	0.2704	0.4314	0.7019
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the leverage-based tercile portfolios formed using the total debt to total assets ratio of the 31 constituent stocks based on the financial statements for year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 31: AARs of the rentability-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Rentability	Before the event period						Event date	After the event period					
	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
high-rentability	0.10%	0.27%	0.36%	0.34%	0.83%	-0.98%	0.36%	-0.66%	0.32%	2.53%	0.89%	-1.20%	0.01%
<i>t-test</i>	0.8407	0.5956	0.4796	0.5076	0.0989*	0.0500**	0.5032	0.1971	0.5305	0.0000***	0.0774*	0.0171**	0.9833
<i>Kolari</i>	0.6478	0.7508	0.5505	0.5122	0.3276	0.0296**	0.9827	0.4429	0.9796	0.0613*	0.2580	0.0170**	0.8038
<i>Wrank</i>	0.4446	0.8785	0.3329	0.3863	0.5751	0.0218**	0.7989	0.2026	0.7213	0.0745*	0.1688	0.0218**	0.9594
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-rentability	1.23%	-0.85%	-0.28%	-0.12%	0.49%	0.22%	0.56%	1.21%	1.72%	1.79%	1.07%	-1.06%	-0.53%
<i>t-test</i>	0.0093***	0.0712*	0.5492	0.8016	0.2934	0.6399	0.2718	0.0117**	0.0004***	0.0006***	0.0230**	0.0241**	0.2713
<i>Kolari</i>	0.0197**	0.0577*	0.5626	0.8388	0.4098	0.5306	0.6247	0.0426**	0.0409**	0.0450**	0.5089	0.1208	0.3004
<i>Wrank</i>	0.0409**	0.1095	0.8589	0.5937	0.5337	1.0000	0.7221	0.1095	0.0619*	0.0912*	0.3281	0.1095	0.1823
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11
low-rentability	-0.64%	-0.41%	0.88%	-1.84%	0.72%	0.29%	-1.83%	0.60%	-0.64%	0.39%	-1.20%	0.13%	-1.83%
<i>t-test</i>	0.2246	0.4387	0.1012	0.0007***	0.1790	0.5880	0.0016***	0.2645	0.2336	0.5021	0.0240**	0.8069	0.0009***
<i>Kolari</i>	0.1756	0.5491	0.1484	0.0284**	0.9535	0.9354	0.2614	0.1678	0.4177	0.8290	0.0081***	0.4820	0.0665*
<i>Wrank</i>	0.4446	0.7213	0.1688	0.0926*	0.5751	0.5751	0.4446	0.4446	0.8785	0.2845	0.0926*	0.7213	0.1688
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the AARs of the rentability-based tercile portfolios formed using the return of assets of the 31 constituent stocks based on the financial statements for year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

Table 32: CAARs of the rentability-based tercile portfolios regressed against the WIB index over the event period using the Market Model

Rentability	Before the event period						At and round the event period							After the event period					
	[-6:-1]	[-5:-1]	[-4:-1]	[-3:-1]	[-2:-1]	[-1:-1]	[-6;6]	[-5;5]	[-4;4]	[-3;3]	[-2;2]	[-1;1]	[0;0]	[1;1]	[1;2]	[1;3]	[1;4]	[1;5]	[1;6]
high-rentability	0.91%	0.80%	0.54%	0.18%	-0.15%	-0.98%	3.16%	3.04%	3.98%	2.73%	-0.13%	-1.28%	0.36%	-0.66%	-0.34%	2.19%	3.07%	1.88%	1.89%
<i>t-test</i>	0.4912	0.5042	0.6151	0.8426	0.8365	0.0610*	0.1460	0.1192	0.0244**	0.0753*	0.9143	0.1632	0.5197	0.2170	0.6457	0.0201**	0.0049***	0.1198	0.1618
<i>Kolari</i>	0.2774	0.5658	0.4889	0.5292	0.9163	0.0296**	0.2946	0.4866	0.2640	0.4845	0.7678	0.2913	0.9827	0.4429	0.5693	0.3943	0.0398**	0.2707	0.3296
<i>Wrank</i>	0.7019	0.8281	0.8507	0.8130	0.2959	0.0218**	0.3855	0.4164	0.1339	0.3816	0.6816	0.2623	0.7989	0.2026	0.5755	0.3286	0.1288	0.5592	0.5708
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
medium-rentability	0.69%	-0.54%	0.31%	0.59%	0.71%	0.22%	5.45%	4.75%	6.66%	5.87%	4.21%	1.99%	0.56%	1.21%	2.93%	4.72%	5.79%	4.73%	4.20%
<i>t-test</i>	0.5753	0.6315	0.7543	0.4890	0.3036	0.6535	0.0075***	0.0096***	0.0001***	0.0001***	0.0002***	0.0205**	0.2888	0.0153**	0.0000***	0.0000***	0.0000***	0.0000***	0.0009***
<i>Kolari</i>	0.2744	0.2660	0.8335	0.6366	0.1505	0.5306	0.0851*	0.3063	0.0317**	0.0228**	0.0038***	0.0415**	0.6247	0.0426**	0.0001***	0.0001***	0.0031***	0.0109**	0.0176**
<i>Wrank</i>	0.5461	0.6692	0.7088	0.5143	0.6612	1.0000	0.1391	0.1493	0.0077***	0.0049***	0.0203**	0.1453	0.7221	0.1095	0.0081***	0.0015***	0.0018***	0.0276**	0.0948*
<i>Obs</i>	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
low-rentability	-1.02%	-0.37%	0.04%	-0.84%	1.00%	0.29%	-5.39%	-2.92%	-2.64%	-2.31%	-0.86%	-0.94%	-1.83%	0.60%	-0.04%	0.35%	-0.85%	-0.72%	-2.55%
<i>t-test</i>	0.4653	0.7699	0.9726	0.3916	0.2033	0.6047	0.0194**	0.1578	0.1571	0.1553	0.5001	0.3350	0.0025***	0.2855	0.9605	0.7213	0.4588	0.5718	0.0747*
<i>Kolari</i>	0.3469	0.5435	0.7107	0.2160	0.9483	0.9354	0.2565	0.3907	0.3693	0.3250	0.6038	0.4999	0.2614	0.1678	0.9257	0.9768	0.5802	0.7784	0.3524
<i>Wrank</i>	0.6964	0.9040	0.9464	0.6583	0.5016	0.5751	0.2301	0.6132	0.8046	0.9790	0.8431	0.9754	0.4446	0.4446	0.6813	0.3933	0.9464	0.8811	0.4013
<i>Obs</i>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Notes: This table presents the CAARs of the rentability-based tercile portfolios formed using the return of assets of the 31 constituent stocks based on the financial statements for year-end 2021. K&P is the adjusted standardized cross-sectional test of Kolari and Pynnoenen (2010). WRank is the Wilcoxon signed-rank test (1945) for the null that AARs have a zero mean. The following table presents the results of the parametric and non-parametric tests; ***, **, and * indicate significant values at 1 percent, 5 percent and 10 percent levels, respectively.

10.2 Figures

Figure 1: First years of Ukraine's independence until the beginning of the Ukraine conflict in 2014

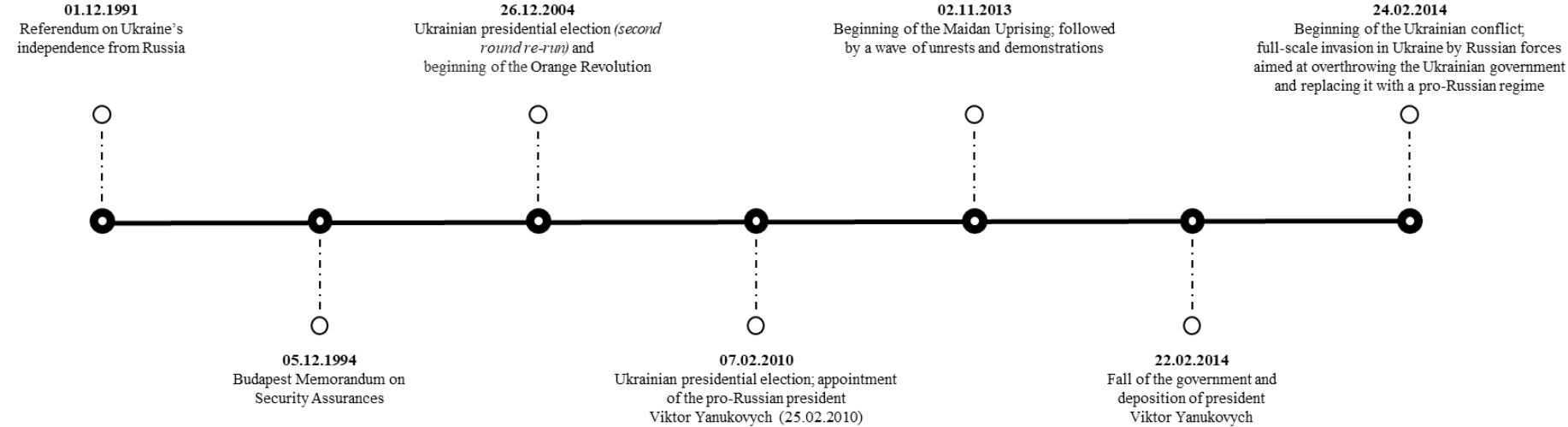


Figure 2: Main events of the Ukraine conflict from 2014 to 2022, culminating into the start of the Russo-Ukrainian war

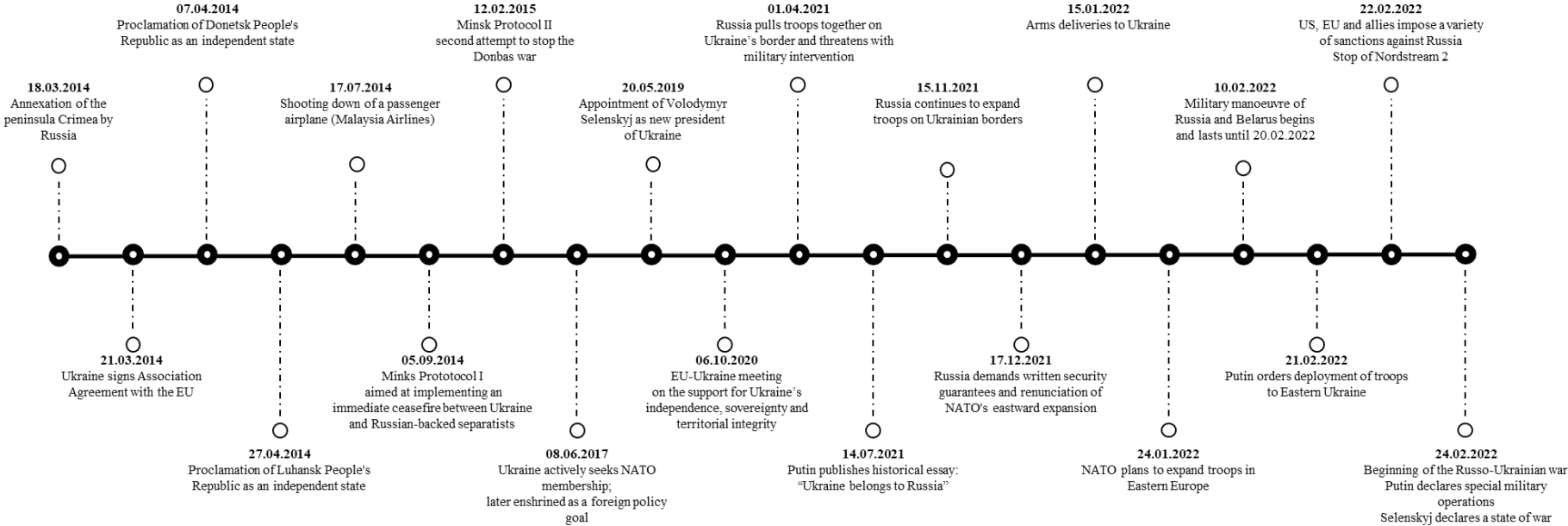
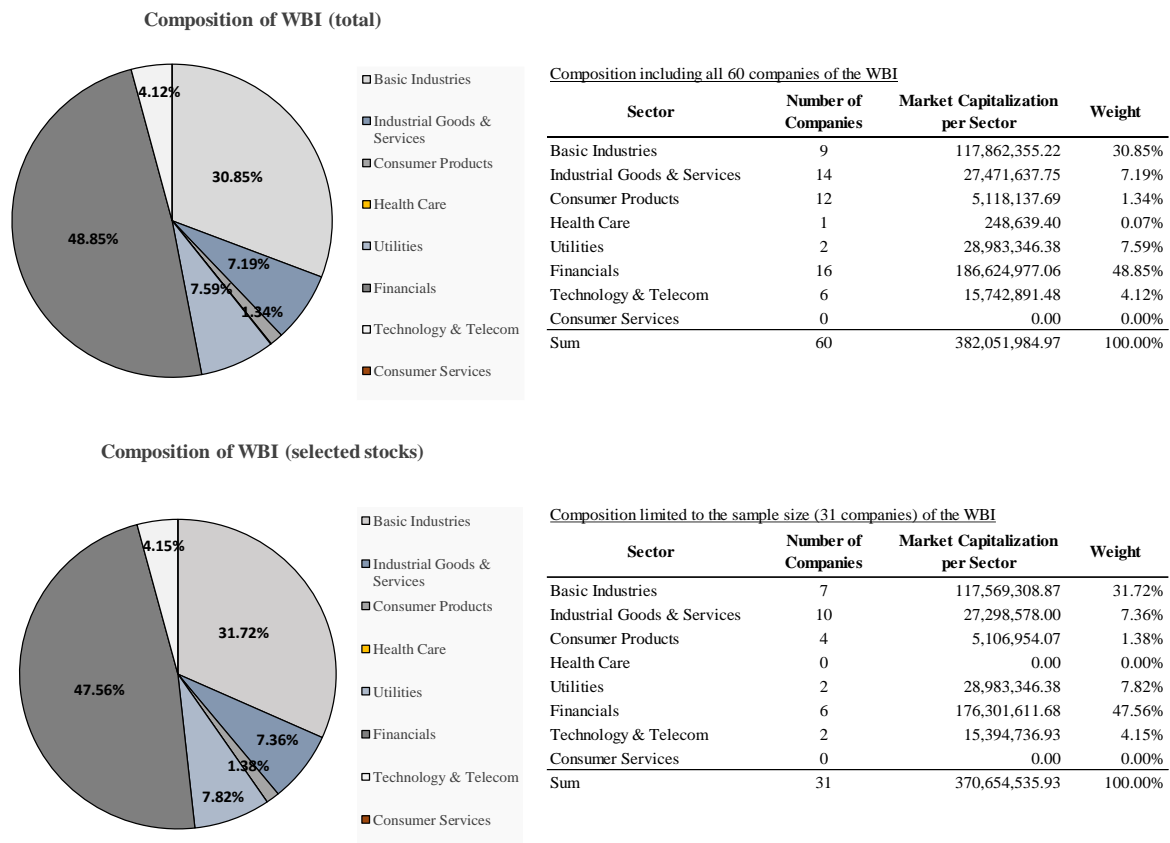
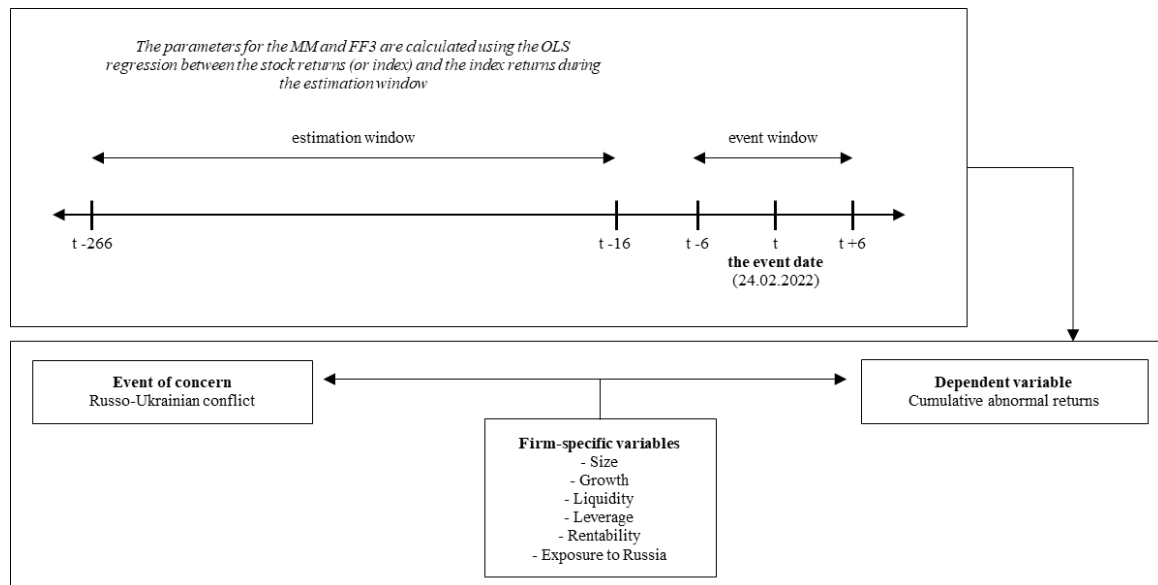


Figure 4: Composition of the WBI – before and after stock selection



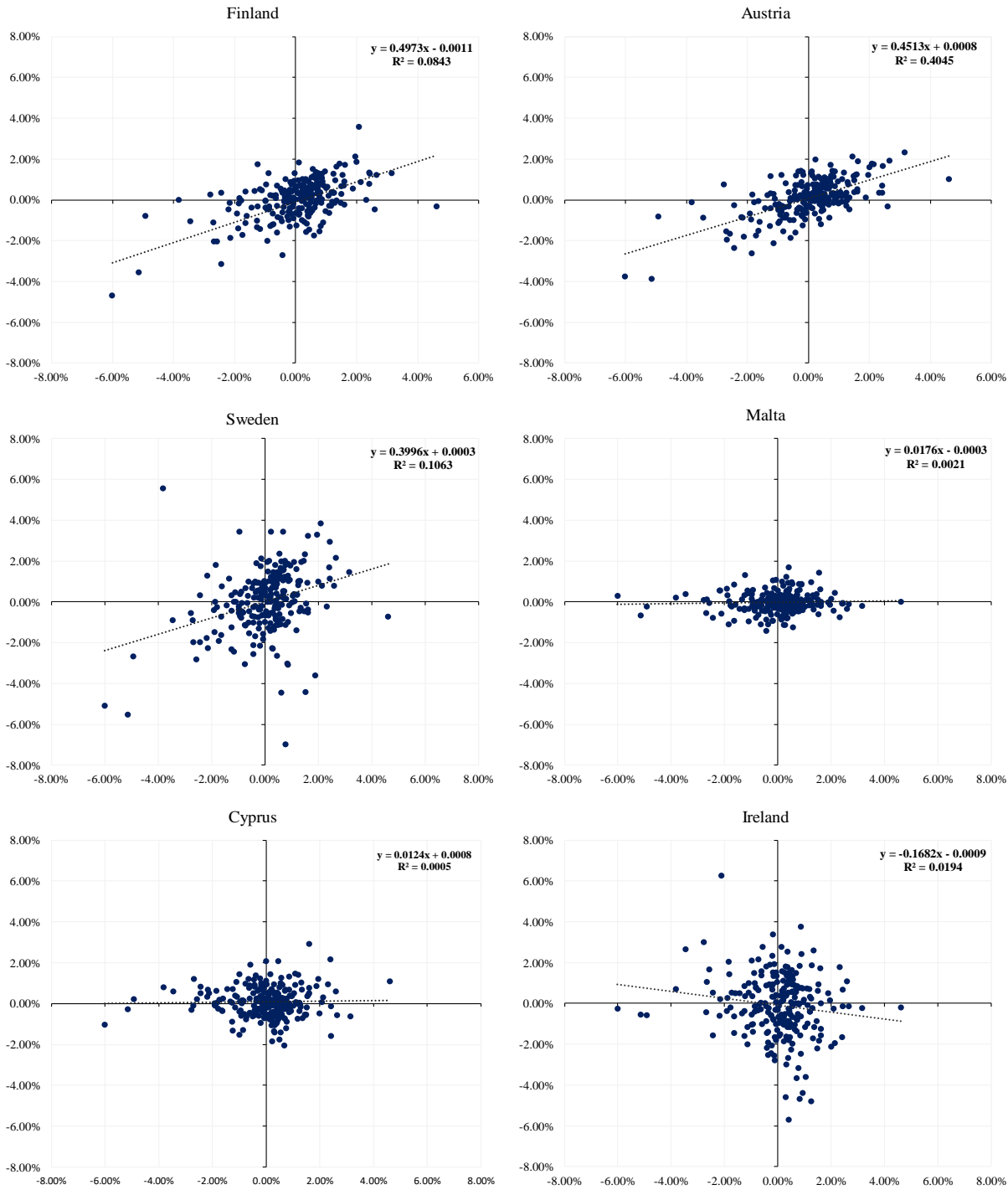
Notes: The raw data encompassed 60 companies. After clearing the data – limiting the sample size to 31 companies – the composition of the WBI has not changed considerably. While the weight in Basic Industries is slightly increased, a little less weight is put on Financials. The Health sector, with one company negligible in size, is completely removed from the sample. Continuing, even after having removed 29 companies due to poor data quality, market capitalization (of February 24, 2022) has only decreased by 3.07%.

Figure 5: Empirical Framework



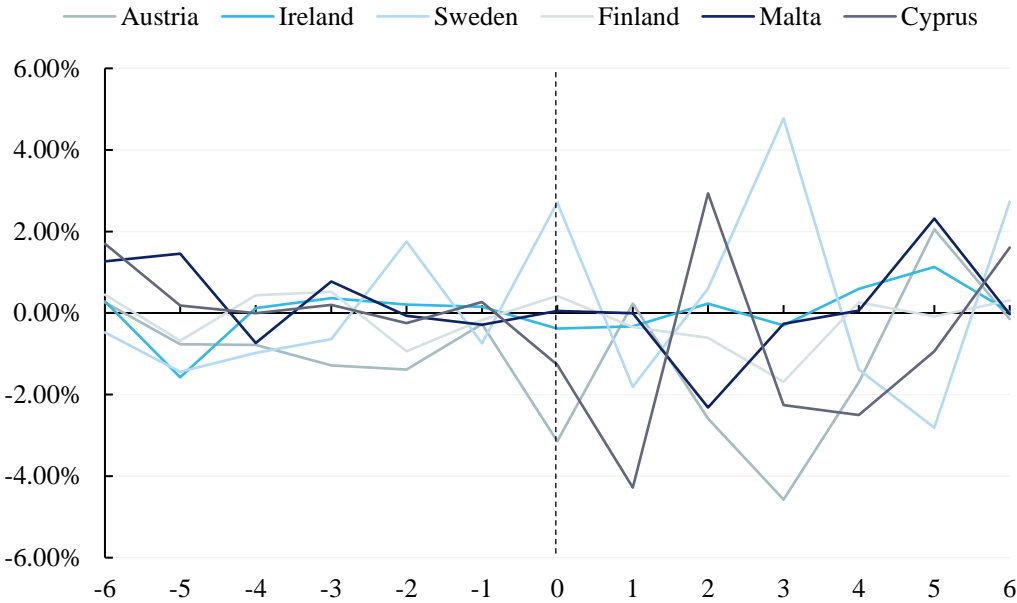
Notes: The graphic displays the main event window (13 days) and estimation window (250 days) considered in this study. February 24, 2022, is set as the event date. Additionally, the firm-specific variables tested in the cross-sectional analysis are shown.

Figure 6: Country exposure to the CEE region based on Beta-coefficients



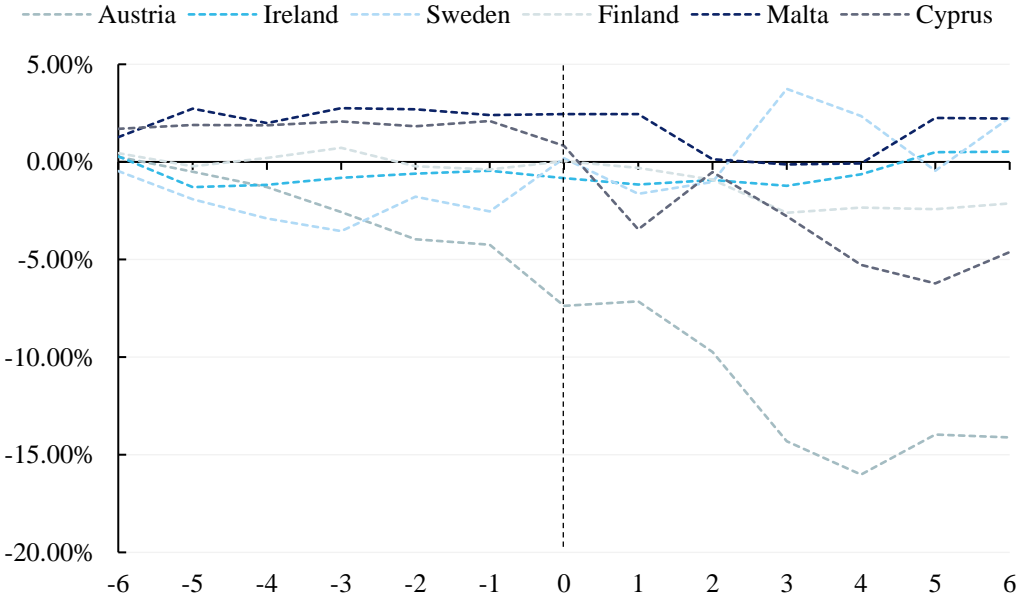
Notes: The graphics display all countries of the European Union that were not members of the North Atlantic Treaty Organization at the start of the Russo-Ukrainian war (February 24, 2022). The stock indices cover each country’s total equity market (Finland: OMXHLS, Austria: WBI, Sweden: OMXSPI, Malta: MSE, Cyprus: CPR, Ireland: ISEQ) and are regressed against the STOXX Eastern Europe Total Market Index (TMI) covering more than 95 percent of the free float market capitalization of 18 Eastern European countries. Finland, Sweden and Austria display the highest exposure to the CEE region; Malta and Cyprus reflect only a small positive correlation; Ireland is even moving in the opposite direction than the Eastern European stock market index.

Figure 7: Movement of ARs of the indices from non-NATO members on the EUROSTOXX600 index over the event window



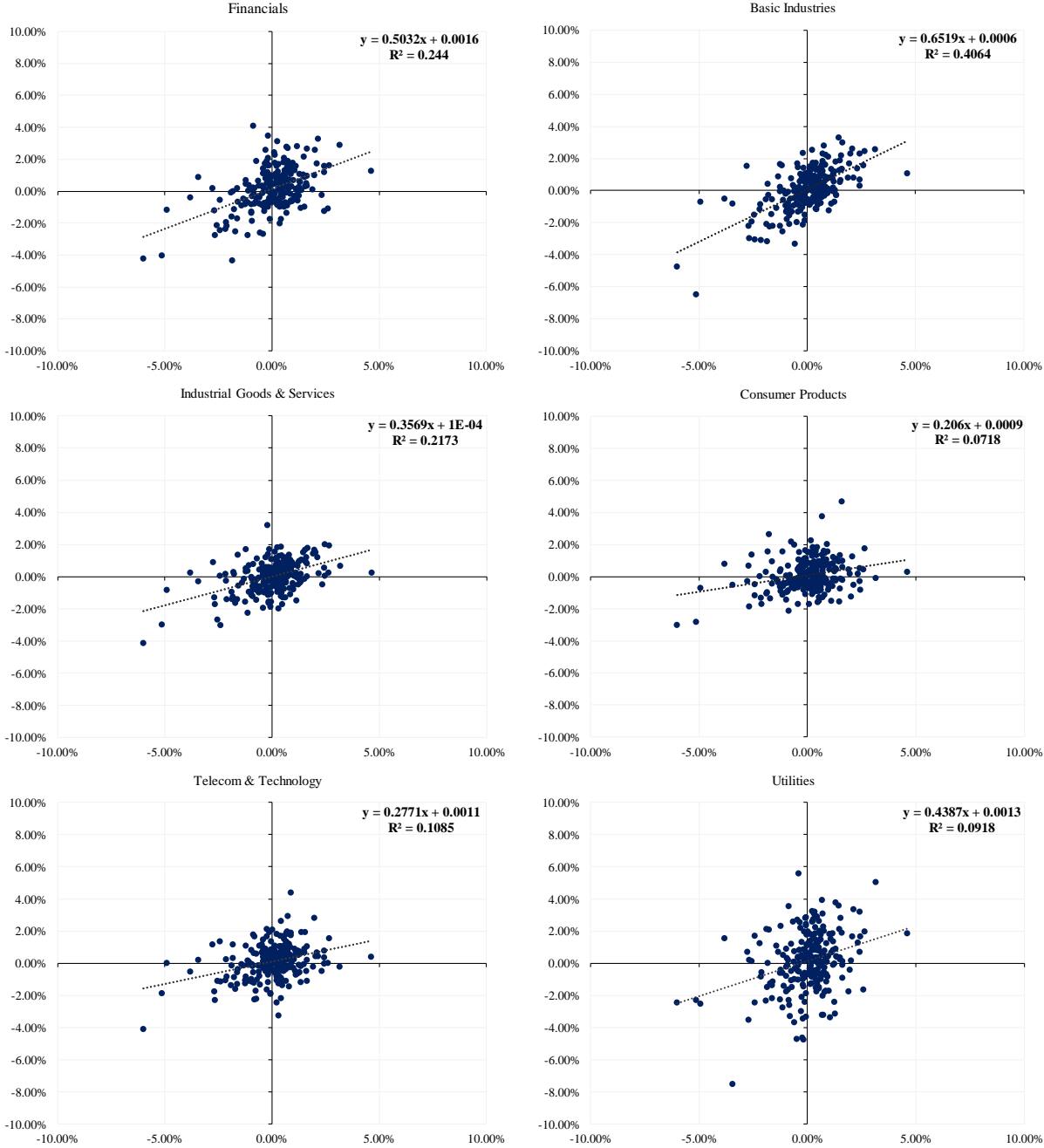
Notes: The returns of the WBI for Austria, the ISEQ for Ireland, the OMXSPI for Sweden, the OMXHLS for Finland, the MSE for Malta and the CPR for Cyprus are regressed against the EUROSTOXX600 following the OLS Market Model. The ARs are shown over the event period ranging from t-6 to t+6 around February 24, 2022.

Figure 8: Movement of CARs of the indices from non-NATO members on the EUROSTOXX600 index over the event window



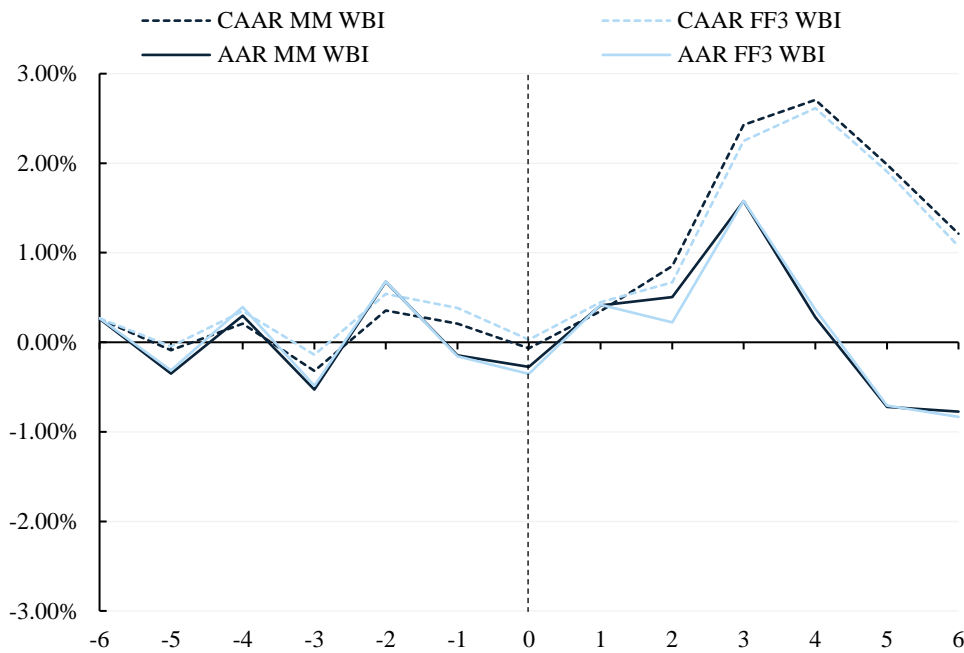
Notes: The returns of the WBI for Austria, the ISEQ for Ireland, the OMXSPI for Sweden, the OMXHLS for Finland, the MSE for Malta and the CPR for Cyprus are regressed against the EUROSTOXX600 following the OLS Market Model. The CARs are shown over the event period ranging from t-6 to t+6 around February 24, 2022.

Figure 9: Sector exposure to the CEE region based on Beta-coefficients



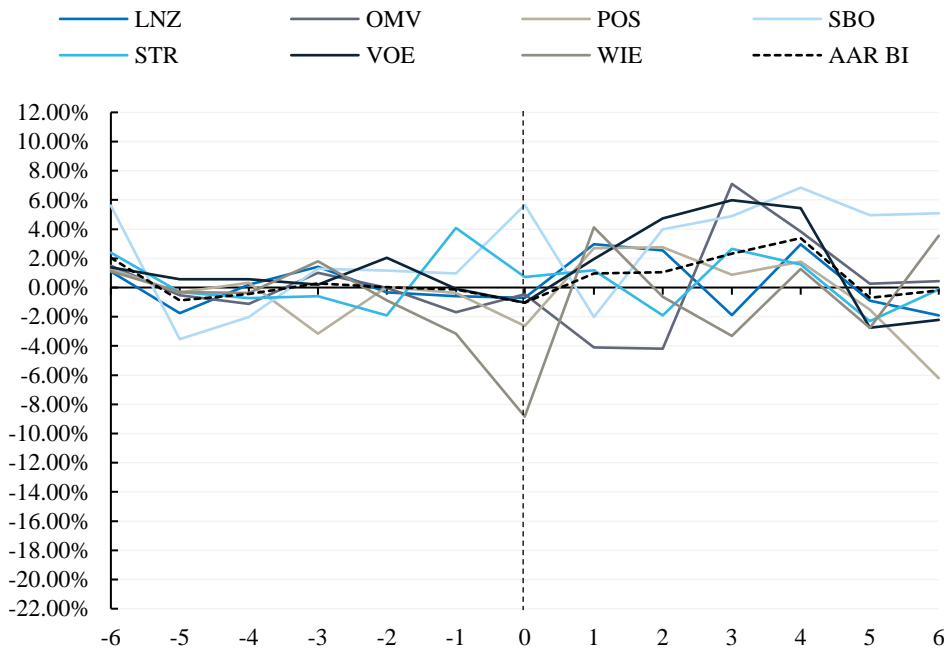
Notes: Each industry’s returns were regressed against the STOX Eastern Europe Total Market Index (TMI) covering more than 95 percent of the free float market capitalization of 18 Eastern European countries. The Financials and Basic Industries sectors display the highest exposure to the market, with Betas of 0.5 and 0.65, respectively.

Figure 10: Movement of AARs and CAARs of the stocks regressed against the WBI over the event window



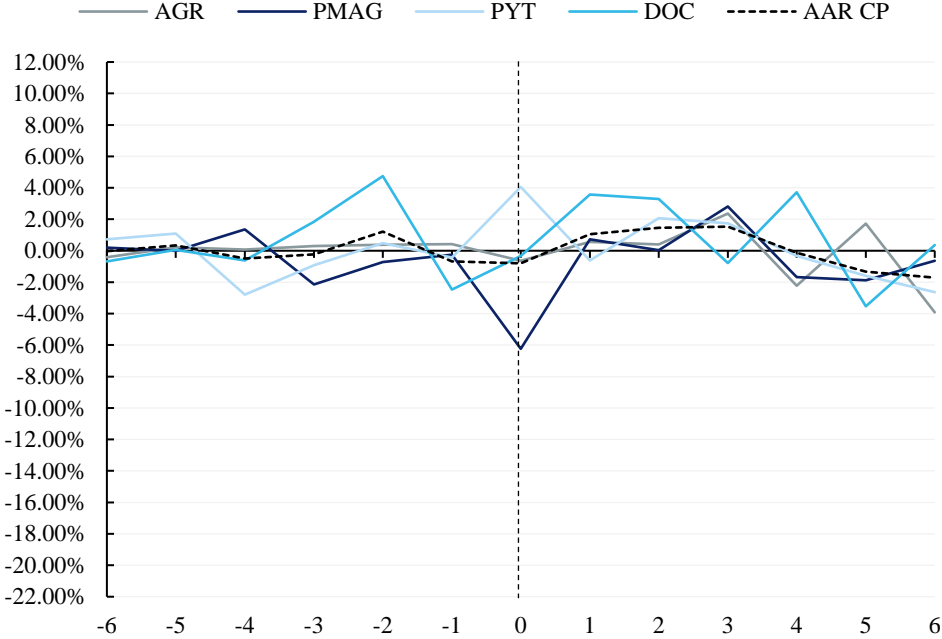
Notes: The graphic displays the AARs and CAARs of 31 Austrian constituent stocks tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model and FF3 Model using OLS regression.

Figure 11: ARs of the constituent companies making up the BI industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



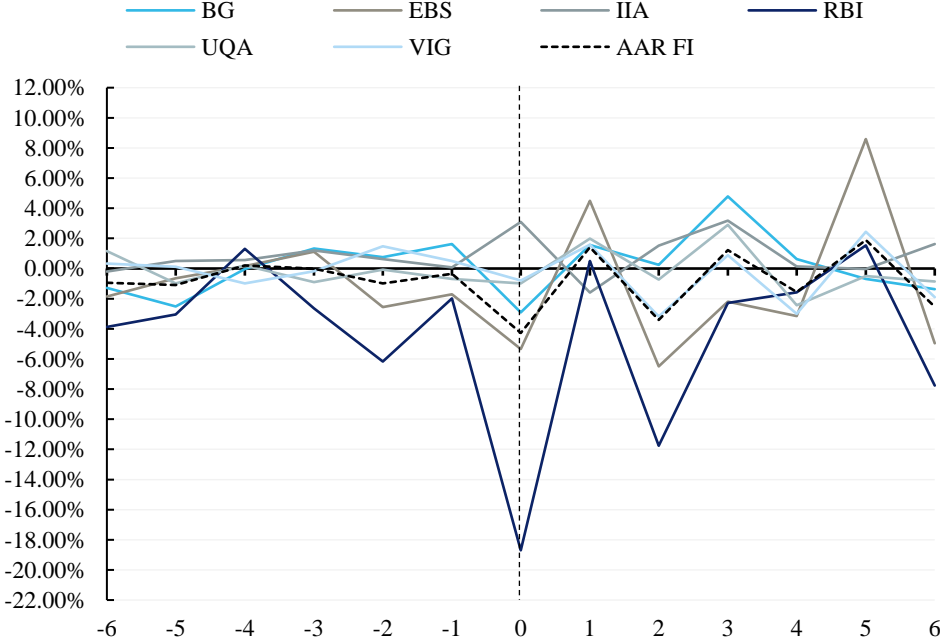
Notes: The graphic displays the ARs of Austrian companies belonging to the Basic Industries sector. The seven stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the BI sample.

Figure 12: ARs of the constituent companies making up the CP industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



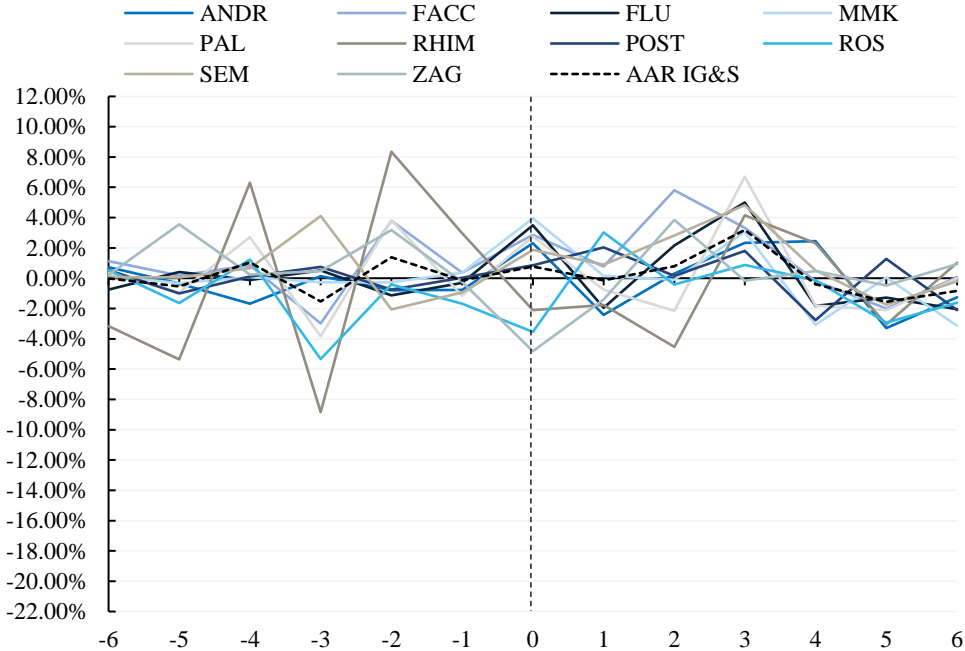
Notes: The graphic displays the ARs of Austrian companies belonging to the Consumer Products sector. The four stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the CP sample.

Figure 13: ARs of the constituent companies making up the FI industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



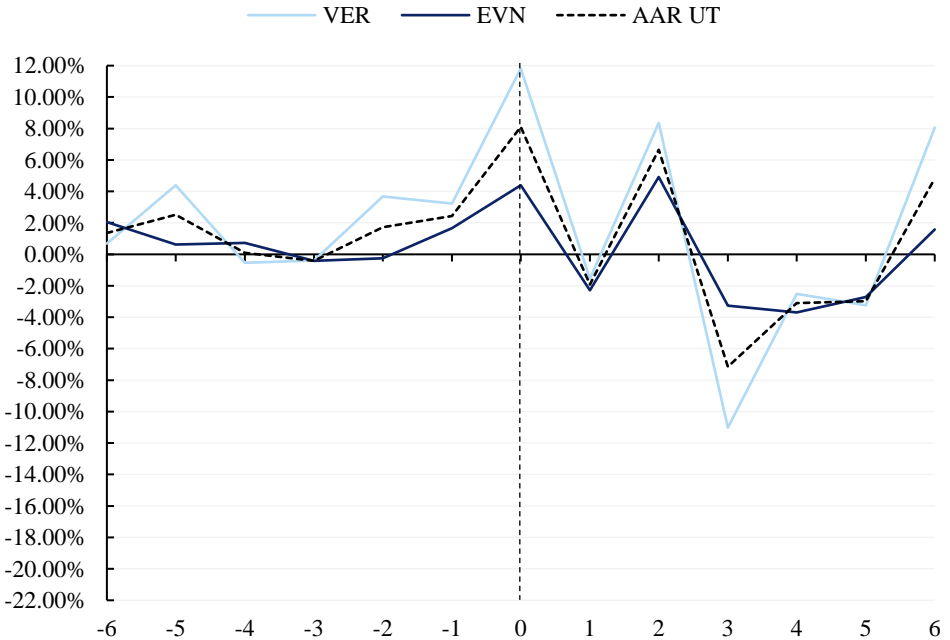
Notes: The graphic displays the ARs of Austrian companies belonging to the Financials sector. The six stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the FI sample.

Figure 14: ARs of the constituent companies making up the IG&S industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



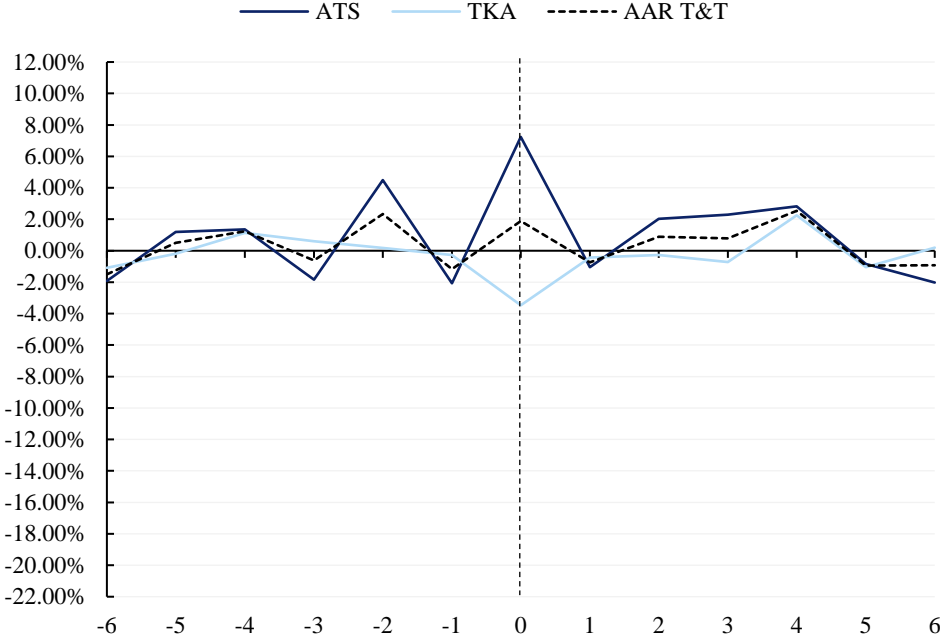
Notes: The graphic displays the ARs of Austrian companies belonging to the Industrial Goods & Services sector. The ten stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the IG&S sample.

Figure 15: ARs of the constituent companies making up the UT industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



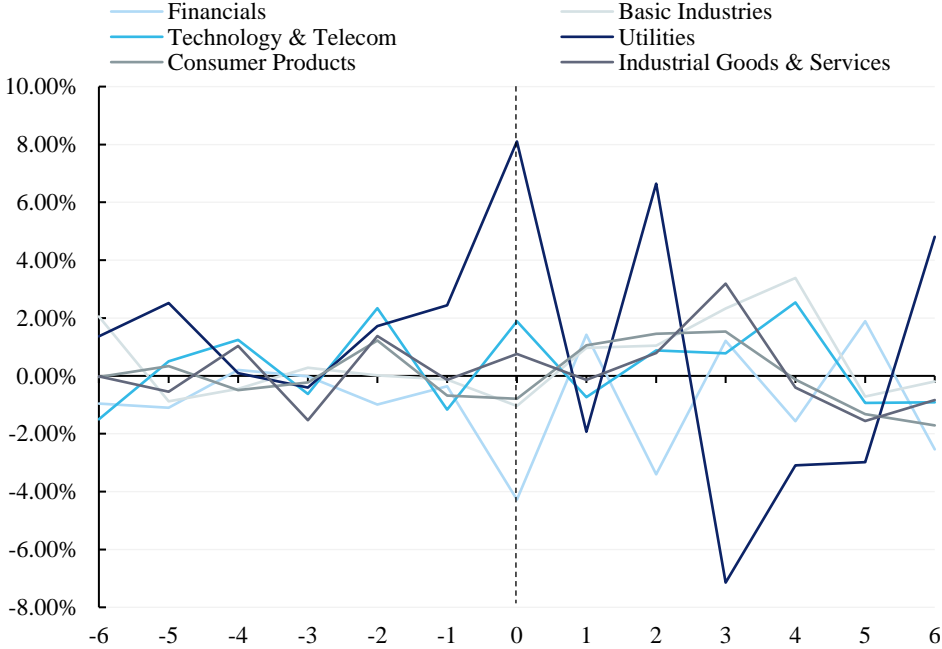
Notes: The graphic displays the ARs of Austrian companies belonging to the Utilities sector. The two stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the UT sample.

Figure 16: ARs of the constituent companies making up the T&T industry regressed against the WBI, the market index, over the event window (including AARs) following the Market Model



Notes: The graphic displays the ARs of Austrian companies belonging to the Technology & Telecom sector. The two stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression. The dashed line depicts the average abnormal returns of the T&T sample.

Figure 17: AARs of the constituent industries regressed against the WBI index over the event window following the Market Model



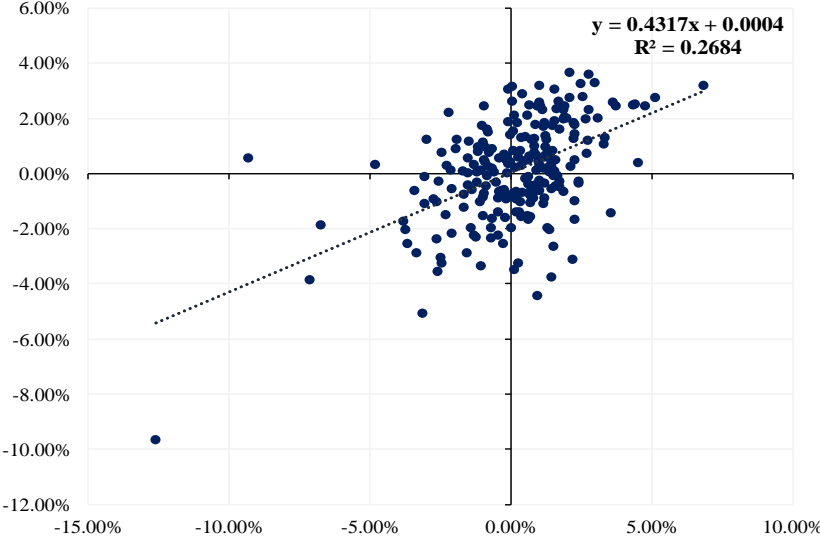
Notes: The graphic summarizes the movement of AARs of all six industries (FI, BI, UT, IG&S, T&T and CP). The stocks are tested against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.

Figure 18: Historical development of Crude Oil Prices: Brent - Europe in USD per barrel



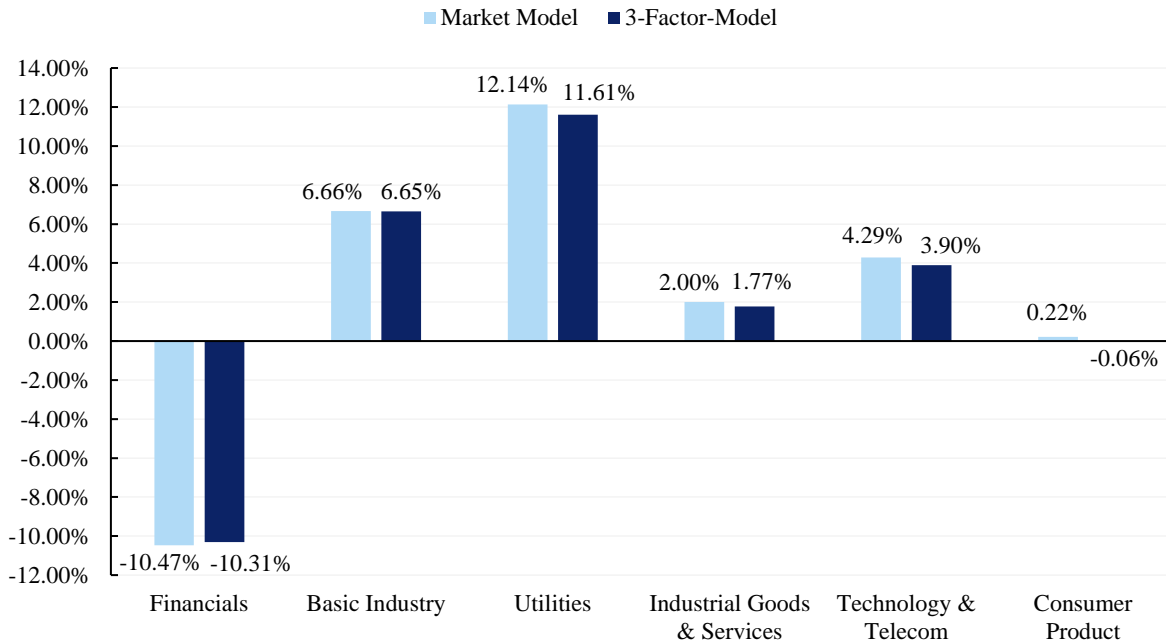
Notes: “Crude Oil Prices: Brent - Europe.” 2023. September 27, 2023. <https://fred.stlouisfed.org/series/DCOILBRETEU>.

Figure 19: Regression plot of oil-related companies (OMV & SBO) to crude oil prices



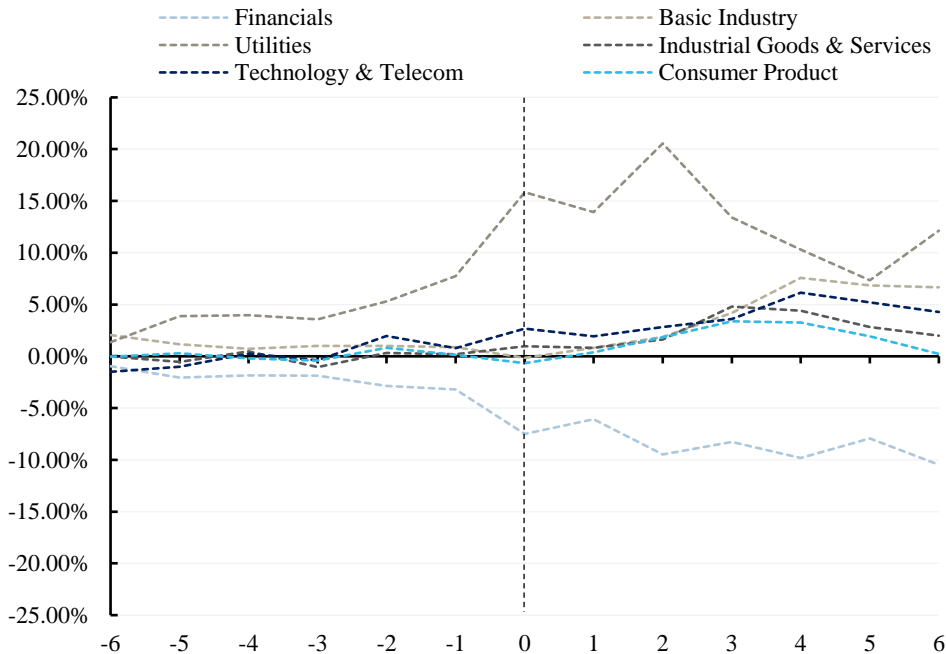
Notes: The regression plot shows that companies exposed to the oil sector move in line with oil prices, indicated by a positive Beta of 0.4317.

Figure 20: CAARs of all industries according to the VSE sector classification covering all 31 stocks of the sample size over the event window



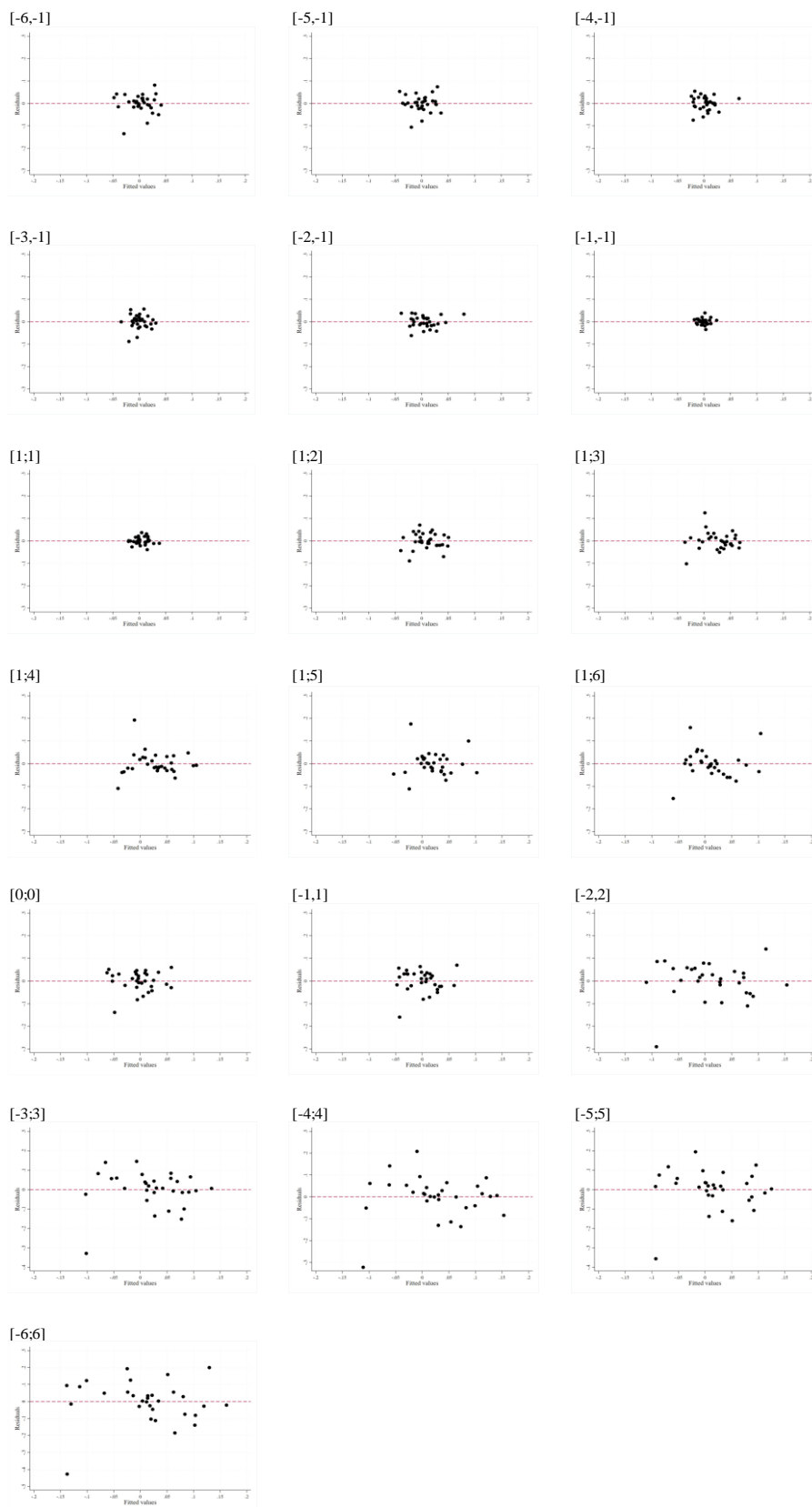
Notes: This graphic shows the CAARs of each industry of the sample size over the event window from t-6 to t+6, with t being the event day, February 24, 2022. It becomes evident that the financials industry experienced the highest negative cumulative average abnormal returns, whereas the other industries ended up with positive CAARs.

Figure 21: CAARs of all industries according to the VSE sector classification according to the Market Model over the event window



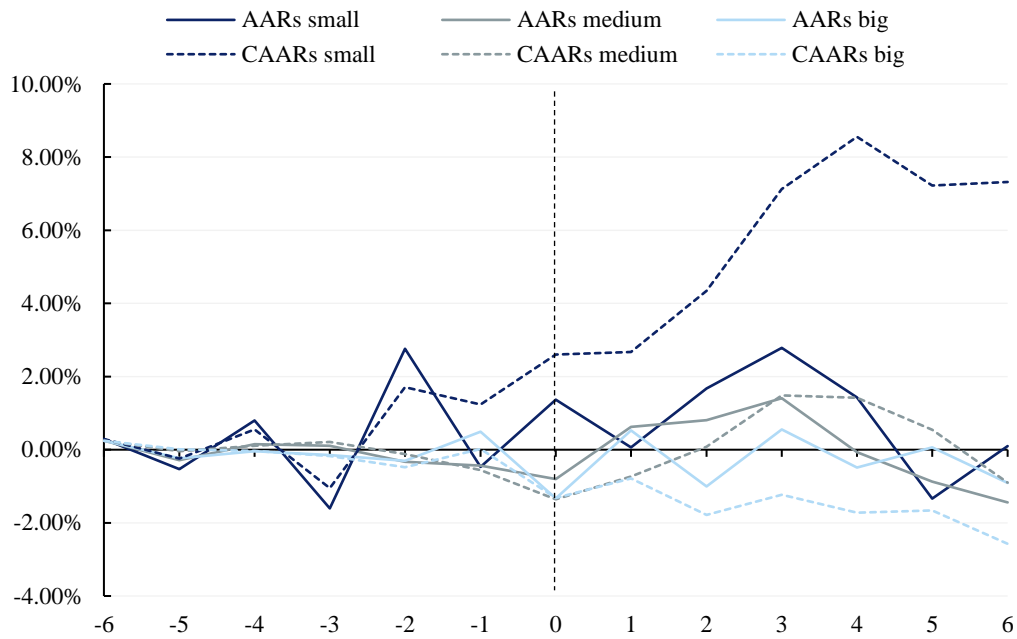
Notes: The graphic displays the CAARs of each industry of the sample size over the event window from t-6 to t+6, with t being the event day, February 24, 2022. It becomes evident that the financials industry experienced the highest negative cumulative average abnormal returns, whereas the other industries ended up with positive CAARs.

Figure 22: Regression plots - test for heteroskedasticity of cross-sectional analysis data



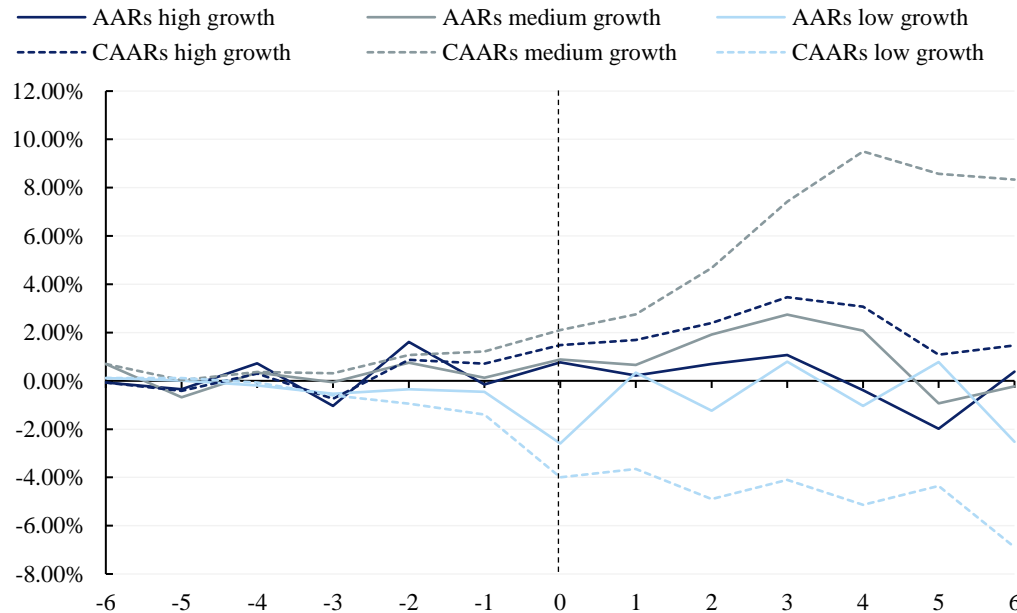
Notes: These graphs display the difference between the predicted (fitted) values from a regression model and the corresponding residuals. Following the results from the Breusch-Pagan test, it becomes evident that especially in the following windows [1;3] [1;4] [-1;1] [-2;2] [-3;3] [-4;4] [-5;5] [-6;6] the dispersion of residuals becomes more inconsistent moving along the range of predicted values, indicating potential heteroskedasticity.

Figure 23: Size – Movement of AARs and CAARs of tercile portfolios based on total assets



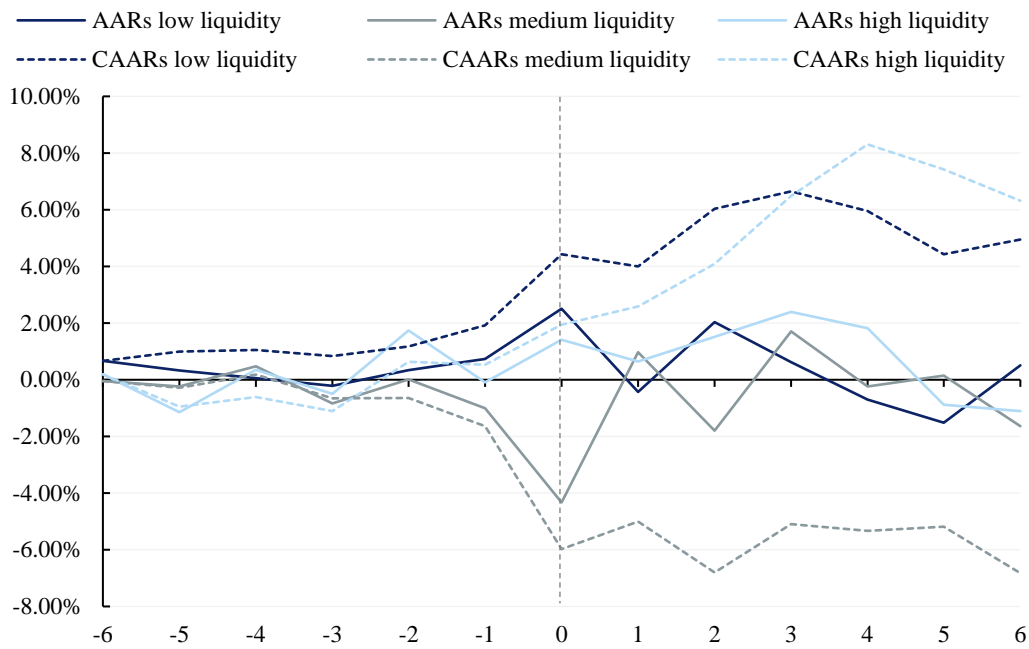
Notes: The graphic summarizes the movement of AARs of size-based tercile portfolios (total assets). Each portfolio covers ten to eleven companies of the full sample of 31 Austrian firms. The stocks are regressed against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.

Figure 24: Growth – Movement of AARs and CAARs of tercile portfolios based on book-to-market value



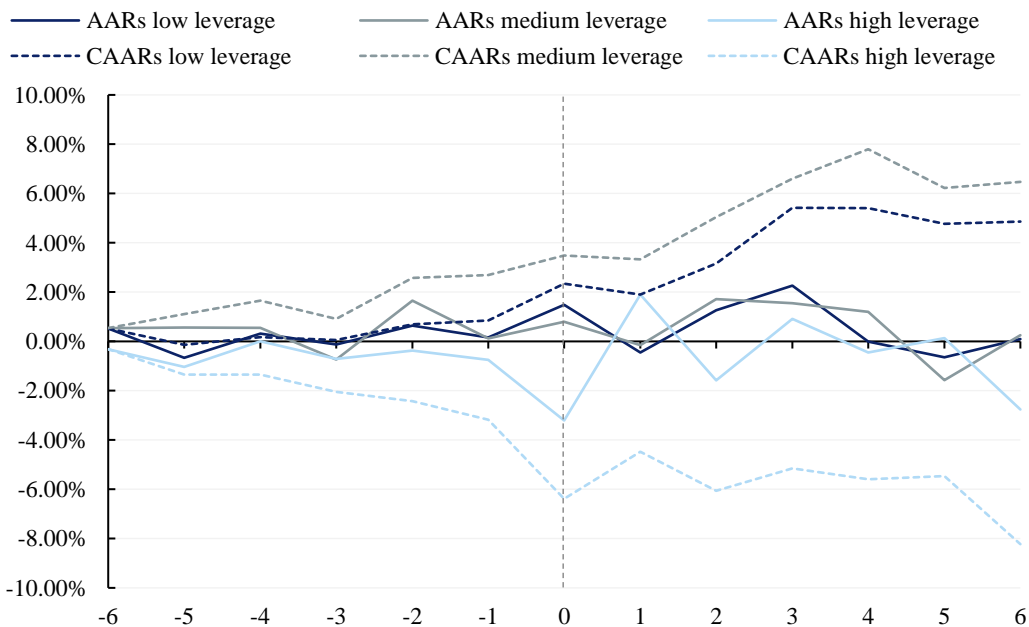
Notes: The graphic summarizes the movement of AARs of growth-based tercile portfolios (book-to-market value). Each portfolio covers ten to eleven companies of the total sample of 31 Austrian firms. The stocks are regressed against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.

Figure 25: Liquidity – AARs and CAARs of tercile portfolios based on current ratio



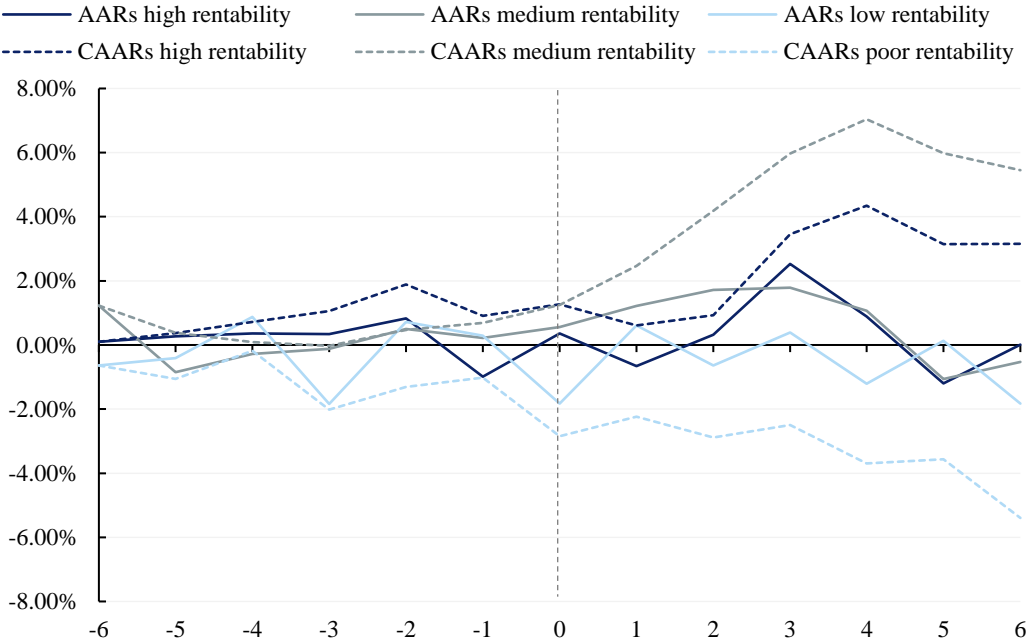
Notes: The graphic summarizes the movement of AARs of liquidity-based tercile portfolios (current ratio = current assets / current liabilities). Each portfolio covers ten to eleven companies of the total sample of 31 Austrian firms. The stocks are regressed against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.

Figure 26: Leverage – AARs and CAARs of the tercile portfolios based on leverage ratio



Notes: The graphic summarizes the movement of AARs of leverage-based tercile portfolios (leverage ratio = total debt to total assets). Each portfolio covers ten to eleven companies of the full sample of 31 Austrian firms. The stocks are regressed against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.

Figure 27: Rentability – AARs and CAARs of the tercile portfolios based on return on assets ratio



Notes: The graphic summarizes the movement of AARs of rentability-based tercile portfolios (return on assets = net income / total assets). Each portfolio covers ten to eleven companies of the total sample of 31 Austrian firms. The stocks are regressed against the WBI, the market index, over the event window from t-6 to t+6 around February 24, 2022, following the Market Model using OLS regression.