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Russia–Ukraine crisis: The effects on the European stock market

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Abstract

We examine the effect of the Russia–Ukraine crisis on the European stock markets. Because of increased political uncertainty, geographic proximity and the ramifications of the fresh sanctions imposed on Russia, the European stock markets tended to react negatively to this crisis. We find that on 21 February 2022, when Russia recognized two Ukrainian states as autonomous regions, European stocks incurred a significant negative abnormal return. Moreover, the negative stock price reactions continued in the post-event period. The magnitude of the stock price reactions to this crisis exhibits considerable variation across industries, countries and size of the company.

KEYWORDS

event study, political uncertainty, Russia–Ukraine crisis, stock returns

JEL CLASSIFICATION

G01, G21, G30, G32

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1 | INTRODUCTION

The recent Russia–Ukraine crisis was exacerbated on 21 February 2022 when Russia recognized Ukraine's Donetsk and Luhansk regions as independent states and mobilized Russian troops inside those two parts of Ukraine as peacekeepers. World leaders called the action the start of a war. Consequently, the United States, the United Kingdom and countries in the European Union (EU) started to impose economic sanctions against Russia. With 37.3% of Russia's total global goods trade in 2020, the EU was Russia's most important trading partner (EC, 2022). Russia supplied 27% of the crude oil, 46.7% of the solid fuel, and 41.1% of the natural gas imported by the EU (Eurostat, 2022). Because of the integrated nature of the Russian economy, particularly with the European countries, through the trade of oil, gas, food and raw materials, the increased geopolitical tension and subsequently imposed sanctions were likely to have an adverse effect on western economies as well as on the Russian economy. This motivates us to investigate how investors in the European stock markets responded to this event.

Prior literature investigating the link between political uncertainty and financial market performance finds that fear of political instability has a significantly negative effect on both the stock market return and the risk profiles of financial assets (see e.g., Dimic et al., 2015; Gemmill, 1992; Jones & Banning, 2008; Kapar & Buigut, 2020; Li & Born, 2006; Mei & Guo, 2004; Nippani & Medlin, 2002). Using a number of international political crises, Berkman et al. (2011) demonstrate the importance of political crises in explaining both the mean and the volatility of stock market returns around the world. Using data from 49 emerging nations, Lehkonen and Heimonen (2015) also report an inverse relationship between political risk and stock returns. Dimic et al. (2016) demonstrate that political risk influences currency carry trade returns.

Among the studies of recent major political risk events, Smales (2017) documents a significantly positive relationship between political risk (the Brexit referendum) and financial market uncertainty. He et al. (2017) examine the economic cost of non-violent diplomatic disputes between mainland China and Taiwan, and show that political tension is related to a significant decline in the stock market return. They also find that anticipated future tension levels are related to reductions in current stock returns. Kapar and Buigut (2020) find that diplomatic and economic blockades on Qatar resulted in a substantial impact on stock market volatility in Qatar. Furthermore, Buigut and Kapar (2020) demonstrate that the blockade of Qatar had a considerable impact on stock markets in Gulf Cooperation Council countries, with the effects varying across different industries and countries. Finally, Bash and Alsaifi (2019) show that the disappearance of Jamal Khashoggi has had a severely negative influence on the Saudi Stock Exchange's stock returns.

There are also studies that explore the economic consequences of geopolitical risk (GPR), which captures the uncertainty arising from the possibility of wars, terrorist acts and conflicts between nations (Caldara & Iacoviello, 2022). Studies suggest that GPR has significant impacts on corporations and financial markets, as evidenced by the adverse effects on investment, employment and downside risks (Caldara & Iacoviello, 2022), equity returns and bond spreads (Rigobon & Sack, 2005) and volatility in the stock markets (Choi, 2022). In a recent study, Salisu et al. (2022) show that geopolitical threats (e.g., military build-ups, threats of war and terrorism) have a greater adverse effect on stock returns than geopolitical acts (i.e., the actual occurrence of adverse events). Russia's invasion of Ukraine in 2022 is viewed as part of a resurgent geopolitical competition among the world's great powers,[1] significantly increasing

[1] https://www.cfr.org/backgrounder/ukraine-conflict-crossroads-europe-and-russia

the geopolitical threats. Our study contributes to the literature by examining how European stock markets have reacted to the Russia–Ukraine crisis.

The ongoing Russia–Ukraine conflict is unique in nature, and differs remarkably from past political uncertainty and wars such as the Russian annexation of Crimea in 2014, the Persian Gulf War, and the Iraq War in several important ways. First, although the Russian invasion of Ukraine is centred in Europe, it has triggered geopolitical risks and shaken the global economy. For example, the geopolitical risk index developed by Caldara and Iacoviello (2022) demonstrates that the geopolitical threat reached a peak level after the Russian invasion of Ukraine (see Figure 1). Moreover, the invasion is likely to impair financial intermediation and trade, raising concerns about slower economic growth and faster inflation around the world. As a result, the impact of this crisis is considerably broader and deeper than the impact of previous political events.

The second notable feature is that this crisis has resulted in a slew of sanctions and restrictions against Russia being imposed by a number of nations. On our selected event date of 21 February,[2] the EU Council enacted restrictive measures against five individuals.[3] On 22 February, the US announced its first tranche of sanctions to limit Russian access to financial resources.[4] On 23 February, the European Council introduced a first-of-its-kind sanctions package.[5] On 24 February, European leaders agreed to impose additional sanctions against Russia in the financial, energy and transportation sectors, restrictions on dual-use goods, export controls, export financing and visa policies. Indeed, the number of sanctions against Russia following the invasion of Ukraine is higher than the number imposed after the Russian annexation of Crimea in 2014. Moreover, the sanctions levied against Russia in 2014 were primarily aimed at its dealings with Crimea and had no direct effect on Russia. Overall, because of the unprecedented recent sanctions, Russia has become the single largest target of global sanctions (see Figure 2). Finally, unlike the previous wars, the Russia–Ukraine crisis has disrupted the global supply chain. Given that Russia (Ukraine) is a major supplier of oil, gas, metals and fertilizers (wheat, sunflower oil and corn), this crisis has resulted in a reduction in the supplies of these commodities. Further, the embargo on Russian exports and Russia's refusal to allow foreign cargoes to transit via its waterways and airspace have disrupted the global supply chain, causing a sharp rise in commodity prices.

We predicted that the Russia–Ukraine crisis had a negative effect on European stock markets through economic and political channels. The economic effect of the Russia–Ukraine crisis is evident because Russia is an integrated trading partner of European countries and a key producer and supplier of crude oil and natural gas, with pipelines feeding many parts of Europe. Moreover, European countries are highly dependent on Russia and Ukraine for food (e.g., wheat, corn, barley, maize, sunflower seed and sunflower oil), fertilizers and raw materials.[6] The disruption arising from the Russia–Ukraine crisis and the accompanying sanctions on Russia have already raised price levels, and this is likely to have a ripple effect on the European economy and corporate

[2]Although the political tension between Russia and Ukraine was discussed for months and several countries expressed concern about a possible Russian invasion of Ukraine, those worries became a reality following Russia's announcement on 21 February 2022. This announcement was dubbed the start of a new war by world leaders, and western countries started to implement a slew of financial sanctions shortly after Russia's proclamation. Hence, 21 February is the most significant date in the timeline of the Russia–Ukraine crisis, and is chosen as the event date in our paper.

[3]https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-ukraine-crisis/history-ukraine-crisis/

[4]https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/22/fact-sheet-united-states-imposes-first-tranche-of-swift-and-severe-costs-on-russia/

[5]https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-ukraine-crisis/

[6]https://www.ifpri.org/blog/how-will-russias-invasion-ukraine-affect-global-food-security

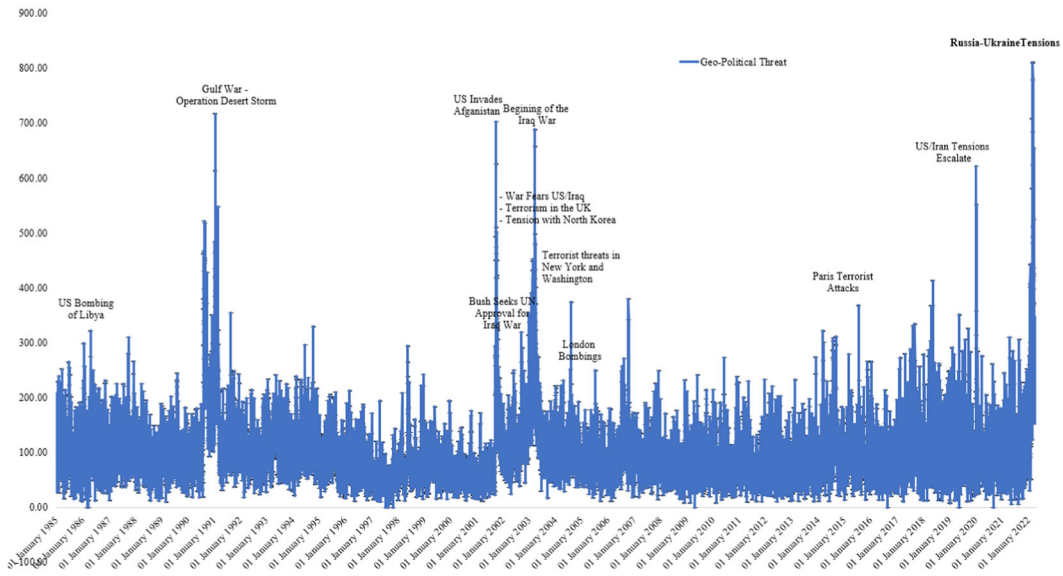

FIGURE 1 Geopolitical threats between January 1985 and January 2022. Data on geopolitical threats was obtained from https://www.matteoiacoviello.com/gpr.htm. [Color figure can be viewed at wileyonlinelib rary.com]

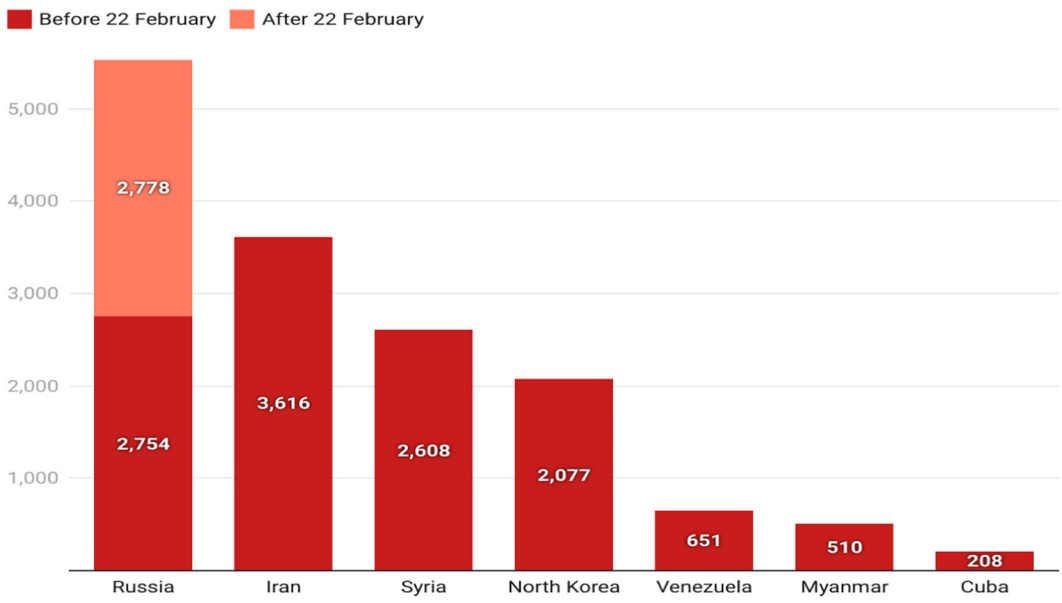

FIGURE 2 Sanctions imposed against Russia and some other selected countries. Data is sourced from https://www.castellum.ai/insights/russia-is-now-the-worlds-most-sanctioned-country. [Color figure can be viewed at wileyonlinelibrary.com]

performance (Rigobon & Sack, 2005). Therefore, the Russia–Ukraine crisis is likely to have an adverse effect on the share prices of European companies.

Further, the geopolitical risk and threats in the Eurozone have escalated as a result of the Russia–Ukraine crisis. Because of their geographic proximity and economic linkages, European countries, as well as companies, are directly affected by this war. European countries have already

absorbed over 6.8 million refugees from Ukraine.[7] Moreover, because of the considerable uncertainty about the duration of this war, the ultimate political and economic consequences of the crisis are unpredictable.[8] Thus, the heightened geopolitical threat in the Euro region is increasing investors' uncertainty and dampening business confidence (Caldara & Iacoviello, 2022), with a depressing effect on stock prices. Overall, the invasion, which is the first of its nature since World War II in any European country, should have a significant impact on the European economy and geopolitics, resulting in negative stock price reactions to this crisis in the European stock markets.

We use firms belonging to the STOXX Europe 600 index, which represents publicly traded firms with large, medium and small capital from the major European countries, to conduct an event study to examine the stock market reactions to Russia's declaration of its recognition of two independent states in eastern Ukraine on 21 February 2022. Our findings demonstrate significantly negative average abnormal returns (AARs) surrounding the short-event windows (e.g., −3 to +3 days), except for the first day following the event (i.e., 22 February). Importantly, we observe 0.41% negative AAR on the event day, the highest drop in stock prices during the event windows. We also observe negative and significant cumulative abnormal returns (CARs) around the event days, pre-event days and post-event days, providing strong evidence of the prolonged negative impact of the Russia–Ukraine crisis on the European stock market. When we examine industry-level variation in the stock price reactions to the crisis, we observe that seven out of eleven industries (viz, the basic materials, consumer staples, financials, healthcare, industrials, telecommunications and utilities sectors) experienced negative and significant AAR on the event day. Moreover, while the consumer staples industry had the worst AAR on the event day, the energy industry experienced an insignificant positive AAR. In addition, the financial services industry witnessed the most severe effect across the event windows. We observe consistent significant industry-level variation when CAR is used in the analysis.

Furthermore, we observe a considerable country-level heterogeneity in the stock price reactions to the crisis. For example, while companies in the Netherlands incurred the most negative AAR, companies in the UK experienced a positive and significant AAR on the event day, and companies domiciled both in Denmark and in Switzerland had significant negative CAR around the event day and the pre-event period. Finally, we observe that the small- and medium-cap companies experienced more negative AAR (CAR) than the large-cap companies on the event day (around the event window).

Our findings contribute to the literature in several important ways. First, we extend the growing body of literature that examines how geopolitical risks and political events affect stock returns. While the majority of the prior studies show that political events have negative impacts on stock returns and volatility (Bash & Alsaifi, 2019; Buigut & Kapar, 2020; Choudhry, 2010; Rigobon & Sack, 2005; Smales, 2017), some also suggest that there are positive effects (Guidolin & La Ferrara, 2010), and others document a weak relationship between war events and market returns (Hudson & Urquhart, 2015). Given these mixed findings, this is the first attempt to examine the stock price reactions to the Russia–Ukraine crisis in European countries.[9] Unlike prior studies (Choudhry, 2010; Rigobon & Sack, 2005), our sample countries are not 'direct' participants in the war, although they are providing humanitarian and military support to Ukraine and imposing restrictions on Russia. We show that European stocks experienced significant negative abnormal returns when

[7] https://data.unhcr.org/en/situations/ukraine

[8] https://abcnews.go.com/Business/wireStory/eu-cuts-forecast-economic-growth-wars-fallout-widens−84746720

[9] Concurrent studies (Boubaker et al., 2022; Boungou & Yatié, 2022) examine the global stock market reactions to the Russia–Ukraine crisis.

Russia recognized the two Ukrainian states as autonomous regions, and that this effect continued in the post-event period. Importantly, we document a prolonged negative reaction in the European stock markets to the Russia–Ukraine crisis.

Second, our study complements prior works that show that the sensitivity of stock prices to political uncertainties and geopolitics differs across industries (Boutchkova et al., 2012; Buigut & Kapar, 2020). We show that some industries, such as the basic materials, consumer staples, financials, healthcare, industrials, telecommunications and utilities sectors, were particularly sensitive to the Russia–Ukraine crisis. Interestingly, while prior studies show that the consumer staples sector is least affected by crises (Landier & Thesmar, 2020), we find this sector to be the most affected during the Russia–Ukraine crisis.

Third, our findings of considerable country-level heterogeneity in the stock price reactions to the Russia–Ukraine crisis on the European stock market extend the related literature (e.g., Buigut & Kapar, 2020). Our findings suggest that country-level variation cannot be explained solely by geographic proximity to Russia or Ukraine; rather, the extent of trade and economic ties affect stock prices significantly. Finally, our findings may guide policymakers, managers and other key stakeholders in developing effective policies to mitigate the negative impacts of political uncertainty on stock markets.

The rest of this paper is structured as follows. The data and empirical methodologies are presented in Section 2. The results are discussed in Section 3. Finally, Section 4 summarizes the study and provides policy implications and directions for future research.

2 | DATA AND METHODOLOGY

2.1 | Data

We collected daily stock prices of firms belonging to the STOXX Europe 600 index from Refinitiv Datastream database. The STOXX Europe 600 index represents firms with large, medium and small capital from European countries, and covers diverse industries. From the initial sample of 600 firms, we dropped 13 firms for which the daily stock price or market value data were not available for the entire estimation period. Thus, our final sample includes the stocks of 587 firms traded in European countries. Table A1 presents the distribution of our sample by industry, while Table A2 presents the sample distribution by country.

Figure 3 exhibits the trend of the STOXX Europe 600 index over a 1-year period (February 2021–March 2022). It is clear that the STOXX Europe 600 index has experienced a sharp decline since February 2022, which coincides with the Russian invasion of Ukraine.

2.2 | Methodology

This study employs the event study approach proposed by Fama et al. (1969) to investigate the impact of the Russia–Ukraine crisis on European stock returns. We use both parametric and non-parametric tests to investigate the significance of the market reactions over the event window. We incorporate a non-parametric test to study the effect of the Russia–Ukraine crisis on the stock returns, in addition to two parametric tests, because prior studies suggest that parametric tests rely on distributional assumptions such as return normality, which tend to be violated in the case of daily returns. Moreover, Maynes and Rumsey (1993) and Corrado and Truong (2008) show that

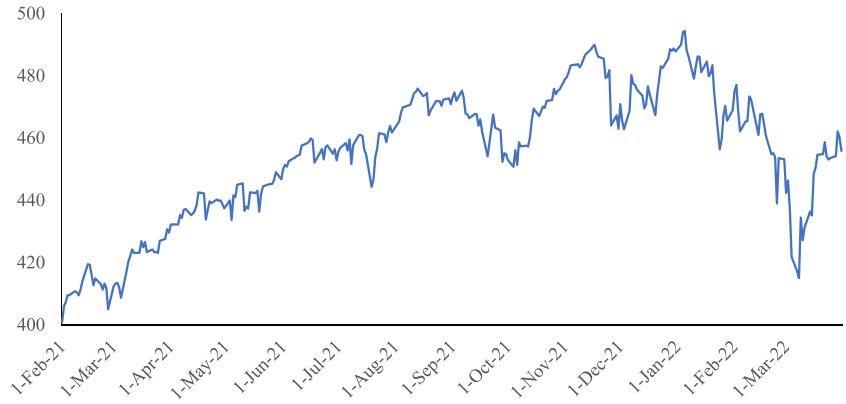

FIGURE 3 Trend in STOXX EUROPE 600 index. [Color figure can be viewed at wileyonlinelibrary.com]

parametric tests yield erroneous results in numerous marketplaces. Other studies also provide evidence that a non-parametric test such as the Wilcoxon statistic is more powerful than parametric statistics (Barber & Lyon, 1996). Therefore, we supplement our analysis with the non-parametric Wilcoxon signed-rank test to check the robustness of our results.

Our event window ranges from the 25th trading day before the event date of 21 February 2022 to the 25th trading day following the event (i.e., [−25, +25]). We deliberately chose a long event window to ascertain whether the short-time impact of the event, if any, was subsequently reversed once the initial surprise of the invasion had subsided. To investigate the abnormal market return around the event day, we first estimate the following equation for each stock in our sample.

$$R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{M,t} + \varepsilon_{i,t}, \tag{1}$$

where $R_{i,t}$ is the logarithmic daily returns of security i on day t, and $R_{M,t}$ is the market return on day t. We use the STOXX Europe 600 index as our proxy for the market index. The market model parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated through OLS regression using a 250-day estimation window that ends 25 days before the event day. As a result, our estimation window dates from 1 February 2021 to 14 January 2022. We drop the days immediately leading up to the event day to control for information leaks before the event day, since the event was evident from the build-up of Russian troops near the Ukrainian border and the reports in the media of potential sanctions if there was an invasion.

Using the estimated parameters from the above equation, we then calculate the abnormal return over the event window:

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}), \tag{2}$$

where $AR_{i,t}$ is the daily abnormal return for firm i at day t. From the estimated $AR_{i,t}$ we calculate the cumulative abnormal return (CAR_i) by summing the daily abnormal returns for event i over the period $[\tau 1, \tau 2]$.

$$CAR_i = \sum_{t=\tau 1}^{\tau 2} AR_{i,t}. \tag{3}$$

To test the significance of the abnormal returns over the event days, we standardize AR_i and CAR_i using the estimation period standard deviation of the residuals in Equation (1) corrected for the sampling error, following Campbell et al. (1997). We then employ Boehmer et al.'s (1991) standardized cross-sectional test (henceforth the BMP test) using the cross-sectional standardized daily abnormal returns (SAR) and standardized cumulative abnormal returns (SCARs) for individual and multiple event days.

Event study methodology usually assumes the cross-sectional independence of abnormal returns, which leads to an underestimation of the standard errors and a severe over-rejection of the null hypothesis (Kolari & Pynnönen, 2010). As the event day is the same for all of our sample stocks, this is an important problem in our analysis. To mitigate its effects and following prior studies (e.g., Cellier et al., 2016), we use Kolari and Pynnönen's (2010) cross-sectional correlation adjustment for the BMP test statistic, which is reported in what follows as the KP test. Finally, as a non-parametric test we use the Wilcoxon signed-rank test (henceforth, WRank) for the AARs and CARs.

3 | EMPIRICAL FINDINGS

3.1 | Abnormal returns around the event day

Table 1 presents the AAR of stocks belonging to STOXX Europe 600 index for each of the days in our event windows, and Figure 4 shows the trend over the 7 days (i.e., [−3, +3]) surrounding the event day. Figure 4 exhibits negative and significant AAR values on all these 7 days except the first day following the event (i.e., 22 February). The magnitude of the negative AAR values increases monotonically up to the event day, and is particularly significant for the 2 days before the event day. One possible explanation for this finding is that the news about the dispute and possible invasion was extensively covered by the major mainstream media worldwide. The US government also revealed intelligence reports about a possible Russian attack on Ukraine. This news was likely to alter investors' perceptions about the possible political crisis, causing the market to react adversely.

Importantly, we observe a 0.41% negative abnormal return on the event day, the highest drop in stock prices during the event window. This economically non-trivial drop in stock prices is also statistically significant at the 1% level, based on all three of our tests.[10] The magnitude of the market reaction on the event day is consistent with other prior studies that investigate market reactions to political crises and epidemic diseases (e.g., Buigut & Kapar, 2020; Naidu & Ranjeeni, 2021).[11] The stock market slightly recovered and registered a positive AAR just after the event day (i.e., +1). However, this AAR is statistically insignificant and did not persist on the following days. Notably, the negative stock market reaction on Days +2 and

[10]In a related study, Boubaker et al. (2022) report an AAR of −0.041 on the event day for the European stock markets. However, while the authors use value-weighted country-specific indices that represent the most relevant stocks for the respective countries, we use an equal-weighted AAR of stocks belonging to the STOXX Europe 600 index.

[11]For example, Naidu and Ranjeeni (2021) document an AAR of −0.001 on an event day that corresponds to an increase in the number of confirmed coronavirus cases. Similarly, Jamal Khashoggi's disappearance caused a market reaction of −0.004 in the Saudi Stock Exchange (Bash & Alsaifi, 2019). Moreover, Buigut and Kapar (2020) show that the diplomatic and economic isolation of Qatar resulted in an AAR of −0.13% in Dubai, −0.50% in Bahrain, −0.21% in Kuwait, and −0.22% in Oman.

TABLE 1 Average abnormal return (AAR)

This table presents the average daily abnormal return (AAR) of 587 stocks belonging to the STOXX Europe 600 index for each day in the event window. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized daily abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the AAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

Event Windows	AAR	BMP	KP	WRank	Obs.
−3	−0.13	−1.15	−0.46	−1.41	587
−2	−0.34	−4.30***	−1.73*	−5.88***	587
−1	−0.34	−2.28**	−0.92	−3.83***	587
0	−0.41	−6.99***	−2.81***	−6.09***	587
1	0.06	−0.89	−0.36	−0.46	587
2	−0.26	−1.96*	−0.79	−2.63***	587
3	−0.25	−2.89***	−1.17	−0.93	587

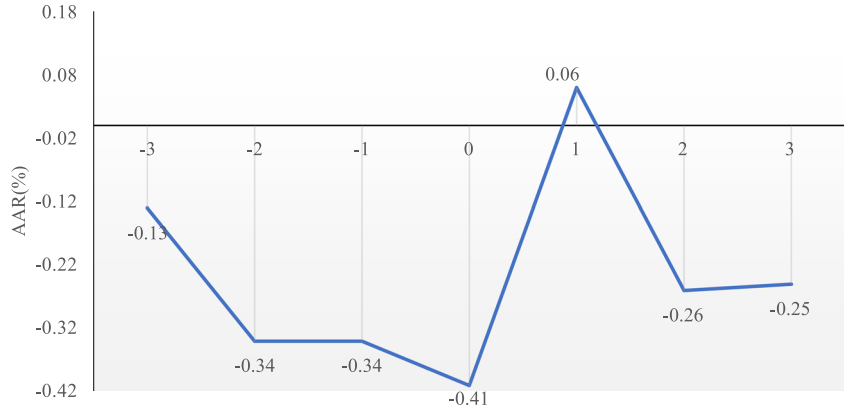

FIGURE 4 The average daily abnormal return over the event window. [Color figure can be viewed at wileyonlinelibrary.com]

+3 coincided with the Ukrainian president's warning on 23 February that a Russian invasion could spark a catastrophic war on the European continent, and Russia's invasion of Ukraine on the following morning.

Table A3 presents the AAR for an extended period around the event day ([−25, +25]). We find that the European stock markets incurred a negative and significant AAR on Day +10 (AAR = −0.27%) and Day +20 (AAR = −0.28%), and a positive and significant AAR on Day +15 (AAR = 0.45%) and Day +25 (AAR = 0.53%), suggesting volatility and uncertainty arising from the Russia–Ukraine crisis.

To provide additional insights, we estimate the CAR of the stocks over a specified time period surrounding the event day. We report the results from this analysis in Table 2. We observe that all CAR values around the event day, the days leading up to the event day, and the post-event days are negative and highly significant using both parametric and non-parametric

TABLE 2 Cumulative abnormal return (CAR)

This table presents the average cumulative abnormal return (CAR) of 587 stocks belonging to the STOXX Europe 600 index over different event windows. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

Event Windows	CAR	BMP	KP	WRank	Obs.
Around event days					
[−1,1]	−0.69	−5.79***	−2.33**	−6.36***	587
[−2, 2]	−1.29	−6.74***	−2.71***	−7.13***	587
[−3, 3]	−1.67	−6.37***	−2.56**	−6.27***	587
[−5, 5]	−1.11	−3.05***	−1.23	−2.07**	587
[−10, 10]	−4.02	−6.60***	−2.66***	−6.88***	587
[−15, 15]	−1.38	−2.41**	−0.97	−1.91*	587
[−20, 20]	−2.16	−3.43***	−1.38	−3.34***	587
[−25, 25]	−3.34	−4.97***	−2.00**	−5.07***	587
Pre-event days					
[−25, 0]	−2.16	−5.36***	−2.16**	−5.20***	587
[−20, 0]	−1.52	−4.21***	−1.69*	−4.09***	587
[−15, 0]	−0.96	−3.51***	−1.41	−3.46***	587
[−10, 0]	−1.44	−5.56***	−2.24**	−5.45***	587
[−5, 0]	−1.11	−5.67***	−2.28**	−6.41***	587
[−3, 0]	−1.21	−6.76***	−2.72***	−8.11***	587
[−2, 0]	−1.09	−7.12***	−2.86***	−8.55***	587
[−1, 0]	−0.75	−5.98***	−2.41**	−7.04***	587
Post-event days					
[0, 1]	−0.35	−5.06***	−2.04**	−4.26***	587
[0, 2]	−0.60	−5.18***	−2.09**	−5.00***	587
[0, 3]	−0.86	−4.85***	−1.95*	−3.31***	587
[1, 2]	−0.20	−1.98**	−0.80	−2.06**	587
[1, 3]	−0.45	−3.20***	−1.29	−1.54	587
[0, 5]	−0.40	−1.98**	−0.80	−0.01	587
[0, 10]	−2.99	−5.39***	−2.17**	−4.75***	587
[0, 15]	−0.83	−1.60	−0.64	−0.44	587
[0, 20]	−1.05	−1.99**	−0.80	−0.95	587
[0, 25]	−1.59	−2.92***	−1.18	−2.14**	587

tests, providing strong evidence of the negative impact of the Ukrainian crisis on the European stock markets.

When examining the window around the event day, we find that the CAR values for all aggregated days around the event day, for example, 3 days [−1, +1], 5 days [−2, +2] and 7 days [−3, +3], are negative and highly significant across the three significance tests. Interestingly, we observe the worst impact (CAR = −4.02%) of the Russian invasion on European firms over the 21 days surrounding the event day (i.e., [−10, +10]). While all the pre-event windows demonstrate negative and significant CAR, we observe the worst stock market performance (CAR = −2.16%) over the [−25, 0] window. Further, although the CAR values for all post-event periods are negative and significant, the worst post-event CAR (−2.99%) is recorded 10 days after the event day (i.e., [0, +10]). Finally, we find that the CAR remains negative and significant for the [0, +20] and [0, +25] windows, implying that the European stock markets had not recovered even a month after the event day. Overall, we observe a clear negative effect of the Russia–Ukraine crisis on our sample of European firms.

3.2 | Industry-specific abnormal returns

Table 3 examines how the stock prices in different industries in the European stock markets responded to the Russia–Ukraine crisis. We obtained the industry classifications from Datastream. We find that seven out of the eleven industries (viz., the basic materials, consumer staples, financials, healthcare, industrials, telecommunication and utilities sectors) experienced negative and significant AAR on the event day. Moreover, while the consumer staples industry had the worst AAR (–0.90%) on the event day, the energy industry experienced an insignificant positive AAR.

Although the consumer staples sector is generally expected to be less sensitive during a downturn (Landier & Thesmar, 2020), our (counterintuitive) findings are consistent with evidence that Russia's invasion of Ukraine has already thrown global supply chains into turmoil, escalating concerns about global food security, rising production costs, delayed deliveries and other challenges for businesses attempting to move goods globally.[12] The significant negative reactions in the consumer staples industry thus point to the fact that investors perceive this sector to be adversely affected by a decrease in consumer spending due to higher inflation and lower disposable income, lower consumer confidence and soaring raw material prices.[13] Our finding is also consistent with the prior literature that demonstrates that food safety events have a short-term negative impact on the consumer staples sector (e.g., Seo et al., 2013). Interestingly, the negative stock market reaction in the consumer staples sector turned positive on some post-event days (e.g., Days +2, +4, +15, +25).[14] The energy sector's positive, albeit non-significant, market reaction on the event day is consistent, since this sector was likely to benefit from the unusually high spike in oil and gas prices caused by the Russia–Ukraine crisis.

When investigating the industry-specific pre-event stock price reactions, we observe that firms in the energy, financials, healthcare, real estate and technology sectors were more

[12]https://www.nytimes.com/2022/03/01/business/economy/ukraine-russia-supply-chains.html

[13]Russia and Ukraine are leading global producers and exporters of commodities, particularly wheat, sunflowers, barley, oil, gas and metals. Russia is the biggest gas and food exporter to Europe.

[14]Industry-specific AARs for an extended period are not reported but are available upon request.

TABLE 3 Industry-level average abnormal return (AAR)

This table presents the industry-specific average daily abnormal return (AAR) of the 587 stocks belonging to the STOXX Europe 600 index grouped together according to their industries. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized daily abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the AAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Pre-event days			Event day	Post-event days		
	Event Windows	**[−3]**	**[−2]**	**[−1]**	**[0]**	**[+1]**	**[+2]**	**[+3]**
Basic Materials	AAR	1.08	−0.22	0.35	−0.57	0.17	0.26	−1.13
	BMP	4.71***	−0.86	0.73	−2.63**	0.21	2.06**	−1.23
	KP	1.87*	−0.34	0.29	−1.04	0.08	0.82	−0.49
	WRank	4.09***	−1.31	1.58	−1.77*	0.56	1.79*	−0.45
	Obs.	39	39	39	39	39	39	39
Consumer Discretion	AAR	−0.64	−0.23	−0.80	−0.22	0.21	−0.71	−0.61
	BMP	−4.53***	−0.48	−2.79***	−0.83	0.45	−2.42**	−1.38
	KP	−1.85*	−0.19	−1.14	−0.34	0.18	−0.99	−0.56
	WRank	−4.31***	−1.69*	−3.09***	−0.89	−0.28	−3.21***	−0.80
	Obs.	88	88	88	88	88	88	88
Consumer Staples	AAR	−0.28	0.43	−0.08	−0.90	−1.06	0.69	−1.04
	BMP	−0.79	1.93*	1.14	−3.90***	−4.02***	1.73*	−3.54***
	KP	−0.35	0.86	0.51	−1.73*	−1.79*	0.77	−1.58
	WRank	−0.33	1.84*	0.99	−3.32***	−3.64***	3.30***	−2.67***
	Obs.	46	46	46	46	46	46	46
Energy	AAR	1.02	−0.55	−0.85	0.55	−0.12	−0.27	4.09
	BMP	3.65***	−2.08*	−1.77*	1.27	−0.64	−1.09	2.89**
	KP	1.35	−0.77	−0.66	0.47	−0.24	−0.40	1.07

(Continues)

TABLE 3 (Continued)

		Pre-event days			Event day	Post-event days		
	Event Windows	[−3]	[−2]	[−1]	[0]	[+1]	[+2]	[+3]
	WRank	2.50**	−1.55	−1.98**	1.33	−0.46	−1.02	2.46**
	Obs.	18	18	18	18	18	18	18
Financials	AAR	−0.44	−0.93	0.13	−0.31	−0.62	−0.40	−2.49
	BMP	−3.60***	−8.89***	0.98	−2.61**	−3.12***	−2.49**	−6.74***
	KP	−0.91	−2.25**	0.25	−0.66	−0.79	−0.63	−1.71*
	WRank	−3.94***	−7.03***	1.05	−2.01**	−3.41***	−2.79***	−5.95***
	Obs.	102	102	102	102	102	102	102
Health Care	AAR	−0.27	−0.56	−1.04	−0.40	1.36	0.33	0.97
	BMP	−0.25	−2.13**	−1.02	−1.69*	2.98***	1.86*	1.32
	KP	−0.07	−0.63	−0.30	−0.50	0.87	0.55	0.39
	WRank	0.16	−1.75*	−4.25***	−2.45**	4.18***	1.74*	2.49**
	Obs.	57	57	57	57	57	57	57
Industrials	AAR	−0.22	−0.23	−0.22	−0.30	0.16	−0.51	0.33
	BMP	−1.97*	−1.19	−1.09	−3.02***	0.42	−3.48***	0.84
	KP	−0.82	−0.50	−0.45	−1.26	0.18	−1.45	0.35
	WRank	−2.10**	−2.40**	−1.42	−2.44**	0.23	−3.41***	1.88*
	Obs.	120	120	120	120	120	120	120
Real Estate	AAR	1.55	−0.43	−0.58	−0.58	0.71	−0.36	0.19
	BMP	6.61***	−1.79*	−2.91***	−1.77*	1.73*	−0.41	1.02
	KP	1.60	−0.43	−0.71	−0.43	0.42	−0.10	0.25

TABLE 3 (Continued)

		Pre-event days			Event day	Post-event days		
	Event Windows	[−3]	[−2]	[−1]	[0]	[+1]	[+2]	[+3]
	WRank	4.23***	−1.96*	−2.86***	−1.62	1.09	−0.26	0.71
	Obs.	34	34	34	34	34	34	34
Technology	AAR	−0.55	−0.77	−1.08	−0.49	0.64	−0.88	2.44
	BMP	−2.25**	−0.81	−2.65**	−1.42	1.78*	−2.85***	5.91***
	KP	−0.77	−0.28	−0.91	−0.48	0.61	−0.98	2.02*
	WRank	−1.85*	−0.31	−2.67***	−1.31	2.03**	−2.57**	4.24***
	Obs.	35	35	35	35	35	35	35
Telecommunications	AAR	−0.66	−0.55	0.06	−0.69	−0.02	−0.17	−1.60
	BMP	−0.94	−2.08*	0.46	−1.88*	−0.34	−0.54	−3.96***
	KP	−0.47	−1.04	0.23	−0.94	−0.17	−0.27	−1.98*
	WRank	−0.37	−2.13**	0.30	−1.87*	−0.30	−1.05	−2.99***
	Obs.	20	20	20	20	20	20	20
Utilities	AAR	0.06	0.95	0.14	−0.87	−0.67	0.11	0.78
	BMP	0.47	3.00***	0.90	−3.94***	−3.06***	0.12	0.05
	KP	0.15	0.94	0.28	−1.23	−0.96	0.04	0.01
	WRank	0.34	3.26***	1.48	−3.98***	−2.46**	1.66*	0.25
	Obs.	28	28	28	28	28	28	28

adversely affected. Finally, a close look at the post-event stock price reactions by industry reveals that the consumer discretionary and financials industries were more adversely affected, while the basic materials, energy, healthcare, industrials, real estate, telecommunications and utility sectors exhibited positive AAR on more post-event days. Interestingly, the financial sector exhibited persistent negative AAR during both pre-and post-event days. This finding is consistent with the prediction that the crisis would have a severe impact on the financial services industry because of the economic sanctions imposed immediately by various western countries and the EU.

Table 4 shows the industry-specific CAR surrounding the event windows. Consistent with our earlier findings in Table 3, we observe that the financials, industrials, telecommunications, consumer staples and consumer discretionary industries experienced much greater negative CAR around the event day,[15] while the other industries exhibited a relatively mild or no effect. During the pre-event periods, industries such as financials, industrials, consumer discretionary, technology and real estate experienced negative CAR, while the financials, telecommunications and consumer staples sectors experienced negative CAR during the post-event window. Interestingly, while the financial industry exhibited consistent negative CAR in all three event windows, the technology, healthcare and energy sectors experienced positive CAR in the post-event window. Figure 5 highlights this fact by comparing the CAR for our sample industries for the short-event window [−3, +3].

Table A4 in the appendix presents the industry-specific CARs for an extended period around the event Day ([−25, +25]). We find that the consumer discretionary industry had a severely negative market reaction in the extended period, particularly after the initial five days of the event. For example, the abnormal CAR of −8.38% for the [0, +10] window is more than double the magnitude of the market reaction of −4.02% for the full sample. The staggering negative market reaction persisted and reached its worst level for the [0, +25] window. We also observe a prolonged record of significant negative CAR for the consumer staples and financial industries during the post-event window.[16]

Although energy stocks did not react significantly during the shorter horizon, they mostly posted positive abnormal returns during the extended post-event period. This result is not surprising, since energy firms benefited from oil and gas price hikes in the aftermath of the Russian invasion of Ukraine. Further, while the healthcare, real estate and technology industries showed negative CARs during the pre-event period, they recorded positive CARs during the extended post-event period.

Overall, we observe a varying level of industry-wide variation in AAR and CAR surrounding the event period, highlighting the significance of industry-level analysis for a full understanding of the true stock market reaction to the Russia–Ukraine crisis.

3.3 | Country-specific abnormal returns

This section explains how different European counties reacted to the Russia–Ukraine crisis. For this purpose, we group our sample stocks based on their county of domicile, as reported by Datastream. Further, we group together countries with fewer than 16 stocks (i.e., Austria,

[15]When we analyse the entire 7 day [−3, +3] time span surrounding our selected event day, all these industries exhibit negative and highly significant CAR values.

[16]This extended adverse market reaction coincided with the advent of the series of sanctions in the post-event window that significantly expanded the scope of the economic restrictions beyond individuals and entities related to the Russian government, increasing fear and uncertainty for market participants.

TABLE 4 Industry-level cumulative abnormal return (CAR)

This table presents the industry-specific average cumulative abnormal return (CAR) of the 587 stocks belonging to the STOXX Europe 600 index grouped together based on their industries. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
Basic Materials	CAR	−0.04	−0.00	−0.05	0.65	−0.43	−0.22	−0.39	−0.13	−1.27	0.43	−0.70
	BMP	−1.38	−0.78	−0.50	0.57	−1.79*	−1.52	−2.13**	−0.99	−1.32	1.63	−0.85
	KP	−0.55	−0.31	−0.20	0.22	−0.71	−0.60	−0.85	−0.39	−0.52	0.64	−0.34
	WRank	−0.47	0.07	0.57	1.09	−0.77	−0.53	−0.96	−0.31	−0.40	1.51	0.10
	Obs.	39	39	39	39	39	39	39	39	39	39	39
Consumer Discretion	CAR	−0.81	−1.75	−3.00	−1.89	−1.25	−1.02	−0.01	−0.72	−1.33	−0.50	−1.11
	BMP	−1.82*	−2.60**	−3.74***	−4.09***	−2.36**	−2.42**	−0.14	−1.57	−1.95*	−1.23	−1.78*
	KP	−0.74	−1.06	−1.53	−1.67*	−0.96	−0.99	−0.06	−0.64	−0.79	−0.50	−0.73
	WRank	−2.30**	−3.10***	−3.96***	−4.17***	−3.12***	−2.58***	−0.40	−2.23**	−1.83*	−2.12**	−1.70*
	Obs.	88	88	88	88	88	88	88	88	88	88	88
Consumer Staples	CAR	−2.04	−0.91	−2.23	−0.83	−0.55	−0.98	−1.96	−1.26	−2.30	−0.36	−1.40
	BMP	−4.12***	−0.86	−3.36***	−1.17	−0.70	−2.31**	−5.70***	−2.26**	−4.72***	−0.59	−3.30***
	KP	−1.83*	−0.38	−1.50	−0.52	−0.31	−1.03	−2.54**	−1.01	−2.10**	−0.26	−1.47
	WRank	−3.94***	−1.48	−3.02***	−1.36	−1.78*	−2.66***	−4.79***	−2.56**	−3.99***	−1.05	−3.03***
	Obs.	46	46	46	46	46	46	46	46	46	46	46
Energy	CAR	−0.42	−1.25	3.86	0.16	−0.85	−0.31	0.43	0.15	4.25	−0.39	3.70
	BMP	−0.59	−1.25	1.71	0.53	−1.06	−0.27	0.61	−0.02	1.98*	−1.23	1.98*

(Continues)

TABLE 4 (Continued)

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
	KP	−0.22	−0.46	0.63	0.20	−0.39	−0.10	0.23	−0.01	0.73	−0.46	0.74
	WRank	−0.72	−1.15	1.85*	0.02	−1.11	−0.54	0.81	0.07	1.98**	−0.59	1.94*
	Obs.	18	18	18	18	18	18	18	18	18	18	18
Financials	CAR	−0.80	−2.13	−5.05	−1.55	−1.11	−0.18	−0.93	−1.33	−3.81	−1.01	−3.50
	BMP	−3.20***	−6.32***	−8.48***	−6.05***	−4.86***	−1.09	−4.25***	−4.80***	−7.12***	−4.31***	−6.93***
	KP	−0.81	−1.60	−2.15**	−1.53	−1.23	−0.28	−1.08	−1.22	−1.81*	−1.09	−1.76*
	WRank	−3.11***	−5.69***	−7.72***	−5.57***	−4.49***	−0.78	−4.10***	−4.56***	−6.45***	−4.14***	−6.17***
	Obs.	102	102	102	102	102	102	102	102	102	102	102
Health Care	CAR	−0.09	−0.32	0.38	−2.28	−2.00	−1.45	0.95	1.28	2.25	1.69	2.65
	BMP	0.29	0.23	0.78	−1.60	−1.85*	−1.41	2.11**	2.51**	2.75***	3.29***	3.15***
	KP	0.08	0.07	0.23	−0.47	−0.54	−0.41	0.62	0.74	0.81	0.97	0.92
	WRank	−0.60	−0.59	0.64	−3.78***	−4.23***	−4.49***	3.33***	3.49***	3.68***	4.38***	3.92***
	Obs.	57	57	57	57	57	57	57	57	57	57	57
Industrials	CAR	−0.37	−1.10	−1.00	−0.98	−0.75	−0.53	−0.14	−0.65	−0.32	−0.35	−0.02
	BMP	−2.03**	−3.30***	−2.02**	−3.55***	−3.00***	−3.20***	−1.49	−2.91***	−0.97	−1.64	−0.21
	KP	−0.85	−1.38	−0.84	−1.48	−1.25	−1.33	−0.62	−1.21	−0.40	−0.68	−0.09
	WRank	−2.12**	−3.42***	−2.12**	−4.11***	−3.78***	−3.01***	−1.47	−3.17***	−0.64	−2.09**	0.11
	Obs.	120	120	120	120	120	120	120	120	120	120	120
Real Estate	CAR	−0.44	−1.23	0.51	−0.03	−1.59	−1.16	0.14	−0.22	−0.03	0.35	0.55
	BMP	−1.03	−2.17**	1.06	−0.06	−3.09***	−2.66**	0.01	−0.38	0.13	1.45	1.54

TABLE 4 (Continued)

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
	KP	−0.25	−0.53	0.26	−0.01	−0.75	−0.64	0.00	−0.09	0.03	0.35	0.37
	WRank	−2.15**	−2.33**	0.79	−0.11	−2.73***	−2.38**	−1.26	−0.73	−0.57	1.31	1.03
	Obs.	34	34	34	34	34	34	34	34	34	34	34
Technology	CAR	−0.93	−2.58	−0.69	−2.88	−2.33	−1.56	0.15	−0.73	1.71	−0.25	2.20
	BMP	−1.54	−2.24**	−0.22	−3.53***	−2.54**	−3.06***	0.28	−1.23	2.21**	−0.63	3.09***
	KP	−0.53	−0.77	−0.08	−1.21	−0.87	−1.05	0.09	−0.42	0.76	−0.22	1.06
	WRank	−1.03	−1.79*	0.03	−3.57***	−2.52**	−2.62***	0.95	−0.39	2.69***	−0.23	2.95***
	Obs.	35	35	35	35	35	35	35	35	35	35	35
Telecommunications	CAR	−0.66	−1.38	−3.64	−1.84	−1.18	−0.63	−0.71	−0.89	−2.49	−0.20	−1.80
	BMP	−1.19	−1.73*	−3.37***	−1.61	−1.69	−1.09	−1.52	−1.56	−3.22***	−0.49	−2.70**
	KP	−0.59	−0.86	−1.68	−0.80	−0.84	−0.55	−0.76	−0.78	−1.61	−0.25	−1.35
	WRank	−1.19	−1.83*	−2.80***	−1.75*	−2.20**	−1.34	−1.87*	−2.02**	−2.50**	−1.16	−2.28**
	Obs.	20	20	20	20	20	20	20	20	20	20	20
Utilities	CAR	−1.41	−0.35	0.48	0.27	0.21	−0.74	−1.55	−1.44	−0.66	−0.56	0.21
	BMP	−3.31***	−0.72	−0.29	0.43	0.21	−1.90*	−4.62***	−2.26**	−1.01	−1.13	−0.45
	KP	−1.04	−0.23	−0.09	0.13	0.07	−0.59	−1.44	−0.71	−0.32	−0.35	−0.14
	WRank	−3.21***	0.55	0.64	1.12	0.59	−1.59	−3.92***	−2.14**	−0.46	−0.52	0.07
	Obs.	28	28	28	28	28	28	28	28	28	28	28

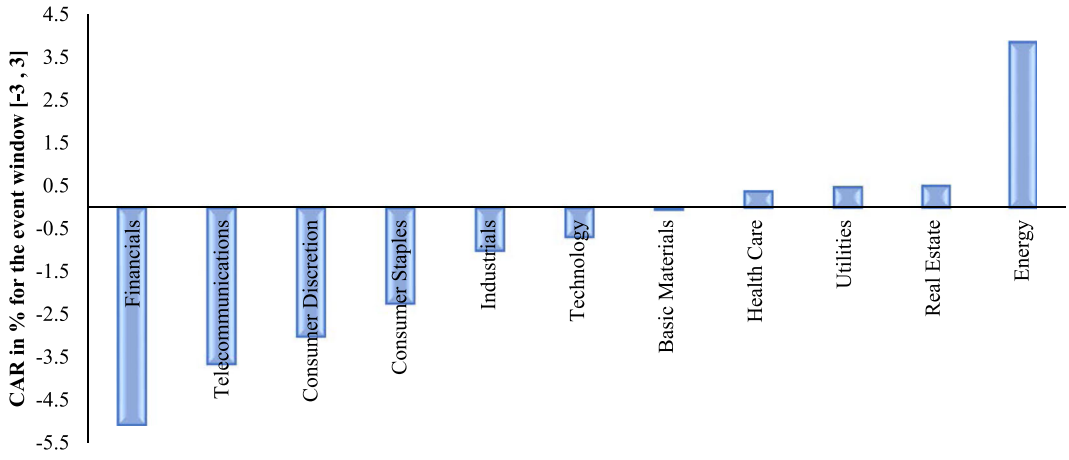

FIGURE 5 The industry-level cumulative abnormal return over the event window [−3, +3]. [Color figure can be viewed at wileyonlinelibrary.com]

Bermuda, Cyprus, the Faroe Islands, Ireland, the Isle of Man, Luxembourg, Malta, Norway, Poland and Portugal) as 'other countries', since they are not suitable for a robust empirical analysis on their own.[17]

Table 5 shows the country-specific AAR for the periods (−3 to +3 days) surrounding the event day. We observe that Belgium, France, Germany, the Netherlands, Switzerland, Sweden and the combined 'other countries' experienced a clear negative AAR on the event day. This finding is unsurprising since these countries are economically closely connected to Russia. For example, Germany buys over half of its gas from Russia, France receives a quarter of its supply from this country,[18] while Russia is Switzerland's one of the largest trading partners.[19] Despite this, Germany suspended approval of the Nord Stream 2 gas pipeline in response to Moscow's activities on the event day. Following Russia's invasion of Ukraine, Europe is on the verge of entering an energy crisis owing to the continent's heavy reliance on Russian gas delivered via pipelines.

Interestingly, while companies in the Netherlands had the most negative AAR,[20] companies in the UK experienced a positive and significant AAR on the day of the event. The extreme negative market reactions of the Dutch firms are reasonable because the Netherlands has a strong dependency on Ukraine for supplies of corn and vegetable oils, and on Russia for supplies of oil, natural gas, nickel and copper. In 2021, for example, Dutch imports from Russia were worth 18.4 billion euros. Of this amount, mineral fuels accounted for 87%, with crude oil accounting for more than 50% and natural gas and petroleum products accounting for the balance.[21] On the other hand, one possible explanation of the findings for UK firms is that half of that country's gas supply comes from domestic sources, with the rest imported mostly from Norway and Qatar. It is very likely that this has contributed to the financial stability of UK firms.

[17]The non-parametric Wilcoxon signed-rank test used in this study requires at least 16 observations to produce a result.
[18]https://www.statista.com/chart/26768/dependence-on-russian-gas-by-european-country/
[19]Both Sweden and Belgium have historically had political tensions with Russia, which could also have frightened investors on the event day.
[20]Our un-tabulated estimates of industry-level AAR for the Netherlands show that the huge negative returns in the Dutch market on the event day were driven by the technology, consumer staples, basic materials and financial industries.
[21]https://www.cbs.nl/en-gb/news/2022/10/87-percent-of-imports-from-russia-are-mineral-fuels

TABLE 5 Country-specific average abnormal return (AAR)

This table presents the country-specific average daily abnormal return (AAR) of the stocks belonging to the STOXX Europe 600 index grouped based on their country of domicile. Other countries include Bermuda, Cyprus, Faroe Islands, Isle of Man, Malta, Norway, Austria, Ireland, Luxembourg, Poland and Portugal. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized daily abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the AAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

	Event Windows	Pre-event days			Event day	Post-event days		
		[−3]	[−2]	[−1]	[0]	[+1]	[+2]	[+3]
Belgium	AAR	1.06	−0.27	0.23	−0.78	−0.61	0.82	0.08
	BMP	3.73***	−1.41	1.03	-4.07***	−2.85**	2.42**	−0.06
	KP	2.93**	−1.11	0.81	−3.20***	−2.24**	1.90*	−0.05
	WRank	2.64***	−1.91*	0.57	−2.84***	−2.07**	2.02**	−0.05
	Obs.	16	16	16	16	16	16	16
Denmark	AAR	−0.53	−0.59	−1.33	−0.60	0.71	0.00	1.82
	BMP	−1.91*	−1.20	−3.43***	−1.78*	1.20	0.24	1.22
	KP	−0.89	−0.56	−1.60	−0.83	0.56	0.11	0.57
	WRank	−1.70*	−1.03	−2.89***	−1.19	1.55	0.30	1.37
	Obs.	23	23	23	23	23	23	23
Finland	AAR	−0.00	−0.27	0.63	−0.09	−1.08	−0.28	−0.99
	BMP	0.14	−1.64	0.70	−0.00	−3.67***	−0.70	−1.65
	KP	0.10	−1.13	0.48	−0.00	−2.52**	−0.48	−1.13
	WRank	−0.72	−1.59	−0.98	0.28	−2.63***	−0.50	−0.85
	Obs.	18	18	18	18	18	18	18
France	AAR	−0.10	0.35	−0.05	−0.55	0.08	−0.05	−0.45
	BMP	−0.70	2.14**	0.42	−4.15***	−0.10	0.34	−1.27
	KP	−0.39	1.20	0.23	−2.33**	−0.06	0.19	−0.71
	WRank	−0.97	1.62	0.47	−3.98***	−1.32	−0.59	−1.34
	Obs.	72	72	72	72	72	72	72
Germany	AAR	−0.04	0.19	−0.82	-0.72	−0.42	−0.56	-0.73
	BMP	0.11	0.87	−3.53***	−5.74***	−2.01**	−1.88*	−2.08**
	KP	0.08	0.62	−2.50**	−4.06***	−1.42	−1.33	−1.47
	WRank	−0.37	0.10	−3.19***	−4.74***	−2.51**	−2.04**	−1.47
	Obs.	65	65	65	65	65	65	65
Italy	AAR	−0.17	−0.08	0.26	−0.11	0.05	−0.18	0.40
	BMP	−0.38	−0.30	1.96*	−0.82	−0.21	−0.33	0.45

(Continues)

TABLE 5 (Continued)

	Event Windows	Pre-event days			Event day	Post-event days		
		[−3]	[−2]	[−1]	[0]	[+1]	[+2]	[+3]
	KP	−0.19	−0.15	0.99	−0.41	−0.11	−0.16	0.23
	WRank	−1.09	−0.20	1.50	−1.09	−0.23	0.98	0.93
	Obs.	28	28	28	28	28	28	28
The Netherlands	AAR	0.20	0.36	−0.17	−1.22	0.02	0.28	0.32
	BMP	0.02	1.03	−0.16	−4.63***	−0.42	1.07	−0.29
	KP	0.01	0.93	−0.14	−4.21***	−0.38	0.97	−0.27
	WRank	1.57	0.78	−0.33	−3.76***	0.16	0.84	0.35
	Obs.	31	31	31	31	31	31	31
Spain	AAR	0.52	−0.01	−0.27	−0.06	−0.34	−0.34	1.48
	BMP	2.36**	−0.27	−1.09	−0.54	−1.47	−0.77	1.69
	KP	1.20	−0.14	−0.56	−0.27	−0.75	−0.39	0.86
	WRank	1.76*	−0.12	−0.26	0.28	−1.87*	−1.22	1.14
	Obs.	25	25	25	25	25	25	25
Sweden	AAR	−0.53	−1.67	−1.30	−0.97	1.19	−0.95	1.60
	BMP	−0.89	−5.74***	−5.41***	−4.19***	3.18***	−4.22***	3.14***
	KP	−0.31	−2.02**	−1.90*	−1.47	1.12	−1.48	1.11
	WRank	−0.91	−5.31***	−4.77***	−4.13***	3.21***	−4.26***	3.89***
	Obs.	62	62	62	62	62	62	62
Switzerland	AAR	−0.13	−0.58	−0.49	−0.31	0.36	−0.34	0.65
	BMP	−0.13	−3.21***	−2.07**	−1.74*	1.38	−1.06	1.59
	KP	−0.07	−1.87*	−1.20	−1.01	0.80	−0.62	0.92
	WRank	0.95	−2.95***	−2.01**	−1.71*	1.47	−0.85	2.08**
	Obs.	55	55	55	55	55	55	55
United Kingdom	AAR	−0.36	−0.41	0.18	0.29	−0.03	0.00	−0.82
	BMP	−3.65***	−3.57***	1.97*	2.57**	−0.16	0.84	−3.24***
	KP	−1.15	−1.13	0.62	0.81	−0.05	0.27	−1.02
	WRank	−3.37***	−4.74***	2.52**	2.61***	1.14	0.46	−2.92***
	Obs.	132	132	132	132	132	132	132
Other countries	AAR	0.07	−0.53	−0.69	−0.73	−0.23	−0.63	−2.99
	BMP	0.44	−2.66**	−2.37**	−2.44**	−1.44	−1.72*	−3.00***
	KP	0.27	−1.61	−1.44	−1.48	−0.87	−1.04	−1.82*
	WRank	0.55	−2.70***	−2.97***	−1.97**	−0.43	−1.78*	−2.85***
	Obs.	60	60	60	60	60	60	60

Importantly, Spain experienced almost no effect on either the event day or during the post-event windows. It is important to note that Spain is not a major customer of Russia, with Algeria and the United States being that country's largest trading partners. Although the Finnish companies did not react on the event day, they showed a significant negative response to the conflict immediately following the event day (i.e., +1). Moreover, companies domiciled in the UK exhibited a significantly negative AAR on the pre-event (−3 and −2) days and the post-event (+3) days. Finally, firms domiciled in Norway did not experience significant abnormal returns in any of the three event windows (results untabulated). This finding is consistent with Norway's position as the world's largest energy exporter. For instance, Norway supplies 35% of France's total supply of natural gas.

We present the country-specific CARs for different short event windows in Table 6. A few observations are worth mentioning: (i) firms domiciled both in Denmark and in Switzerland had significant negative CAR during the days surrounding the event and in the pre-event periods, but registered non-significant CAR during the post-event periods; (ii) over the entire period, companies from Germany and the 'other countries' experienced significantly negative CAR; and (iii) stocks of firms domiciled in Italy, Spain and Norway remained completely unaffected during all three event windows. Figure 6 shows the differences in market reaction for different countries by comparing the country-specific CARs.[22]

Table A5 presents the country-level CARs for an extended period. This shows that Finland, Germany and France suffered the worst in the post-event window, with negative abnormal returns of between −7.4% and −7.9% for these three countries for the [0, +10] event window. We observe similar negative CARs in the extended post-event windows for firms in the Netherlands. Interestingly, while Swedish firms exhibit significant negative CARs for the extended pre-event windows, they experienced positive CARs in the post-event periods ([0, +15] and [0, +20]).

Overall, we find significant country-wide variations in AAR and CAR around the event time, suggesting the importance of country-specific stock market reactions in the European market to the Russia–Ukraine crisis.

3.4 | Additional analysis

3.4.1 | Size-based abnormal returns

In our additional analysis, we examine whether the stock market reaction to the Russia–Ukraine crisis in European countries differs according to the firm size. For this analysis, we collected the daily market capitalization of the sample firms from Datastream to form size-based tercile portfolios: large-, mid- and small-cap equities.

[22]Untabulated parametric analysis shows that firms in Austria experienced severe negative CARs of −4.10%, −11.92%, −17.29% and −21.94% for the [−1, 1], [−3, 3], [−5, 5] and [−10, 10] windows, respectively. The European Banking Authority (EBA) reports that banks from Austria, France and Italy have the highest direct asset exposures towards Russia, while Austrian, French and Hungarian banks have exposure to Ukraine. Thus, Austria is the only country in our sample with direct asset exposure to both Russia and Ukraine, which shows the vulnerability of Austrian banks to the Russian invasion (source: https://www.eba.europa.eu/eba-risk-dashboard-indicates-limited-direct-impact-eu-banks-russian-invasion-ukraine-also-points).

TABLE 6 Country specific cumulative abnormal return (CAR)

This table presents the country-specific cumulative daily abnormal return (CAR) of the stocks belonging to the STOXX Europe 600 index grouped together according to their country of domicile. Other countries include Bermuda, Cyprus, Faroe Islands, Isle of Man, Malta, Norway, Austria, Ireland, Luxembourg, Poland and Portugal. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
Belgium	CAR	−1.16	−0.61	0.53	0.24	−0.82	−0.55	−1.38	−0.57	−0.48	0.21	0.30
	BMP	−2.91**	−1.21	0.34	0.38	−1.91*	−1.41	−4.93***	−1.13	−0.63	0.54	0.20
	KP	−2.29**	−0.95	0.27	0.30	−1.50	−1.11	−3.87***	−0.89	−0.49	0.43	0.16
	WRank	−2.33**	−1.03	−0.10	−0.05	−1.65*	−1.91*	−3.21***	−1.29	−0.47	0.36	0.47
	Obs.	16	16	16	16	16	16	16	16	16	16	16
Denmark	CAR	−1.22	−1.81	−0.53	−3.05	−2.52	−1.93	0.11	0.11	1.93	0.71	2.52
	BMP	−3.08***	−2.75**	−0.79	−5.18***	−4.72***	−4.73***	−0.49	−0.35	0.76	1.15	1.43
	KP	−1.44	−1.28	−0.37	−2.42**	−2.20**	−2.21**	−0.23	−0.16	0.36	0.53	0.67
	WRank	−2.74***	−2.28**	−1.28	−3.53***	−3.53***	−3.62***	0.52	0.27	1.09	1.37	1.76*
	Obs.	23	23	23	23	23	23	23	23	23	23	23
Finland	CAR	−0.54	−1.10	−2.09	0.26	0.26	0.53	−1.17	−1.45	−2.43	−1.36	−2.34
	BMP	−0.20	−0.65	−1.22	0.33	0.35	0.66	−3.55***	−2.54**	−2.40**	−3.17***	−2.71**
	KP	−0.14	−0.45	−0.84	0.23	0.24	0.45	−2.44**	−1.74*	−1.65	−2.17**	−1.86*
	WRank	−2.11**	-1.89*	−1.85*	−1.37	−1.50	−0.54	−2.77***	−2.11**	−1.81*	−2.55**	−2.33**
	Obs.	18	18	18	18	18	18	18	18	18	18	18
France	CAR	−0.52	−0.21	−0.76	−0.34	−0.24	−0.60	−0.47	−0.52	−0.97	0.03	−0.42
	BMP	−2.03**	−0.20	−1.03	−0.73	−0.42	−2.97***	−2.47**	−1.76*	−2.05**	0.11	−0.83

TABLE 6 (Continued)

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
	KP	−1.14	−0.11	−0.58	−0.41	−0.24	−1.67*	−1.39	−0.99	−1.15	0.06	−0.47
	WRank	−2.60***	−0.92	−1.35	−1.11	−0.93	−2.58**	−3.52***	−3.16***	−2.62***	−0.98	−1.23
	Obs.	72	72	72	72	72	72	72	72	72	72	72
Germany	CAR	−1.96	−2.33	−3.11	−1.39	−1.35	−1.54	−1.14	−1.70	−2.43	−0.98	−1.71
	BMP	−5.72***	−4.43***	−3.92***	−3.36***	−4.01***	−6.02***	−4.06***	−4.00***	−3.42***	−2.46**	−2.61**
	KP	−4.04***	−3.14***	−2.77***	−2.38**	−2.83***	−4.26***	−2.87***	−2.83***	−2.42**	−1.74*	−1.85*
	WRank	−4.88***	−4.13***	−4.06***	−2.99***	−4.06***	−5.02***	−3.89***	−4.67***	−3.21***	−3.23***	−2.32**
	Obs.	65	65	65	65	65	65	65	65	65	65	65
Italy	CAR	0.20	−0.05	0.18	−0.09	0.07	0.15	−0.06	−0.24	0.16	−0.13	0.28
	BMP	0.42	−0.13	0.11	0.13	0.52	0.94	−0.58	−0.55	−0.10	−0.39	0.07
	KP	0.21	−0.07	0.05	0.07	0.26	0.48	−0.29	−0.28	−0.05	−0.20	0.03
	WRank	0.48	0.43	0.64	−0.14	0.20	0.55	−0.87	−0.30	0.34	−0.11	0.41
	Obs.	28	28	28	28	28	28	28	28	28	28	28
The Netherlands	CAR	−1.37	−0.74	−0.22	−0.83	−1.03	−1.39	−1.21	−0.93	−0.61	0.29	0.61
	BMP	−3.00***	−0.46	−0.52	−1.30	−1.55	−4.19***	−3.43***	−1.19	−1.06	0.79	0.41
	KP	−2.72**	−0.42	−0.47	−1.18	−1.41	−3.80***	−3.11***	−1.08	−0.96	0.72	0.37
	WRank	−2.25**	−0.57	−0.04	−1.33	−2.08**	−3.37***	−2.57**	−1.47	−0.47	0.27	0.67
	Obs.	31	31	31	31	31	31	31	31	31	31	31
Spain	CAR	−0.67	−1.02	0.98	0.19	−0.34	−0.33	−0.40	−0.74	0.74	−0.69	0.80
	BMP	−1.83*	−1.73*	0.57	0.36	−1.08	−1.31	−1.23	−1.51	0.28	−1.40	0.51
	KP	−0.94	−0.88	0.29	0.19	−0.55	−0.67	−0.63	−0.77	0.15	−0.71	0.26

(Continues)

TABLE 6 (Continued)

		Around event days			Pre-event days			Post-event days				
	Event windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
	WRank	−2.22**	−1.49	0.69	0.50	−1.14	−0.98	−1.33	−1.52	0.20	−1.60	−0.09
	Obs.	25	25	25	25	25	25	25	25	25	25	25
Sweden	CAR	−1.07	−3.69	−2.63	−4.47	−3.93	−2.26	0.22	−0.73	0.87	0.24	1.84
	BMP	−3.15***	−7.97***	−4.22***	−6.86***	−7.75***	−6.45***	−0.50	−3.82***	−0.13	−0.43	1.94*
	KP	−1.11	−2.80***	−1.48	−2.41**	−2.72***	−2.27**	−0.17	−1.34	−0.04	−0.15	0.68
	WRank	−3.65***	−5.86***	−3.59***	−5.86***	−6.02***	−5.18***	−0.21	−2.42**	0.99	0.16	2.86***
	Obs.	62	62	62	62	62	62	62	62	62	62	62
Switzerland	CAR	−0.44	−1.36	−0.84	−1.51	−1.38	−0.80	0.05	−0.29	0.36	0.02	0.67
	BMP	−0.90	−2.14**	−0.77	−3.58***	−4.30***	−2.60**	0.14	−0.34	0.61	0.43	1.16
	KP	−0.52	−1.25	−0.45	−2.08**	−2.50**	−1.51	0.08	−0.20	0.35	0.25	0.67
	WRank	−0.67	−2.08**	−0.31	−3.88***	−4.11***	−3.05***	0.70	0.10	1.51	0.36	1.77*
	Obs.	55	55	55	55	55	55	55	55	55	55	55
United Kingdom	CAR	0.44	0.04	−1.15	−0.30	0.06	0.47	0.26	0.27	−0.56	−0.02	−0.85
	BMP	2.25**	0.78	−3.01***	−0.98	0.69	2.88***	1.29	1.56	−1.83*	0.34	−2.55**
	KP	0.71	0.25	−0.95	−0.31	0.22	0.91	0.41	0.49	−0.58	0.11	−0.80
	WRank	2.87***	0.25	−3.27***	−1.49	0.16	3.18***	2.12**	1.88*	−1.74*	0.84	−2.27**
	Obs.	132	132	132	132	132	132	132	132	132	132	132
Other countries	CAR	−1.64	−2.80	−5.72	−1.88	−1.95	−1.42	−0.95	−1.58	−4.57	−0.85	−3.84
	BMP	−3.76***	−4.27***	−3.86***	−3.28***	−3.82***	−3.07***	−3.13***	−3.46***	−3.46***	−2.37**	−3.30***
	KP	−2.27**	−2.58**	−2.34**	−1.99*	−2.31**	−1.86*	−1.89*	−2.09**	−2.09**	−1.43	−2.00*
	WRank	−3.42***	−3.75***	−3.61***	−3.39***	−3.78***	−3.14***	−2.54**	−2.89***	−3.08***	−1.90*	−2.82***
	Obs.	60	60	60	60	60	60	60	60	60	60	60

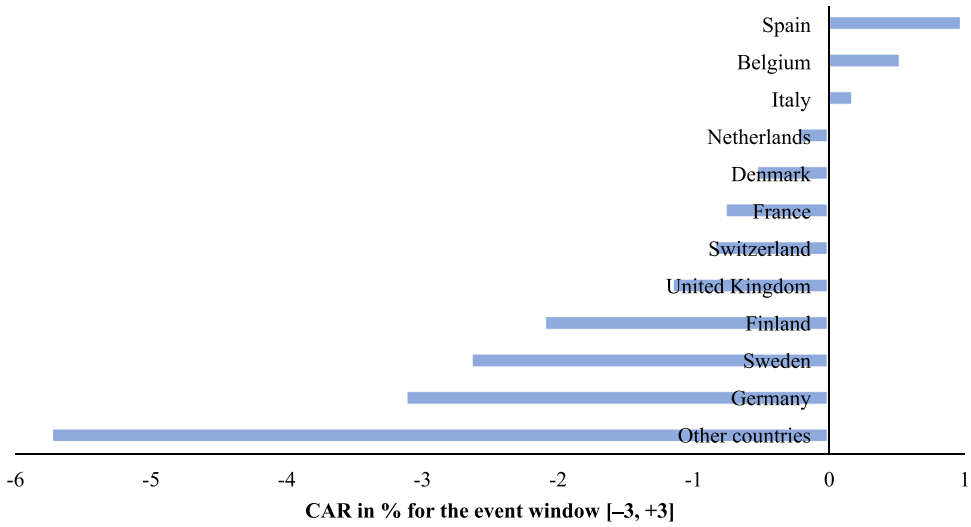

FIGURE 6 The country-level cumulative abnormal return over the event window [−3, +3]. [Color figure can be viewed at wileyonlinelibrary.com]

The daily AARs for the large-, mid- and small-cap portfolios are reported in Table 7. When investigating the event day results, we find that the small-cap firms had the largest negative market AAR (−0.48%), followed by the mid-cap (−0.41%) and the large-cap firms (−0.34%). Moreover, during the pre-event windows, large-cap stocks remained largely unaffected, whereas both mid-and small-cap stocks exhibited some negative AARs. Finally, when we look at the post-event period results, we find that the mid-cap firms incurred a negative AAR on the +3 (−0.66%) post-event days, whereas small-cap firms experienced a negative AAR on the +2 (−0.47%) and +3 (−0.35%) post-event days.

Table 8 presents the CARs of the three size-based portfolios surrounding the event day. Consistent with the results for the AARs, we observe that the small-cap firms were most heavily affected by the Russia–Ukraine crisis, as evidenced by negative, significant and larger CARs, followed by mid- and then by large-cap firms. Interestingly, for the large-cap firms, the negative CARs are relatively larger during the pre-event period, suggesting that the market started to react to the threat of war during the pre-event period for the large-cap firms. However, for mid- and small-cap firms, we observe higher levels of (adverse) market reactions around the event day window. We report the results for the CARs for an extended period in Table A6 in the appendix. When we look at the extended post-event period results, we find that large-cap firms incurred significantly negative CARs in the [0, +10] and [0, +25] post-event windows, whereas mid- and small-cap firms incurred significant negative CARs in the [0, +10] post-event days.

Overall, we observe considerable size-based portfolio-wide variations in the AAR and CAR surrounding the Russia–Ukraine crisis, underscoring the significance of portfolio-level analysis to understand the true stock market reactions in the European markets. We find that small and medium (large) firms were more (less) negatively affected by the Russia–Ukraine crisis, which is consistent with the extant literature that shows that small and medium firms are more vulnerable to political and epidemic crises (Miyajima & Yafeh, 2007; Naidu & Ranjeeni, 2021).

TABLE 7 Size-based average abnormal return (AAR)

This table presents the average daily abnormal return (AAR) of the stocks belonging to the STOXX Europe 600 index grouped together according to the size tercile. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized daily abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the AAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Pre-event days			Event day	Post-event days		
	Event Windows	**[−3]**	**[−2]**	**[−1]**	**[0]**	**[+1]**	**[+2]**	**[+3]**
Large cap	AAR	−0.19	−0.05	−0.25	−0.34	0.07	−0.05	0.25
	BMP	−1.60	−0.36	−0.96	−4.48***	−0.17	0.13	−0.24
	KP	−1.28	−0.29	−0.77	−3.60***	−0.14	0.11	−0.20
	WRank	−1.45	−1.24	−0.90	−3.97***	−0.29	−0.02	0.15
	Obs.	196	196	196	196	196	196	196
Mid cap	AAR	0.08	−0.44	−0.43	−0.41	0.10	−0.25	−0.66
	BMP	0.92	−2.81***	−2.42**	−3.93***	−0.60	−0.91	−2.56**
	KP	0.54	−1.65*	−1.42	−2.31**	−0.35	−0.54	−1.51
	WRank	0.30	−2.87***	−2.51**	−3.28***	0.53	−1.42	−1.11
	Obs.	195	195	195	195	195	195	195
Small cap	AAR	−0.27	−0.52	−0.35	−0.48	0.01	−0.47	−0.35
	BMP	−1.05	−4.55***	−0.95	−3.72***	−0.73	−2.73***	−2.01**
	KP	−0.41	−1.77*	−0.37	−1.45	−0.28	−1.07	−0.78
	WRank	−1.34	−5.93***	−3.11***	−3.39***	−1.00	−3.11***	−0.58
	Obs.	196	196	196	196	196	196	196

3.4.2 | Geographical proximity and abnormal return

In our final analysis, we examine whether geographical proximity has ramifications for the market reaction to Russia's invasion of Ukraine. Three of our sample countries (Norway, Finland and Poland) have borders with Russia, and only Poland has a border with Ukraine. These countries represent 41 of our sample firms (<7% of the total sample). All these three countries are members of the European Union. It is important to stress that about half of our sample firms (287 out of 587 firms) are from the Euro area, and the rest (except for three firms from Bermuda, the Faroe Islands and the Isle of Man) are domiciled in Member States of the European Union. Thus, in general, all the countries in our sample have some degree of direct exposure to this war due to their geographic proximity and economic ties. Therefore, it is important to examine whether the sample firms from the three countries sharing borders with Russia and/or Ukraine exhibit asymmetric effects.

We conduct parametric analysis for these three countries separately. In untabulated analysis, we observe that Poland is the worst-hit country in our sample, as evidenced by the AAR of −2.11% on the event day, −2.71% (on Day +2), and −9.33% (on Day +3) during the

TABLE 8 Size-based cumulative abnormal return (CAR)

This table presents cumulative daily abnormal return (CAR) of the stocks belonging to the STOXX Europe 600 index grouped together according to the size tercile. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event days			Pre-event days			Post-event days				
	Event Windows	**[−1, 1]**	**[−2, 2]**	**[−3, 3]**	**[−3, 0]**	**[−2, 0]**	**[−1, 0]**	**[0, 1]**	**[0, 2]**	**[0, 3]**	**[1, 2]**	**[1, 3]**
Large-cap	CAR	−0.51	−0.61	−0.55	−0.83	−0.64	−0.59	−0.26	−0.31	−0.06	0.02	0.27
	BMP	−3.24***	−2.32**	−2.10**	−3.60***	−3.25***	−4.03***	−3.09***	−2.45**	−1.47	−0.04	−0.21
	KP	−2.60***	−1.87*	−1.69*	−2.90***	−2.62***	−3.25***	−2.48**	−1.97*	−1.19	−0.03	−0.17
	WRank	−3.30***	−2.24**	−1.78*	−4.01***	−4.05***	−4.20***	−2.16**	−1.95*	−0.87	−0.11	0.21
	Obs.	196	196	196	196	196	196	196	196	196	196	196
Mid-cap	CAR	−0.73	−1.43	−2.01	−1.20	−1.28	−0.83	−0.31	−0.56	−1.22	−0.15	−0.81
	BMP	−3.79***	−3.99***	−3.89***	−4.02***	−4.93***	−4.31***	−2.66***	−2.48**	−3.12***	−1.03	−2.48**
	KP	−2.23**	−2.35**	−2.29**	−2.37**	−2.90***	−2.54**	−1.56	−1.46	−1.83*	−0.61	−1.46
	WRank	−3.58***	−3.86***	−3.49***	−3.92***	−4.71***	−4.10***	−1.61	−2.14**	−1.63	−0.74	−0.90
	Obs.	195	195	195	195	195	195	195	195	195	195	195
Small-cap	CAR	−0.82	−1.82	−2.44	−1.62	−1.35	−0.83	−0.47	−0.94	−1.30	−0.47	−0.82
	BMP	−3.03***	−5.39***	−5.23***	−4.10***	−4.18***	−2.62***	−3.12***	−4.54***	−4.01***	−2.50**	−2.82***
	KP	−1.18	−2.10**	−2.04**	−1.60	−1.63	−1.02	−1.21	−1.77*	−1.56	−0.98	−1.10
	WRank	−4.14***	−6.11***	−5.63***	−6.14***	−5.97***	−4.01***	−3.61***	−4.49***	−3.38***	−2.64***	−2.02**
	Obs.	196	196	196	196	196	196	196	196	196	196	196

post-event periods. In addition, firms from Poland experienced CAR of −15.54% for the [−3, +3] window. This severe negative return for Poland drives the results for 'other countries' in Figure 6. While Finland did not suffer as much as Poland in the short-run, Finnish firms incurred AAR of −1.08% on Day +1 and CAR of −2.43% over the [0, +3] period and −7.87% over the [0, +10] period. Interestingly, Norway had non-significant positive abnormal returns in the post-event period. This result is not surprising since oil-rich Norway is a NATO member and did not suffer any immediate political risk despite having a border with Russia. Instead, Norway benefited from rising energy prices.

We combine firms from these three counties together, as the number of firms (other than firms from Finland) is insufficient for conducting a non-parametric Wilcoxon's signed-rank test. Our analysis reveals that there is no significant above-market reaction for the 41 firms from the three neighbouring countries, a finding driven mainly by the positive, albeit non-significant, market reaction by firms from Norway.

4 | CONCLUDING REMARKS AND FUTURE RESEARCH AGENDA

This study examines how shareholders in the European financial markets reacted to Russia's recognition of the Donetsk and Luhansk regions of eastern Ukraine as two autonomous states on 21 February 2022. We expected the European stock market, an integrated trading partner of Russia's economy, to respond negatively to this crisis, owing to increasing political instability, geographic proximity and the consequences of any sanctions imposed on Russia.

We employ firms belonging to the STOXX Europe 600 index as our sample. Using an event study methodology, we find a negative and significant AAR in the event windows. Importantly, we observe –0.41% AAR on the event day, the highest drop in stock prices during the event windows. We also find a negative and significant CAR around the event days, pre-event days and post-event days, providing strong evidence of the negative impact of the Russia–Ukraine crisis on the European stock market. When we look at industry-level variation in the stock price reactions to the crisis, we observe a considerable industry-wide variation in AAR and CAR surrounding the event period. Further, we observe that, while firms in the Netherlands had the most negative AAR, companies in the UK experienced a positive and significant AAR on the event day, and firms domiciled both in Denmark and in Switzerland had significant negative CAR during the days surrounding the event and the pre-event periods, suggesting a significant country-level variation in the stock price reaction to the crisis. Finally, we observe that small- and median-cap firms were more heavily affected by the crisis than large-cap firms.

Our study indicates that, in general, investors have taken the Russia–Ukraine crisis very seriously. The wave of this political crisis is already echoing around the globe. If this war becomes a long one, it will have a serious impact on the global economy. Therefore, governments should act quickly to ensure financial stability in their respective countries. To improve investor confidence, policy actions such as fiscal, monetary, and other appropriate measures should be implemented. In the short term, policymakers in Europe should consider lowering their significant reliance on Russia for critical oil and gas supplies, and pursuing alternative energy sources while working towards long-term sustainability. The political crisis in Russia and Ukraine has once again pushed for a primary focus on renewable energy growth.

Finally, because our research was conducted at the very beginning of the ongoing Russia–Ukraine crisis, it is possible that it might not fully reflect the outcome of the crisis. We

encourage future research to examine the repercussions of this unique event comprehensively. Furthermore, because the crisis has shaken global politics, future research may conduct a comprehensive examination of how the crisis has affected stock markets around the world.

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DATA AVAILABILITY STATEMENT

The data sets that support the findings of this study are available from Refinitiv Datastream database. Restrictions apply to the availability of these data. The data description in the paper allows readers to replicate the study after subscribing to the data from the vendor. Also, further help is available from the corresponding author upon reasonable request.

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APPENDIX A

TABLE A1 Sample distribution by industry

This table presents the number of firms in each industry in our sample.

Industry	No. of firms
Basic Materials	39
Consumer Discretion	88
Consumer Staples	46
Energy	18
Financials	102
Health Care	57
Industrials	120
Real Estate	34
Technology	35
Telecommunications	20
Utilities	28
Total	**587**

TABLE A2 Sample distribution by country

This table presents the number of firms in each country in our sample.

Countries	No. of firms
Belgium	16
Denmark	23
Finland	18
France	72
Germany	65
Italy	28
The Netherlands	31
Spain	25
Sweden	62
Switzerland	55
United Kingdom	132
Other countries	60
Total	**587**

TABLE A3 Average abnormal return (AAR) for the extended period

This table presents the average daily abnormal return (AAR) of 587 stocks belonging to the STOXX Europe 600 index for each day in the event window for an extended period (−25, +25). BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized daily abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the AAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

Event Windows	AAR	BMP	KP	WRank	Obs
−25	−0.14	−2.04**	−0.82	−2.69***	587
−24	−0.24	−3.43***	−1.38	−3.62***	587
−23	0.02	0.02	0.01	0.11	587
−22	−0.04	−1.44	−0.58	−0.88	587
−21	−0.24	−2.98***	−1.20	−2.20**	587
−20	−0.25	−2.31**	−0.93	−2.06**	587
−19	−0.28	−2.86***	−1.15	−2.81***	587
−18	0.15	0.38	0.15	2.67***	587
−17	−0.39	−4.04***	−1.62	−4.57***	587
−16	0.21	2.84***	1.14	3.69***	587
−15	0.41	4.78***	1.92*	5.86***	587
−14	−0.15	−3.69***	−1.48	−3.05***	587
−13	0.23	4.34***	1.75*	4.60***	587
−12	0.10	2.19**	0.88	2.00**	587
−11	−0.11	−2.06**	−0.83	−1.24	587
−10	−0.31	−5.39***	−2.17**	−5.00***	587
−9	−0.12	−0.92	−0.37	−1.28	587
−8	0.34	3.56***	1.43	4.82***	587
−7	0.06	1.76*	0.71	1.92*	587
−6	−0.30	−3.62***	−1.46	−4.42***	587
−5	−0.29	−4.75***	−1.91*	−4.71***	587
−4	0.39	5.71***	2.30**	6.51***	587
−3	−0.13	−1.15	−0.46	−1.41	587
−2	−0.34	−4.30***	−1.73*	−5.88***	587
−1	−0.34	−2.28**	−0.92	−3.83***	587
0	−0.41	−6.99***	−2.81***	−6.09***	587
1	0.06	−0.89	−0.36	−0.46	587
2	−0.26	−1.96*	−0.79	−2.63***	587

TABLE A3 (Continued)

Event Windows	AAR	BMP	KP	WRank	Obs
3	−0.25	−2.89***	−1.17	−0.93	587
4	0.28	4.25***	1.71*	3.35***	587
5	0.18	−0.06	−0.02	2.30**	587
6	−0.80	−5.61***	−2.26**	−5.42***	587
7	−0.13	−1.50	−0.60	−1.22	587
8	−0.73	−4.68***	−1.88*	−5.46***	587
9	−0.66	−6.96***	−2.80***	−6.26***	587
10	−0.27	−2.90***	−1.17	3−.20***	587
11	−0.00	0.18	0.07	0.80	587
12	1.16	8.23***	3.31***	9.78***	587
13	0.13	1.22	0.49	1.73*	587
14	0.41	5.85***	2.35**	5.09***	587
15	0.45	7.60***	3.06***	7.52***	587
16	−0.50	−4.80***	−1.93*	−4.63***	587
17	0.73	5.85***	2.35**	7.18***	587
18	0.01	0.71	0.29	0.83	587
19	−0.18	−3.58***	−1.44	−2.94***	587
20	−0.28	−3.36***	−1.35	−4.56***	587
21	−0.19	−3.00***	−1.21	−3.07***	587
22	−0.36	−5.54***	−2.23**	−5.44***	587
23	−0.41	−4.34***	−1.75*	−5.48***	587
24	−0.11	−0.96	−0.39	−1.13	587
25	0.53	7.10***	2.86***	8.53***	587

TABLE A4 Industry-level cumulative abnormal return (CAR) for the extended period

This table presents the industry-specific average cumulative abnormal return (CAR) of the stocks belonging to the STOXX Europe 600 index grouped together based on their industries. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event day					**Pre-event days**					**Post-event days**				
	Event windows	**[−5, 5]**	**[−10, 10]**	**[−15, 15]**	**[−20, 20]**	**[−25, 25]**	**[−25, 0]**	**[−20, 0]**	**[−15, 0]**	**[−10, 0]**	**[−5, 0]**	**[0, 5]**	**[0, 10]**	**[0, 15]**	**[0, 20]**	**[0, 25]**
Basic Materials	CAR	−1.51	−0.84	−0.20	−1.57	−0.03	0.79	0.96	1.83	1.50	0.43	−2.51	−2.90	−2.59	−3.10	−1.39
	BMP	−0.83	−0.78	−0.48	−0.67	−0.55	−0.23	−0.12	0.68	0.58	0.01	−1.11	−1.06	−0.81	−0.81	−0.70
	KP	−0.33	−0.31	−0.19	−0.27	−0.22	−0.09	−0.05	0.27	0.23	0.00	−0.44	−0.42	−0.32	−0.32	−0.28
	WRank	0.57	0.42	0.78	0.68	0.43	0.47	0.57	1.37	1.45	1.05	0.28	0.36	0.92	0.82	0.80
	Obs.	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Consumer Discretion	CAR	−2.90	−9.12	−6.95	−8.91	−10.30	−1.78	−1.73	−0.35	−0.96	−1.24	−1.88	−8.38	−6.82	−7.40	−8.74
	BMP	−2.36**	−5.75***	−4.82***	−5.62***	−5.51***	−1.08	−1.49	−0.09	−0.95	−1.84*	−1.88*	−5.60***	−5.35***	−5.39***	−6.33***
	KP	−0.96	−2.35**	−1.97*	−2.29**	−2.25**	−0.44	−0.61	−0.03	−0.39	−0.75	−0.77	−2.29**	−2.18**	−2.20**	−2.58**
	WRank	−2.53**	−5.61***	−4.57***	−5.29***	−5.67***	−0.79	−1.00	0.47	−0.51	−2.63***	−1.51	−5.28***	−5.25***	−5.08***	−5.65***
	Obs.	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
Consumer Staples	CAR	−0.91	−6.69	−6.01	−5.56	−5.68	−1.75	−1.46	−1.06	−1.00	−0.43	−1.38	−6.58	−5.85	−4.99	−4.83
	BMP	−1.14	−4.66***	−4.21***	−3.43***	−2.87***	−1.77*	−1.43	−0.88	−1.10	−0.72	−2.07**	−4.97***	−4.82***	−3.85***	−2.94***
	KP	−0.51	−2.07**	−1.87*	−1.53	−1.28	−0.79	−0.64	−0.39	−0.49	−0.32	−0.92	−2.21**	−2.14**	−1.71*	−1.31
	WRank	−0.91	−4.40***	−3.68***	−3.35***	−2.77***	−2.16**	−1.75*	−1.20	−1.16	−0.23	−1.64	−4.71***	−4.39***	−3.89***	−***
	Obs.	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Energy	CAR	3.34	11.76	7.16	9.08	7.36	0.01	1.93	−1.29	−2.26	−0.73	4.61	14.57	9.01	7.70	7.90
	BMP	0.68	3.49***	2.25**	2.47**	2.34**	−0.07	0.82	−1.02	−2.43**	−0.99	1.30	4.54***	3.07***	2.20**	2.46**

TABLE A4 (Continued)

		Around event day					Pre-event days					Post-event days				
	Event windows	[−5, 5]	[−10, 10]	[−15, 15]	[−20, 20]	[−25, 25]	[−25, 0]	[−20, 0]	[−15, 0]	[−10, 0]	[−5, 0]	[0, 5]	[0, 10]	[0, 15]	[0, 20]	[0, 25]
	KP	0.25	1.29	0.84	0.92	0.87	−0.02	0.30	−0.38	−0.90	−0.37	0.48	1.69	1.14	0.82	0.91
	WRank	1.72*	2.81***	2.07**	2.46**	2.24**	−0.11	1.07	−0.81	−2.20**	−0.94	1.94*	3.16***	2.55**	2.24**	2.37**
	Obs.	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Financials	CAR	−7.21	−12.05	−4.29	−4.54	−5.99	−0.56	0.81	0.03	−1.82	−2.38	−5.15	−10.54	−4.63	−5.67	−5.74
	BMP	−8.55***	−10.22***	−3.74***	−4.11***	−4.53***	−1.42	0.62	−0.70	−4.57***	−8.41***	−7.12***	−9.22***	−3.84***	−4.62***	−4.27***
	KP	−2.17**	−2.59**	−0.95	−1.04	−1.15	−0.36	0.16	−0.18	−1.16	−2.13**	−1.81*	−2.34**	−0.97	−1.17	−1.08
	WRank	−7.74***	−7.94***	−3.20***	−3.58***	−4.02***	−1.82*	−0.13	−1.75*	−4.53***	−6.73***	−6.64***	-7.32***	-3.70***	−4.52***	−4.26***
	Obs.	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
Health Care	CAR	3.25	0.68	−0.17	0.41	−0.78	−6.89	−6.26	−4.86	−4.35	−1.74	4.58	4.63	4.29	6.26	5.70
	BMP	3.07***	0.59	0.39	0.48	0.09	−2.76***	−2.72***	−3.33***	−2.97***	−0.87	4.58***	3.08***	4.38***	6.02***	5.04***
	KP	0.90	0.17	0.12	0.14	0.03	−0.81	−0.80	−0.98	−0.87	−0.25	1.34	0.90	1.28	1.77*	1.48
	WRank	3.44***	0.94	0.00	0.88	0.25	−3.62***	−3.58***	−3.85***	−4.14***	−2.36**	4.79***	3.65***	4.25***	5.02***	4.57***
	Obs.	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
Industrials	CAR	−0.02	−0.55	3.04	0.60	−2.41	−2.33	−1.55	0.13	−0.34	-0.36	0.04	-0.51	2.61	1.85	−0.38
	BMP	−0.12	−0.40	2.92***	0.54	−1.73*	−3.36***	−2.63***	0.33	−0.74	−1.10	−0.17	−0.41	2.54**	1.60	−0.40
	KP	−0.05	−0.16	1.22	0.22	−0.72	−1.40	−1.10	0.14	−0.31	−0.46	−0.07	−0.17	1.06	0.67	−0.17
	WRank	−0.62	−1.38	2.69***	−0.06	−3.07***	−3.08***	−2.46**	−0.07	−0.77	−1.22	−0.43	−1.07	2.22**	1.05	−1.35
	Obs.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Real Estate	CAR	2.76	0.37	3.26	2.23	1.50	−2.07	−1.73	−2.25	−0.47	−0.00	2.18	0.27	4.93	3.38	2.99
	BMP	4.37***	0.59	2.74***	1.60	0.94	−1.79*	−1.77*	−2.70**	−0.85	−0.07	4.11***	0.75	5.34***	3.26***	2.90***
	KP	1.06	0.14	0.66	0.39	0.23	−0.43	−0.43	−0.65	−0.21	−0.02	1.00	0.18	1.29	0.79	0.70

(Continues)

TABLE A4 (Continued)

		Around event day					Pre-event days					Post-event days				
	Event windows	**[−5, 5]**	**[−10, 10]**	**[−15, 15]**	**[−20, 20]**	**[−25, 25]**	**[−25, 0]**	**[−20, 0]**	**[−15, 0]**	**[−10, 0]**	**[−5, 0]**	**[0, 5]**	**[0, 10]**	**[0, 15]**	**[0, 20]**	**[0, 25]**
	WRank	3.82***	0.85	2.68***	1.77*	1.91*	−1.14	−1.19	−2.06**	−0.73	0.03	3.56***	0.74	3.80***	2.38**	2.20**
	Obs.	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Technology	CAR	1.44	−0.90	−0.78	−2.19	−4.02	−8.51	−7.26	−3.42	−4.87	−2.65	3.60	3.48	2.15	4.58	4.00
	BMP	1.29	−0.40	−0.26	−1.42	−2.29**	−5.51***	−5.16***	−3.53***	−5.44***	−2.79***	3.53***	2.26**	1.80*	3.34***	2.78***
	KP	0.44	−0.14	−0.09	−0.49	−0.79	−1.89*	−1.77*	−1.21	−1.86*	−0.96	1.21	0.77	0.62	1.14	0.95
	WRank	1.54	−0.08	−0.16	−1.16	−1.98**	−4.09***	−4.01***	−2.93***	−3.96***	−2.51**	3.47***	2.21**	1.61	2.78***	2.67***
	Obs.	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Telecommunications	CAR	−3.77	−4.55	−0.95	1.65	4.77	3.59	2.91	−0.04	−0.57	−2.09	−2.38	−4.68	−1.61	−1.95	0.49
	BMP	−2.60**	−1.47	−0.04	1.54	3.14***	2.50**	1.91*	0.10	−0.33	−1.84*	−3.21***	−1.88*	−0.66	−0.77	0.72
	KP	−1.30	−0.73	−0.02	0.77	1.57	1.25	0.95	0.05	−0.16	−0.92	−1.60	−0.94	−0.33	−0.38	0.36
	WRank	−2.31**	−1.23	0.30	1.75*	2.58***	1.90*	1.49	0.37	0.11	−1.75*	−2.54**	−1.90*	−0.78	−1.19	0.11
	Obs.	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Utilities	CAR	4.59	−2.20	−0.95	0.13	0.45	−1.33	−1.05	−2.71	−2.05	−0.37	4.08	−1.02	0.88	0.31	0.91
	BMP	1.47	−1.01	−0.95	−0.68	−0.44	−1.33	−1.23	−2.62**	−2.21**	−0.87	1.59	−0.69	−0.27	−0.48	−0.19
	KP	0.46	−0.32	−0.30	−0.21	−0.14	−0.42	−0.38	−0.82	−0.69	−0.27	0.50	−0.22	−0.08	−0.15	−0.06
	WRank	2.71***	0.16	−0.05	0.52	0.73	−0.82	−1.00	−2.05**	−1.87*	−0.68	2.80***	0.80	1.28	1.02	1.16
	Obs.	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

TABLE A5 Country-level cumulative abnormal return (CAR) for the extended period

This table presents the country-specific cumulative daily abnormal return (CAR) of the stocks belonging to the STOXX Europe 600 index grouped together according to their country of domicile. Other countries include Bermuda, Cyprus, Faroe Islands, Isle of Man, Malta, Norway, Austria, Ireland, Luxembourg, Poland and Portugal. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank test for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event day					Pre-event days					Post-event days				
	Event windows	[−5, 5]	[−10, 10]	[−15, 15]	[−20, 20]	[−25, 25]	[−25, 0]	[−20, 0]	[−15, 0]	[−10, 0]	[−5, 0]	[0, 5]	[0, 10]	[0, 15]	[0, 20]	[0, 25]
Belgium	CAR	1.83	−0.20	1.17	1.02	0.66	−3.75	−2.31	−1.87	0.07	0.22	0.83	−1.04	2.27	2.56	3.63
	BMP	1.00	−0.18	0.61	0.34	0.10	−1.71	−1.40	−1.50	−0.08	0.26	0.62	−0.48	1.31	1.37	1.43
	KP	0.79	−0.14	0.48	0.27	0.08	−1.34	−1.10	−1.18	−0.06	0.20	0.49	−0.38	1.03	1.07	1.13
	WRank	1.09	0.16	0.72	0.36	−0.21	−1.40	−1.03	−1.14	−0.16	−0.26	1.03	−0.10	0.93	1.03	1.09
	Obs.	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Denmark	CAR	2.87	2.01	0.26	−0.79	−3.63	−6.91	−5.80	−3.57	−3.51	−2.31	4.59	4.92	3.23	4.42	2.69
	BMP	0.87	0.11	−0.40	−0.73	−1.47	−3.48***	−3.17***	−2.40**	−2.50**	−2.97***	1.62	0.83	0.60	1.05	0.48
	KP	0.41	0.05	−0.19	−0.34	−0.69	−1.62	−1.48	−1.12	−1.17	−1.39	0.76	0.39	0.28	0.49	0.22
	WRank	0.76	0.15	−0.70	−0.58	−1.49	−2.77***	−2.68***	−2.01**	−2.25**	−2.43**	1.70*	1.16	1.13	1.70*	0.91
	Obs.	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Finland	CAR	−4.02	−8.54	−1.32	−4.01	−8.61	−2.66	−1.35	−0.60	−0.77	−0.18	−3.93	−7.87	−0.82	−2.75	−6.04
	BMP	−1.40	−2.14**	−0.47	−1.00	−1.58	−0.69	−0.31	−0.05	−0.16	−0.01	−1.89*	−2.67**	−0.59	−1.20	−1.87*
	KP	−0.96	−1.47	−0.32	−0.69	−1.08	−0.47	−0.21	−0.03	−0.11	−0.00	−1.30	−1.83*	−0.41	−0.82	−1.28
	WRank	−1.98**	−2.03**	0.50	−0.59	−1.46	−1.59	−0.98	−0.98	−1.24	−1.68*	−1.68*	−2.37**	0.33	−0.68	−1.55
	Obs.	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
France	CAR	−1.38	−6.29	−2.44	−4.04	−4.62	−1.01	−0.87	0.73	0.55	−0.18	−1.75	−7.39	−3.72	−3.72	−4.16
	BMP	−1.15	−3.50***	−1.41	−2.18**	−2.31**	−1.03	−0.94	0.72	0.51	−0.36	−1.98*	−4.51***	−2.30**	−2.28**	−2.36**
	KP	−0.64	−1.97*	−0.79	−1.23	−1.30	−0.58	−0.53	0.41	0.29	−0.20	−1.11	−2.53**	−1.29	−1.28	−1.33

(Continues)

TABLE A5 (Continued)

		Around event day					Pre-event days					Post-event days				
	Event windows	**[−5, 5]**	**[−10, 10]**	**[−15, 15]**	**[−20, 20]**	**[−25, 25]**	**[−25, 0]**	**[−20, 0]**	**[−15, 0]**	**[−10, 0]**	**[−5, 0]**	**[0, 5]**	**[0, 10]**	**[0, 15]**	**[0, 20]**	**[0, 25]**
	WRank	−0.81	−3.89***	−1.53	−2.28**	−2.43**	−0.01	−0.08	0.91	0.61	−0.44	−2.12**	−4.76***	−2.56**	−2.60***	−2.72***
	Obs.	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
Germany	CAR	−1.51	−7.99	−3.86	−3.53	−4.79	−1.16	−0.25	−0.76	−1.24	−0.36	−1.87	−7.47	−3.81	−4.00	−4.35
	BMP	−1.59	−3.42***	−2.01**	−1.83*	−2.05**	−0.87	−0.08	−0.90	−1.38	−1.09	−1.97*	−3.49***	−2.21**	−2.30**	−2.28**
	KP	−1.12	−2.42**	−1.42	−1.29	−1.45	−0.61	−0.05	−0.64	−0.98	−0.77	−1.39	−2.47**	−1.56	−1.63	−1.61
	WRank	−1.89*	-4.26***	−2.85***	−3.21***	−3.08***	−0.74	0.20	−0.55	−0.98	−1.10	−2.00**	−3.94***	−2.77***	−3.20***	−3.27***
	Obs.	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Italy	CAR	1.04	−5.15	−2.85	−4.59	−3.51	−1.80	−1.29	−0.33	−1.05	0.59	0.34	−4.21	−2.63	−3.41	−1.81
	BMP	0.61	−1.72*	−1.29	−2.15**	−1.25	−1.25	−1.07	−0.62	−1.27	1.49	0.14	−1.32	−0.95	−1.25	−0.48
	KP	0.31	−0.87	−0.65	−1.09	−0.63	−0.63	−0.54	−0.31	−0.64	0.75	0.07	−0.67	−0.48	−0.63	−0.24
	WRank	1.14	−1.75*	−1.34	−2.41**	−1.98**	−1.43	−1.69*	−1.09	−1.87*	1.25	0.30	−0.75	−0.73	−0.96	−0.34
	Obs.	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
The Nether-lands	CAR	−0.34	−4.70	−2.51	−3.28	−3.97	−2.20	−1.65	0.08	−1.06	−0.47	−1.09	−4.87	−3.81	−2.85	−2.99
	BMP	−0.64	−2.28**	−1.41	−1.70*	−2.02*	−1.44	−1.04	−0.05	−0.94	−0.78	−1.30	−2.63**	−2.53**	−1.83*	−1.92*
	KP	−0.58	−2.07**	−1.28	−1.55	−1.83*	−1.30	−0.94	−0.05	−0.85	−0.71	−1.18	−2.38**	−2.30**	−1.66	−1.74*
	WRank	0.29	−1.59	−0.82	−1.10	−1.25	−1.43	−1.23	−0.22	−0.57	−0.51	−0.67	−2.21**	−2.18**	−1.37	−1.31
	Obs.	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Spain	CAR	2.56	0.97	4.55	4.04	3.93	1.06	1.45	0.35	−0.40	−0.14	2.65	1.31	4.15	2.53	2.82
	BMP	1.10	0.17	1.82*	1.42	1.76*	0.00	0.10	−0.34	−0.68	−0.63	1.46	0.47	2.19**	1.37	1.56
	KP	0.56	0.09	0.93	0.72	0.90	0.00	0.05	−0.18	−0.35	−0.32	0.74	0.24	1.12	0.70	0.79
	WRank	0.90	0.36	2.27**	2.25**	2.11**	0.39	0.34	−0.01	0.12	−0.47	1.04	0.31	1.68*	1.22	1.17
	Obs.	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25

TABLE A5 (Continued)

		Around event day					Pre-event days					Post-event days				
	Event windows	[−5, 5]	[−10, 10]	[−15, 15]	[−20, 20]	[−25, 25]	[−25, 0]	[−20, 0]	[−15, 0]	[−10, 0]	[−5, 0]	[0, 5]	[0, 10]	[0, 15]	[0, 20]	[0, 25]
Sweden	CAR	−2.35	−1.18	0.94	−0.09	−4.02	−6.74	−5.89	−4.91	−5.35	−4.40	1.08	3.21	4.89	4.83	1.76
	BMP	−3.34***	−1.22	0.99	0.10	−1.79*	−4.53***	4.72***	−4.29***	−6.27***	−6.35***	−0.27	1.41	3.67***	2.88***	0.50
	KP	−1.17	−0.43	0.35	0.03	−0.63	−1.59	−1.66	−1.51	−2.20**	−2.23**	−0.09	0.50	1.29	1.01	0.17
	WRank	−2.59***	−0.81	0.74	−0.04	−1.78*	−4.15***	−4.22***	−4.13***	−5.16***	−5.56***	0.99	1.97**	3.73***	3.35***	1.17
	Obs.	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Switzerland	CAR	−0.87	−2.86	−1.63	−1.37	−2.73	−2.28	−1.86	−1.52	−1.93	−1.54	0.36	−1.23	−0.41	0.19	−0.75
	BMP	−0.71	−1.59	−0.62	−0.15	−1.11	−2.29**	−1.74*	−1.48	−2.46**	−2.29**	0.35	−0.80	−0.02	0.75	0.01
	KP	−0.41	−0.92	−0.36	−0.09	−0.64	−1.33	−1.01	−0.86	−1.43	−1.33	0.21	−0.46	−0.01	0.43	0.01
	WRank	−0.13	−1.38	−0.70	−0.20	−1.17	−2.30**	−1.83*	−1.99**	−2.51**	−2.45**	1.29	−0.29	0.23	1.01	0.41
	Obs.	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
United Kingdom	CAR	−0.08	−2.23	0.18	−0.99	−1.33	−0.33	−0.21	−0.14	−0.51	−0.49	0.70	−1.42	0.61	−0.49	−0.71
	BMP	0.04	−2.49**	0.25	−1.05	−1.13	−0.90	−0.87	−0.84	−1.62	−1.80*	1.36	−1.50	1.08	−0.18	−0.38
	KP	0.01	−0.78	0.08	−0.33	−0.36	−0.28	−0.27	−0.26	−0.51	−0.57	0.43	−0.47	0.34	−0.06	−0.12
	WRank	−0.30	−3.02***	0.01	−1.22	−1.42	−0.76	−0.50	−0.30	−1.53	−2.21**	1.39	−1.68*	0.71	−0.70	0.89
	Obs.	132	132	132	132	132	132	132	132	132	132	132	132	132	132	132
Other countries	CAR	−5.92	−8.10	−5.57	−5.57	−6.55	−2.91	−1.17	−0.63	−2.17	−2.37	−4.28	−6.66	−5.67	−5.12	−4.37
	BMP	−2.52**	−2.38**	−1.76*	−1.47	−2.24**	−2.25**	−0.96	−0.89	−2.82***	−4.40***	−1.95*	−1.98*	−1.69*	−1.44	−1.73*
	KP	−1.52	−1.44	−1.06	−0.89	−1.35	−1.36	−0.58	−0.54	−1.70*	−2.66***	−1.18	−1.20	−1.02	−0.87	−1.05
	WRank	−2.03**	−2.35**	−1.11	−1.10	−2.00**	−2.11**	−1.10	−0.93	−2.58***	−4.04***	−1.09	−1.86*	−1.30	−0.33	−0.61
	Obs.	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60

TABLE A6 Size-based cumulative abnormal return (CAR) for the extended period

This table presents cumulative daily abnormal return (CAR) of the stocks belonging to the STOXX Europe 600 index grouped based on size tercile. BMP is the standardized cross-sectional test of Boehmer et al. (1991) using standardized cumulative abnormal returns. KP presents the cross-sectional correlation adjusted BMP test statistics proposed by Kolari and Pynnönen (2010). WRank is the Wilcoxon signed-rank for the null hypothesis that the CAR has a zero median. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively.

		Around event-day					**Pre-event days**					**Post-event days**				
	Event windows	**[−5, 5]**	**[−10, 10]**	**[−15, 15]**	**[−20, 20]**	**[−25, 25]**	**[−25, 0]**	**[−20, 0]**	**[−15, 0]**	**[−10, 0]**	**[−5, 0]**	**[0, 5]**	**[0, 10]**	**[0, 15]**	**[0, 20]**	**[0, 25]**
Large cap	CAR	−0.34	−2.62	−0.94	−1.16	−2.11	−0.99	−0.59	−0.68	−1.22	−0.72	0.05	−1.74	−0.60	−0.90	−1.46
	BMP	−1.29	−3.43***	−1.78*	−2.01**	−2.56**	−1.97*	−1.44	−2.11**	−3.50***	−3.11***	−0.85	−2.70***	−1.37	−1.72*	−2.15**
	KP	−1.04	−2.76***	−1.44	−1.62	−2.06**	−1.58	−1.16	−1.70*	−2.81***	−2.50**	−0.68	−2.17**	−1.10	−1.39	−1.73*
	WRank	−0.79	−3.58***	−1.74*	−1.87*	−2.31**	−1.54	−0.96	−1.52	−2.99***	−2.87***	−0.31	−2.50**	−1.27	−1.42	−1.81*
	Obs.	196	196	196	196	196	196	196	196	196	196	196	196	196	196	196
Mid cap	CAR	−1.35	−4.53	−2.20	−2.61	−3.20	−1.85	−1.42	−0.75	−1.38	−0.92	−0.84	−3.55	−1.86	−1.60	−1.76
	BMP	−1.84*	−3.66***	−1.79*	−2.05**	−2.78***	−2.77***	−2.41**	−1.27	−2.82***	−2.49**	−1.64	−3.13***	−1.67*	−1.45	−1.87*
	KP	−1.08	−2.15**	−1.06	−1.20	−1.63	−1.63	−1.42	−0.75	−1.66*	−1.46	−0.96	−1.84*	−0.98	−0.85	−1.10
	WRank	−0.40	−3.18***	−1.05	−1.57	−2.59***	−2.82***	−2.61***	-1.97**	−2.79***	−2.58***	0.35	−2.13**	−0.17	0.32	−0.28
	Obs.	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195
Small cap	CAR	−1.64	−4.91	−1.01	−2.72	−4.72	−3.64	−2.54	−1.44	−1.70	−1.70	−0.42	−3.68	−0.04	−0.66	−1.55
	BMP	−2.20**	−4.63***	−0.51	−1.98**	−3.24***	−4.31***	−3.26***	−2.63***	−3.32***	−4.08***	−0.78	−3.79***	0.61	−0.25	−1.06
	KP	−0.86	−1.80*	−0.20	−0.77	−1.26	−1.68*	−1.27	−1.03	−1.29	−1.59	−0.31	−1.48	0.24	−0.10	−0.41
	WRank	−2.34**	−5.23***	−0.60	−2.31**	−3.86***	−4.47***	−3.31***	−2.43**	−3.62***	−5.53***	−0.04	−3.65***	0.61	−0.56	−1.64
	Obs.	196	196	196	196	196	196	196	196	196	196	196	196	196	196	196