WHEN RUSSIA TURNED OFF THE TAP TO EUROPE

AN EVENT STUDY OF THE EUROPEAN STOCK MARKET REACTION DURING NORD STREAM PIPELINE ANNOUNCEMENTS

SOFIA LUNDQUIST

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Abstract:

We use three events related to the Russian gas supply to Europe from Nord Stream pipelines as potential exogenous shocks to test political uncertainty and its effect on asset pricing. Investigating stock returns of firms in the STOXX Europe 600 index, we do not find consistent evidence of firms more exposed to Nord Stream or Russia experiencing more negative stock returns following the events. We cannot be certain what explanation drives our results; thus, we cannot add insight to other studies in terms of priced political risk. For future event studies, we highlight the notion of considering earlier related events as well as difficulties to capture the exogenous shocks during periods of economic and political turbulence.

Keywords:

Political Uncertainty, Nord Stream, Exogenous Shock, Stock Returns, STOXX Europe 600

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1. Introduction

In February 2022 Russia invaded Ukraine which significantly impacted international trade in Europe. One crucial import from Russia to Europe is the supply of natural gas through the Nord Stream pipelines. Before the Russia-Ukraine war, Europe imported around 40% of its gas supply from Russia. Thus, shortages in supply from Russia would essentially have economic and political implications (Di Bella, Flanagan, Foda, Maslova, Pienkowski, Stuermer and Toscani, 2022). We examine three different events related to Nord Stream and their effect on the European stock market by examining firms in the STOXX Europe 600 index. The three events assumably increase political uncertainty and create exogenous shocks with implications on asset pricing. We consider the impacts of three potential exogenous shocks by applying methodologies used in the article *The impacts of political uncertainty on asset prices: Evidence from the Bo scandal in China* (2017) written by Liu, Shu, and Wei.

The energy dependency between Europe and Russia strengthened in 2011 with the opening of the Nord Stream 1 pipeline. The pipeline was constructed to connect natural gas supply from Russia to Europe. The owner of Nord Stream, Gazprom, is a Russian energy company with the Russian state as the majority owner. In 2015, the outlining of another pipeline project, Nord Stream 2, was initiated with the aim to increase the natural gas supply to Europe (Financial Times, 2022). Nord Stream's political consequences have been debated. For example, before Germany signed Nord Stream 2, NATO warned Germany of the security implications of a new Nord Stream pipeline (The Guardian, 2022). The certification process of Nord Stream 2 was suspended on the 22nd of February 2022, one day after Putin had ordered "peacekeeping" units to Ukraine (Reuters, 2022). Later, on the 19th of August 2022, Russian Gazprom made an announcement that they would, during a three-day period, do maintenance of the Nord Stream gas pipeline. The start date would be on the 31st of August (Reuters, 2022). The announcement came as a surprise as they had already undergone annual maintenance of their operations one month earlier (Politico, 2022). Leaders in Europe suspected that the maintenance was an attempt by Russia to intentionally try to create a crisis in Europe by cutting its energy supplies (Financial Times, 2022). On the 31st of August 2022, Russia shut down the Nord Stream 1 pipeline scheduled to reopen on the 2nd of September 2022 (Financial Times, 2022). However, on the evening of Friday, the 2nd of September 2022, Gazprom announced that they would keep the pipeline closed until further notice. Earlier that day, a limit on the price of Russian oil had been suggested by countries in 'The Group of Seven' (Financial Times, 2022). Due to the ongoing war and increased inflation climate, the reduction of gas would create additional pressure on a recession in Europe (Financial Times, 2022). On the 26th of September at 02:03, there was a leakage in Nord Stream 2 and later that day the same phenomenon was found in Nord Stream 1 (Aftonbladet, 2022). On the 27th of September, Swedish Prime Minister Magdalena Andersson confirmed that detonations were the cause of the leaks and that it is most likely sabotage (Dagens Industri, 2022). Since the reason behind the explosions is unclear, several theories exist about their occurrence. The speculations about the gas leaks have further threatened the political balance since they potentially increased the uncertainty of if the pipelines would ever be operating again. The events considered in this study are August 19th, September 5th, and September 27th in 2022, when there were different announcements about the Nord Stream that possibly led to political uncertainty witnessed in the stock market.

Due to the political tension between Russia and Europe since the beginning of the war, the Nord Stream announcement are appealing events to examine. In this study, we define political uncertainty to include the impact of political uncertainty, economic uncertainty and geopolitical risk based on arguments from Baker, Bloom and Davis (2016) and Caldara and Iacoviello (2022). We test if the three unanticipated events cause exogenous shocks that affect political uncertainty and thus stock prices. Exogenous shocks are "unexpected or unpredictable events that occur outside an industry or country but can have a dramatic effect on the performance or markets within an industry or country" (UN, 2022). The significance of the events lies in the fact that the suspension of energy supply from Nord Stream increases political uncertainty, potentially having implications for the trade relationship between Russia and Europe.

This study investigates priced political risk by examining the effect on firms in the STOXX Europe 600 index, from three exogenous shocks to political stability. We use four proxies to determine each firm's policy sensitivity. The first is *Energy Sensitivity* which is each firm's reaction to policy announcements from European leaders on energy supply and prices. The second is *Russian Gas,* each European country's dependency on Russian gas, which is a measure of the natural gas import from Russia divided by final energy consumption. The third is *Bordering* which is countries whose economic and geographical zones the Nord Stream crosses. The fourth is *Trade,* a country's trade dependency on Russia, that measures total imports and exports from Russia normalized by the country's GDP. The last three measures are based on countries where firms are assigned a value depending on their headquarter location. Therefore, the research questions are:

I. Do the events on the 19th of August, the 5th of September, and the 27th of September 2022 create exogenous shocks that have implications for political uncertainty on asset pricing?

II. Do firms that are more sensitive to energy policy announcements, are headquartered in countries more dependent on Russian gas, bordering to the Nord Stream pipelines, and more dependent on trade with Russia experience more negative returns for our events?

Similar to Liu et al. (2017), we use four policy sensitivity proxies to assess the implications of political uncertainty on firms in the STOXX Europe 600 index. To examine the relationship between asset pricing and political uncertainty, we use a univariate test and cross-section regressions. The cross-section regressions, as well as a panel data regression, are used to determine if firms that are more sensitive to our policy sensitivity proxies have more negative returns following the events. To robustness check the variables, we conduct extended event windows and fixed-effect regressions. A significance test is conducted to investigate if there are some countries and industries more affected by the events. In addition, insights from this study will be justified using a permutation test.

Looking at the empirical results, the findings show large disparity. For the first event, we find evidence of firms more sensitive to energy policy announcements having more negative stock returns. For the second event, firms that are headquartered in countries more dependent on Russian gas have more negative stock returns. For the third event, we find no policy sensitivity proxy to be significant. We do not find evidence of firms bordering the Nord Stream pipelines or depending more on trade with Russia experiencing more negative stock returns for our events. Since our results are very different between events and variables, as witnessed in the permutation tests, we argue that our study presumably captures noise. Thus, we cannot provide answers to whether firms with higher policy sensitivity proxies have more negative returns for our events. The empirical results show weak evidence for the events creating exogenous shocks impacting the political uncertainty on asset pricing. Therefore, it is not possible to draw conclusions about whether there is a risk premium associated with political uncertainty, as argued by Liu et al. (2017). The reason for our results could be due to a lack of exogenous shocks for our events or measurement errors. Potentially, investors already reacted to speculations about the political and economic effects of Russia shutting down the gas supply, which results in a lack of exogenous shocks in the event windows. The reason for this could be that, compared to other studies, our event setting differs since we have many prior events related to our shocks. On the other hand, it might be hard to capture the exogenous shocks since we cannot eliminate all measurement errors during a period with high economic and political turbulence. With the results from this study, we are not certain what the explanations for the results might be. However, the insights from this study add to the literature since we highlight potential sources of flaws in event studies investigating political uncertainty during turbulent periods.

2. Literature Review

We replicate the article *The impacts of political uncertainty on asset prices: Evidence from the Bo scandal in China* by Liu et al. (2017), with some extensions to suit the Nord Stream events. Liu et al. (2017) assess the unpredicted event of an exogenous shock to the political balance in China in 2012 to establish a causal connection between political uncertainty and financial markets. Using the methodology by Brown and Warner (1985) and daily stock returns on large Chinese firms, the results in Liu et al. (2017) show significant decreases in stock prices around the event window, especially for firms that are responsive to government policy adjustments. Their findings show that there is a risk premium for political risk, created during political uncertainty. Our Nord Stream events differ from the Bo scandal since our events have implications for international political relationships and international trade. In this study, we extend the article by Liu et al. (2017) by investigating other events using other political uncertainty proxies during a turbulent period in Europe. For this study, we investigate two types of articles closely related to our topic. First, we look at articles related to political uncertainty on asset prices since this is the phenomenon we intend to capture with our study. Second, we use event study articles on the Russia-Ukraine war since the Nord Stream events that we examine are closely related to the war.

The effect of political uncertainty on asset prices is well-examined in the academic literature. Multiple studies investigate the impact of political uncertainty on the stock market using historical events. Brogaard, Dai, Ngo and Zhang (2020) examine political uncertainty on a global level by looking at elections in the US as exogenous shocks and find that stock markets outside the US are negatively impacted by these events, indicating that political events in one country can create an exogenous shock in another. Boutchkova, Doshi, Durnev and Molchanov (2012) find that a firm's sensitivity to political events varies depending on the industry and that increased political risk results in more stock return volatility. Pástor and Veronesi (2012) examine government policy announcements and find a negative correlation between stock returns and policy uncertainty and in their other study, they illustrate that political risk premiums exist (Pástor and Veronesi, 2013). Evidence from the articles will aid in this study since the Nord Stream events arguably increase the political uncertainty among European firms.

Due to the essence of our events, we include articles investigating the Russia-Ukraine war's impact on stock markets. Several papers study the period at the beginning of the Russia-Ukraine war and its global impact on financial markets. Ahmed, Hassan and Kamal (2022) investigate stock returns when the war emerged and find heterogeneity in how countries and industries responded to the war event. These findings are interesting for us since we intend to do use country-specific variables in our regressions on Nord Stream events, that are closely related to the war. Yousaf, Patel and Yarovaya (2022) find that stock markets related to Russia are more impacted by the economic sanctions following Russia's invasion of Ukraine, which is valuable for this study since we examine firms' economic dependency on Russia during the war. Abbassi, Kumari and Pandey (2022) and Boubaker, Goodell, Pandey and Kumari (2022) use country-specific variables in their regressions to examine if these factors impacted abnormal returns, an inspiration for our policy sensitivity proxies. Abbassi et al. (2022) find their variables relating to trade dependence, as well as geopolitical risk to have negative effects on stock returns during the events that they investigated. Similarly, Boubaker et al. (2022) find countries with more international trade have a more negative impact on stock returns. This indicates that using country-specific variables for these types of events can provide insightful results and, thus, is important for our study.

This study contributes to the literature on risk premiums associated with political uncertainty and the literature on stock market reactions during politically turbulent periods. First, to the best of our knowledge, there are no prior event studies examining the exogenous impact of Nord Stream's recent events on the European stock market. The contribution is crucial due to the high potential for future Nord Stream related events. Second, we apply new methodologies to investigate an event related to the Russia-Ukraine war. We do this by applying methodology from Liu et al. (2017) and other articles about political uncertainty. We contribute to the research on the Russia-Ukraine war and stock prices by adding the dimension of risk premiums associated with political uncertainty, an approach none of these studies have taken before. Lastly, we contribute to the literature by testing an exogenous shock to political stability in Europe during a turbulent period. We deviate from Liu et al. (2017) by investigating international political events while they only looked at one domestic political event. During our event periods, there are a lot of other things happening in Europe, thus, potentially having effects on our results. By investing the effects of the events during a turbulent period, we provide evidence and implications for policymakers, investors, and academia.

3. Hypothesis

According to the Efficient Market Hypothesis, the announcements of new information impacting firm's valuation should result in an immediate price change (MacKinlay, 1997; Bodie, Kane, Marcus, 2021). Liu et al. (2017) test if there is causality between political uncertainty and stock prices by using an unexpected political event, that acts as an exogenous shock. Their study shows that increasing political uncertainty affects stock prices negatively by requiring a risk premium. Following our Nord Stream events, we expect the stock returns to decrease as a result of increased political uncertainty. The evidence of political uncertainty and stock prices suggested by Pástor and Veronesi (2012) and Pástor and Veronesi (2013) also support our hypothesis that the Nord Stream event increase political uncertainty and should lead to a decrease in stock returns due to a risk premium associated with political uncertainty. Therefore, our hypothesis is:

H1: The exogenous shocks of each of the three events will decrease stock returns following the events.

As Liu et al. (2017), we argue that firms with higher policy sensitivity proxies are more negatively affected following each announcement. We expect this if political uncertainty is priced, as claimed by Pástor and Veronesi (2013). We use four proxies for policy sensitivity, inspired by the ones used by Liu et al. (2017) and others.

The first proxy is *Energy Sensitivity* to energy policy announcements, corresponding to "Policy announcement" in Liu et al. (2017). It is a measure of firms' reaction to previous policy announcements from European leaders on energy supply and prices during 2022 (European Council, 2022). We expect firms that respond negatively to these energy announcements to be more exposed to political uncertainty during Nord Stream events. We measure this proxy by calculating the absolute cumulative abnormal returns for each stock on the energy news days.

The second proxy relates to dependency on *Russian Gas* for each European country in the sample. Prior studies (Ahmed et al., 2022) find a negative stock return effect on countries relying on Russian gas during the Russia-Ukraine conflict. Similarly, the *Russian Gas* proxy is crucial for this event since the Nord Stream events had direct impact on natural gas supply from Russia (Di Bella et al., 2022). Each firm obtains a value based on the country of headquarters. We argue that countries that import more Russian gas out of their total final energy consumption will be more Russian gas dependent and thus more sensitive to Nord Stream announcements.

The third proxy is *Bordering* to Nord Stream. We believe that countries bordering the Nord Stream pipelines are more exposed to political uncertainty. This is supported by Brogaard et al. (2020) who state that countries physically closer to geopolitical events have a more effect on stock returns. It is also evident for the Russia-Ukraine war, as Boungou and Yatié (2022) argue for. Furthermore, this is emphasized in Appendix A, where we can see that the countries that search the most on Google for the word "Nord Stream" during Q3 2022 were those bordering Nord Stream.

The last proxy is *Trade* dependency on Russia, which measures each country's imports and exports from Russia, normalized by their GDP. We believe that a country more dependent on trade with Russia will be more exposed to political uncertainty stemming from the Nord Stream events. Abbassi et al. (2022) and Boubaker et al. (2022), using a trade-to-GDP ratio in their regression, find that trade dependence negatively affects abnormal returns during the Russia-Ukraine war. Boutchkova et al. (2012) also find that countries more exposed to international trade with Russia are likely to be more responsive to an increase in political uncertainty following the essence of the events. The hypothesis is, therefore:

H2: Firms more sensitive to energy policy announcements, more dependent on Russian gas, border either economically or geographically to the Nord Stream pipeline, and are highly dependent on trade with Russia experience more negative stock returns following each event.

We hypothesize that the third event on the 27th of September 2022 results in less market reactions since it does not have the same magnitude of effect on the European economy as the first and second events. Russia had already shut off the pipelines, and the event should not severely impact the economy. Following the insights from Boutchkova et al. (2012), we hypothesize that political events with more economic implications considerably affect stock market reactions more. Similarly, based on the argument from Pástor and Veronesi (2013), we expect the political risk premium to be more substantial for the first and second events as these events assumably result in higher political uncertainty. However, despite this, the third event potentially has consequences for the political uncertainty perception related to national security, which is a subcategory of policy uncertainty (Baker et al., 2016). Thus, we expect the event to have some impact but not to the same extent as the first and second events. The hypothesis is, therefore:

H3: The exogenous shock from the third event has a less negative effect on the stock returns since the gas supply had already been shut off on September 2nd 2022.

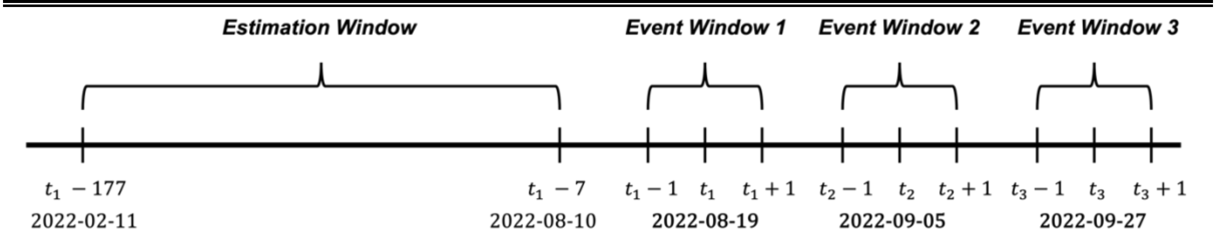
4. Data

4.1 Nord Stream Events

Liu et al. (2017) examine the relationship between asset pricing and political uncertainty on one event date. In contrast, we investigate the effect of three events related to Nord Stream gas pipelines. Since our three Nord Stream events differ in essence, our analysis is mainly conducted by seeing each event separately. Doing different analyses per event is something that other multiple-event studies have done, such as Cornett and Tehranian (1990). This study's main event days are the 19th of August 2022, the 5th of September 2022, and the 27th of September 2022. In Figure 1, we provide a timeline of the three different events related to Nord Stream. The first event we consider is when the maintenance was announced, the second is when the gas was shut down, and the last is when there were explosions in the pipelines.

We and Liu and al. (2017) take inspiration from Baker et al. (2016) by using newspaper articles to investigate the events' effects. As Liu et al. (2017), we measure the significant impact on the political stability in the country by noting the magnitude of Internet searches and subjectively inspecting several media article discussions. We strongly believe that our three events dramatically increase the political uncertainty due to their effect on European countries and the trade relationship between Russia and Europe during the Russia-Ukraine war (Bloom, 2009).

Figure 1. Timeline for the three events
The figure shows a timeline for the three events investigated in this study. The first event is on August 19th 2022, the second is on September 5th 2022, and the third is on September 27th 2022. The estimation window is also included, a six-month period one week before the first event.



Event 1. The 19th of August 2022

The first event we consider is the announcement on the 19th of August, 2022. On this date, Russia announced that starting on the 31st of August, they would pause their gas supply to Europe for the duration of three days, ending on September 2nd (Financial Times, 2022). Germany confirmed that there were no technical reasons behind the shutdown (The Guardian, 2022). The maintenance announcement created concern in the political environment since this was the first irrational shutdown of the Nord Stream pipelines, indicating a potential political motive. Many newspaper articles highlight how the event on 19th of August increase the uncertainty about the future supply of Russian gas and create fear for the future European energy supply (Financial Times, 2022; CBS, 2022). Akin to the study by Cornett and Tehranian (1990), we choose the event since it includes essential information to investors about Nord Stream. Even more important, the event was not anticipated by the market. In the announcement on the 19th of August, it was predicted that the work would be finished on the 2nd of September and that the gas supply would continue after that date (Financial Times, 2022).

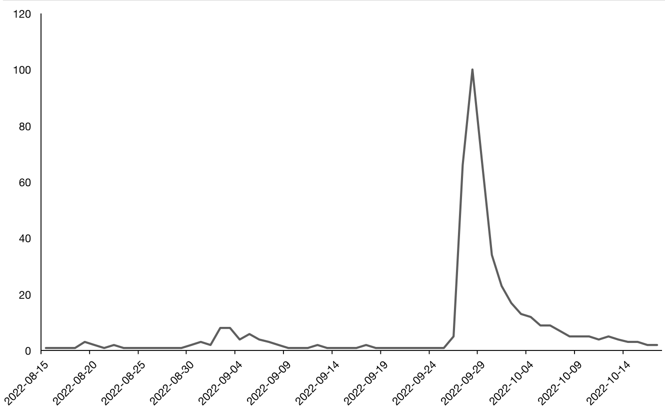
Event 2. The 5th of September 2022

In the late evening of the 2nd of September, Gazprom stated that they would indefinitely stop the pipeline from operating (The Guardian, 2022). Since Europe is crucially dependent on gas from Russia for their energy supply, it arguably increased the political uncertainty in Europe (Di Bella et al., 2022). Furthermore, the announcement on the 2nd of September was widely captured in the media, which is likely to have a systematic effect on the stock market. The stock market presumably reacted to this news on the following trading day, September 5th, as the 2nd of September was a Friday, and the stock market was closed at the time of the announcement. To examine the stock price reaction to the announcement of the Nord Stream suspension, we need to analyze stock returns on the 5th of September. Following the reasoning conducted in the study by Cornett and Theranian (1990), this event also contains new information for the market. We argue that the event was unanticipated since the announcement from Gazprom was unexpected.

Event 3. The 27th of September 2022

On the night of 26th of September, a gas leak was reported in the Nord Stream 2 pipeline. Later, on the evening of September 26th, announcements came about two additional leakages in the Nord Stream 1 pipeline (Aftonbladet, 2022). Since the second and third gas leakages occurred on the evening of September 26th, the most significant market reaction reasonably came on September 27th. This is also supported by the magnitude of Google searches on September 27th (Figure 2). On September 27th it was also announced that the leakages were most likely sabotage which greatly affected the security policy aspect (Dagens Industry, 2022). The uncertainty of who did the sabotage have an impact on national security since it challenges the political relationship between Russia and Europe. Like the other events, the third event was not anticipated as the explosions came as a surprise to the world. This results in national security policy uncertainty, a subcategory of policy uncertainty argued by Baker et al. (2016). The events were unanticipated since no one had predicted the explosions.

Figure 2. Graph of Google searches for "Nord Stream"
The graph shows the amount of Google searches for the word "Nord Stream" from Google Trends for the period the 15th of August 2022 to the 21st of October 2022. The line is an index with the highest value of 100, indicating the time with the highest interest for the search word. We can see a peak in searches for the 27th of September 2022.



4.2 Other Macroeconomic Events

Other macroeconomic and political announcements impact the financial markets during the event periods. Factors influencing the economic climate in 2022 are inflation, monetary policy, and the war in Ukraine (International Monetary Fund, 2022). These economic conditions can impact movements in the financial markets. Therefore, we include control variables for these to minimize the effects of other macroeconomic factors that can create a bias for our explanatory variables. A list of other Nord Stream events is seen in Appendix B and is included to be sure that there are no overlapping events for the extended event windows. We look at the macroeconomic events of monetary policy announcements, inflation levels announcements and Putin announcements (Appendix C and D). We can see a monthly inflation announcement happening on the 18th of August potentially impacting the first event. In the cross-section regression, we control for the inflation event like earlier studies (Egger and Zhu, 2020; Smales, 2017), by inserting discrete values for each country to capture which country was most affected by the announcement. The inflation data for each country is obtained from Eurostat (2022), and the control variable is a percentage change of inflation from the previous month. Since there are several macroeconomic events and war events during the turbulent period, it may be challenging to separate the surprising effects of the Nord Stream shocks. However, by including these control variables, we remove the effect of some of the other events mentioned in Appendix C and D.

4.3 Variables

4.3.1 Dependent Variables

We obtain daily data for stock prices since these present few obstacles for the methodology used in this study, as generalized by Brown and Warner (1985), and thus suitable to capture the effects of the exogenous shocks. Since we investigate stock market returns in Europe, an adequate representation of various countries and industries are the STOXX Europe 600, as Ahmed et al. (2022). Financial information for individual firms in the STOXX Europe 600 index is collected from the S&P Capital IQ database. STOXX Europe 600 index prices are collected from the Eikon database. Firms for which stock price data were unavailable during the event period are excluded from the dataset. In total, the dataset consists of 576 firms for all regressions except for the extended event windows, where there is a difference in available stock price data. We use the same firms for all regressions to stay consistent. Throughout this study, we ignore individual stock prices that have no data. In the estimation window, we exclude non-trading days such as weekends. We use abnormal returns as the dependent variables to measure the effect of the events on the financial market, following the regressions from the article by Liu et al. (2017).

4.3.2 Independent Variables

4.3.2.1 Policy Sensitivity Proxies

Liu et al. (2017) use three proxies to measure the policy sensitivity of each firm. Similarly, we use four proxies of policy sensitivity for each firm from STOXX Europe 600 index. The proxies are not identical due to the disparity between the Nord Stream events and the Bo scandal in Liu et al. (2017). Furthermore, we include an extra proxy since we believe it can have additional explanatory value in our study. Additional motivation for the proxies comes from studies on stock market effects during the Russia-Ukraine war and other studies (Ahmed et al., 2022; Abbassi et al., 2022; Boubaker et al., 2022; Boungou and Yatié, 2022; Yousaf et al., 2022).

The first proxy that we use is firms' reactions to policy announcements from European leaders on “Energy prices and security of supply” collected from the European Council (European Council, 2022). This relates to the “Policy announcement” measure in the study by Liu et al. (2017). For this study, we argue that *Energy Sensitivity* to energy policy announcements is a proxy for policy sensitivity. The European Union has implemented several policies and made announcements about the "Energy prices and security of supply" (European Council, 2022). We find fourteen policy announcements from February to September 2022 (Appendix E). Furthermore, we exclude the announcements on the 10^{th} and 11^{th} of March since there are monetary policy announcements and Putin announcements during those days, seen in Appendix C and D. In addition, we exclude the energy policy announcement on February 24^{th} as we believe other factors could impact the financial market movement on this day since it marks the start of Russia's invasion of Ukraine. We construct the variable by replicating how Liu et al. (2017) create their "Policy announcement" variable. We do this by sorting firms based on their absolute cumulative abnormal returns on the energy announcement day. Each firm is then given a ranking number, with the highest ranking for firms most affected by the announcements. The ranking number is then normalized to conversion by dividing it by the total number of firms plus one, as Liu et al. (2017).

The second proxy is the dependency on *Russian gas* for each European country. The Russian gas dependency is measured as Russian natural gas import divided by final energy consumption in a country. The data is collected from Eurostat (2020). A limitation of this data is that some countries may have biased import data due to re-exports of gas from Russia (Di Bella et al., 2022). Eurostat has data on Russian imports for all European countries in 2020 except for Austria, Denmark and the UK. For Denmark, we use gas imports from Germany to Denmark as a proxy since they re-export all their natural gas from Russia. For Austria, we use the share of gas supply from Russia from Statista (2021) multiplied by total gas imports from Eurostat (2020). For the UK, we use the energy dependency data from 2019 since data from Eurostat for 2020 is not available. Each firm is assigned to a country based on the location of its headquarters, obtained from the Capital IQ database. Because of the broad differences between imports of Russian gas, we standardize the variables to get a mean of zero and a standard deviation of one.

$$\text{Russian gas dependency}_i = \frac{\text{Natual gas imported}_i}{\text{Final energy consumption}_i}$$

where $\text{Russian gas dependency}_i$ is the dependency on Russian gas for each country i, $\text{Natural gas imported}_i$ is the amount of natural gas imported by each country i in 2020, $\text{Final energy consumption}_i$ is the final energy consumption for each country i in 2020.

The third proxy is *Bordering* to the Nord Stream pipelines. This variable is a dummy, meaning that a country has a value of one if it is bordering to Nord Stream and a value of zero otherwise. First, we consider countries whose exclusive economic zones the Nord Stream crosses. These countries are Finland, Sweden, Denmark, and Germany. Furthermore, since we want to obtain a measure for geographical bordering Nord Stream, we include countries that border the territorial waters where pipelines are located. These are Estonia, Latvia, Lithuania and Poland (BBC, 2022).

The last proxy, *Trade,* is a measure of the trade relationship with Russia. There are several measures for trade, and in this study, we use a variable inspired by the trade-to-GDP ratio from the study by Abbassi et al. (2022) and Boubaker et al. (2022). This proxy is calculated using the export and import from Russia for each country, normalized by each country's GDP as follows:

$$\text{Trade dependency}_i = \frac{\text{Import}_i + \text{Export}_i}{\text{GDP}_i}$$

where Trade dependency$_i$ is the trade dependency for each country i, Import$_i$ is the value of imports to Russia per country i during 2021, Export$_i$ is the value of exports to Russia per country i during 2021 and GDP$_i$ is the GDP for each country i during 2021. The variable is standardized to have a mean of zero and a standard deviation of one. We measure trade dependency in relative terms to avoid size-effect and to obtain a more comparable measure between countries. All data is obtained from the *TradeMap* website.

Table 1. Variables used in regressions
The table shows and describes the variables used in the regressions and the data sources used to calculate the values of the variables.

Variable	Abbreviation	Description	Data Sources
Cumulative abnormal return	*CAR1*, *CAR2*	Cumulative abnormal returns (CARs) in percentage over the three-day event window summarized. CARs are calculated through the market model (CAR1) and the market-adjusted return model (CAR2).	S&P Capital IQ and Eikon
Energy Sensitivity	*SENS*	Measures firm's sensitivity to energy announcements based on firm's cumulative abnormal returns to policy announcements from European leaders on "Energy prices and security of supply". Rank firms between zero and one where the highest values indicate most negative CARs.	European Council, 2022
Russian Gas	*GAS*	Measures dependency on Russian gas for each country by taking total natural gas imported by Russia divided by final energy consumption per country scaled to mean of zero and standard deviation of one.	Eurostat, 2020
Bordering	*BORD*	Measures if a firm has HQ in a country bordering Nord Stream pipelines. A dummy variable that is one for countries whose economic zones or geographical zone are crossed by Nord Stream and zero for the others.	BBC, 2022
Trade	*TRAD*	Measures dependency of trade with Russia for each country by imports and exports from Russia for each country normalized by each country's GDP and scaled to mean of zero and standard deviation of one.	TradeMap, 2021
All Variables	*ALL*	Measures the combined policy sensitivity proxies by summarizing *Energy Sensitivity, Russian Gas, Bordering*, and *Trade* and scaled to mean of zero and standard deviation of one.	NA

4.3.2.2 Countries and Industries

The country that we assign to each firm is based on their primary office location or headquarters, extracted from the S&P Capital IQ database. Countries that have fewer firms than sixteen will be categorized as "Other countries" because they will not provide robust empirical results stand alone, like Ahmed et al. (2022). The countries under "Other countries" are Malta, Portugal, Poland, Luxembourg, and Austria.

We categorize industries for all firms based on the Eikon database, similar to Ahmed et al. (2022). From the Eikon database, we obtain eleven different industries.

4.3.2.3 Firm-Specific Control Variables

Exactly as Liu et al. (2017) we control for the firm specific characteristics: firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol). All data is obtained from the S&P Capital IQ database. LnSZ is the logarithm of firms' market cap on the day before the first event on the 18th of August 2022.

B/M is the book-to-market value of firms based on the 18th of August 2022 market cap and latest fully year reported book value of total common equity. Leverage is the ratio between the latest full year reported total amount of debt and total amount of assets. BHR is the percentage return of holding the stock from two weeks prior to the first event on the 4th of August 2022 to one week before the first event on the 11th of August 2022. IVol is calculated as the standard deviation of CAR1 daily returns of the estimation period.

5. Methodology

The methodology in the article by Liu et al. (2017) forms the fundamental pillars for this study. To provide insights into whether the events resulted in exogenous shocks that potentially had implications for political uncertainty on asset pricing, a univariate test and cross-section regressions are used. To test if firms with higher policy sensitivity proxies have more negative stock market returns on the events, the univariate test, cross-section regressions and a panel data regression are used. To robustness check our assumptions and results, we substantiate the findings with extended event window regressions and fixed-effect regressions. We also conduct significance tests for countries and industries. In addition, to provide strong evidence for the results, a permutation test is crucial.

5.1 Abnormal Returns

To measure the effect that the event has on market reactions, we begin by using the same method as Liu et al. (2017). Calculating abnormal returns is sufficient in event studies to study the short-term effects that news announcement has on stock returns (MacKinlay, 1997). As Liu et al. (2017), we use an event window of three trading days around the event day [-1, 1]. The estimation window is used to calculate the expected returns for each firm and is used in the abnormal return calculations. Liu et al. (2017) use a six-month estimation period with the end of the estimation period being before another scandal. The reason for this is that the other scandal is linked to the event that they are investigating and thus, the authors want to avoid any biases that are caused by this other event. Using the same methodology, we use an estimation window of six months, starting from the 11th of February 2022 to the 10th of August 2022. This leaves a short period between the estimation and the first event window to remove anticipation (Brooks, 2014). The estimation window is the same for each of the three events to avoid potential biases of the contamination of the other event windows.

Abnormal returns in Liu et al. (2017) are derived using two methods, to provide robustness for the results. These methods are the market model and the market adjusted returns, based on Brown and Warner (1985). In the market model, we extract coefficients of α_i and β_i for all firms in the dataset by using an OLS regression:

$$Ret_{i,t} = \alpha_i + \beta_i R_{M,t} + \epsilon_{i,t}$$

where $Ret_{i,t}$ is the return for a stock i on a trading day t and $R_{M,t}$ is the market index on trading day t. The OLS regression is based on returns in the estimation window. The STOXX Europe 600 index is used as a proxy for the market return in the regression (Ahmed et al., 2022). The coefficients from the OLS regression together with the market return from the STOXX Europe 600 index are used to calculate the expected return. Lastly, the abnormal returns in the event window are derived by subtracting the expected returns from the realized returns. We derive the abnormal returns for all firms in the STOXX Europe 600 index using the following method:

$$ARet1_{i,\tau} = Ret_{i,\tau} - (\hat{\alpha}_i + \hat{\beta}_i R_{M,\tau})$$

where $ARet1_{i,\tau}$ is the abnormal returns using the market model for a stock i on trading day τ. CAR1 is derived for the event window according to:

$$CAR1 = \Sigma_{\tau=-1}^{1} ARet1_{i,\tau}$$

where $CAR1$ is cumulative abnormal returns for event window [-1, 1]. Liu et al. (2017) also uses the market-adjusted returns for calculating abnormal returns for robustness purposes. In the market-adjusted return model, abnormal returns are derived by deducting the market return from the individual stock's return. We use the STOXX Europe 600 index as a proxy for the market return (Ahmed et al., 2022). Abnormal returns are calculated as:

$$ARet2_{i,\tau} = Ret_{i,\tau} - R_{M,\tau}$$

where $ARet2_{i,\tau}$ is the abnormal returns using the market-adjusted return model for a stock i on trading day t. CAR2 is derived for the event window according to:

$$CAR2 = \Sigma_{\tau=-1}^{1} ARet2_{i,\tau}$$

where $CAR2$ is cumulative abnormal returns for event window [-1, 1].

5.2 Regressions

5.2.1 Univariate Tests

As Liu et al. (2017), we begin by doing a univariate test to measure how the market response to the three Nord Stream events. The test will provide evidence for the magnitude and significance of CARs around the event days, as well as if CARs depend on how policy sensitive firms are. Firms are grouped according to their value of policy sensitivity based on the three proxies' percentiles. The "highest" extreme group is the upper quantile, the "lowest" is the lower quantile and the middle is the remaining quantiles. Then, we calculate CARs for each group based on dummies for each quantile of each sensitivity proxy. The variable *Bordering* is not included in the test due to its characteristic of being a dummy variable and thus not being able to divide into extreme groups. The three proxies *Energy Sensitivity*, *Russian Gas,* and *Trade* are used to group firms. The variable *All Three* is calculated in the same way as Liu et al. (2017) and is a summary of all variables in the test, standardized to have a mean of zero and a standard deviation of one and is also used to group firms. Similar to Liu et al. (2017), since there is event-day clustering for all firms, this study could suffer from a cross-sectional correlation problem (Kolari and Pynnönen, 2010). Hence, as Lui et al. (2017), we control for fixed effects for industry and country as well as using two-way clustering for standard errors for country and industry to avoid cross-sectional correlation and heteroskedasticity (Boutchkova et al., 2012; Brogaard et al., 2020). This methodology is more suitable for this event setting since it reduces the event-day clustering problem by creating a more restrictive *t*-statistic, as argued by Liu et al. (2017). For the fixed effects we exclude one country dummy, Ireland, and one industry dummy, telecommunication, to avoid multicollinearity. The fixed effects and two-way standard error clustering used in this test are also applied to the following regressions throughout this study.

5.2.2 Cross-Section Regression

Following the next step in the methodology by Liu et al. (2017), we perform cross-sectional regression analysis on CARs for each policy sensitivity proxies as independent variables. The regression will add further insight into the effects of exogenous shocks on political uncertainty and its consequences for stock pricing, following each of the events. We add control variables for firm-specific characteristics, as in Lui et al. (2017), that are firm size (lnSZ), book-to-market equity (B/M), leverage (leverage), return over one week (BHR) and daily idiosyncratic risk (IVol). These variables can have an impact on stock returns and are included to aim to reduce the omitted variable bias (Fama and French, 1992). These control variables are included in all the following regressions in this study. Additionally, we control for some exogenous macroeconomic factors that are happening around the same time as the event, which allows us to potentially reduce the omitted variable bias. Following the methodology by Liu et al. (2017), we begin by doing regressions of each proxy by itself and then on the *All Variables* that includes all four proxies. *All Variables* is calculated the same way as in the univariate test, but now we add all four proxies and then standardize it to mean zero and standard deviation one. Further explanations of the proxies can be found in Table 1. We control for fixed effects for country and industry as well as two-way clustering for standard errors are included, as in the univariate test.

$$
\begin{aligned}
CAR_{i,e} = {} & \beta_0 + \beta_1 SENS_{i,e} + \beta_2 lnSZ_{i,e} + \beta_3 B/M_{i,e} + \beta_4 leverage_{i,e} + \beta_5 BHR_{i,e} + \beta_6 IVol_{i,e} \\
& + FE_{industry} + FE_{country} + \varepsilon_{i,e} \\
CAR_{i,e} = {} & \beta_0 + \beta_2 GAS_{i,e} + \beta_2 lnSZ_{i,e} + \beta_3 B/M_{i,e} + \beta_4 leverage_{i,e} + \beta_5 BHR_{i,e} + \beta_6 IVol_{i,e} \\
& + FE_{industry} + FE_{country} + \varepsilon_{i,e} \\
CAR_{i,e} = {} & \beta_0 + \beta_3 BORD_{i,e} + \beta_2 lnSZ_{i,e} + \beta_3 B/M_{i,e} + \beta_4 leverage_{i,e} + \beta_5 BHR_{i,e} \\
& + \beta_6 IVol_{i,e} + FE_{industry} + FE_{country} + \varepsilon_{i,e} \\
CAR_{i,e} = {} & \beta_0 + \beta_4 TRAD_{i,e} + \beta_2 lnSZ_{i,e} + \beta_3 B/M_{i,e} + \beta_4 leverage_{i,e} + \beta_5 BHR_{i,e} + \beta_6 IVol_{i,e} \\
& + FE_{industry} + FE_{country} + \varepsilon_{i,e} \\
CAR_{i,e} = {} & \beta_0 + \beta_5 ALL_{i,e} + \beta_2 lnSZ_{i,e} + \beta_3 B/M_{i,e} + \beta_4 leverage_{i,e} + \beta_5 BHR_{i,e} + \beta_6 IVol_{i,e} \\
& + FE_{industry} + FE_{country} + \varepsilon_{i,e}
\end{aligned}
$$

5.2.3 Panel Data with Aggregate Event Windows

To further test if the events are exogenous shocks to political uncertainty, we investigate the effect of the Nord Stream events as one phenomenon by conducting a panel data regression, using inspiration from the article by Egger and Zhu (2020). This is an extension from Liu et al. (2017) since they only have one event date. We believe investigating aggregated event days will provide evidence of the effect of political uncertainty by looking at the proxies' impact during the Nord Stream phenomena. Using a regression with panel data allows us to increase the power of the test through increased degrees of freedom since we can combine time series and cross-sectional data. We do the same regression as for the cross-section regression, with country, industry, and firm characteristics fixed effects, clustered standard errors, as well as adding calendar time fixed effects using time dummies. We drop one event dummy variable to avoid multicollinearity. As other articles, to capture unobserved heterogeneity and to potentially reduce the omitted variable bias, we incorporate time fixed effects (Boutchkova et al., 2012; Brogaard et al., 2020).

5.3 Robustness Tests

5.3.1 Cross-section Regression with Extended Event Window

For robustness we extend the *event window* to investigate if the chosen event period ([1, -1]) impacts the results. This allows further insight into the effect of political uncertainty proxies on stock returns following the events, as well as the timing effects of the potential exogenous shocks. Following the methodology from prior event studies on the Russia-Ukraine war (Abbassi et al., 2022; Ahmed et al., 2022), we conduct the regression by extending the main *event windows* around the event days. Similar to earlier studies (Ahmed et al., 2022; Boubaker et al., 2022), this study examines a maximum of five days around the event days ([-5, +5]). We extend the event window to analyze the pre- and post-period around the main event. As argued by MacKinlay (1997), the period before and after the events can be of interest since it provides information about the expectations from investors and reaction to the announcement. Compared to earlier regressions, all independent variables are regressed simultaneously following the methodology by Abbassi et al. (2022), Boubaker et al. (2022) and Boutchkova et al. (2012). We control for fixed effects for country, industry and firm characteristics as well as two-way clustering for standard errors as in the cross-section regressions.

Extending the *event windows*, we must take into consideration macroeconomic exogenous effects happening in the same period. We control for one inflation event when they occur during the extended event window that we are investigating. However, for European Central Bank (ECB) announcements, there is less disparity between countries since it affects the whole Eurozone. As there is no time dimension in each regression, we consider the ECB announcements happening in the same period by examining the results. The ECB announcement happens on day [+3] for the second event, meaning that the event windows [-3, 3], [-5, 5], [1, 3] and [1, 5], will be affected. Therefore, it is important to identify if there is a large difference in these windows and the pre-event and [-1, +1], which is not affected by the ECB announcement.

5.3.2 Fixed Effect Regression

To provide robustness for our tests of sensitivity proxies, we investigate if the variables are sensitive to changes to the fixed effect method. The results from these regressions give us insight into how our results would differ if we had chosen another method for fixed effects. As in the previous regression, all variables are regressed simultaneously. Egger and Zhu (2020) argue that in an event window, fixed effects seize all influencing factors for countries and industries that are similar. We show the result of fixed effects by seeing how our results change when we first only control for industries, then for countries, then for countries and industries and lastly for industries per countries. The results from the regressions are included in Appendix F. The results in Appendix F illustrate that our control for fixed effect in earlier regressions are satisfactory, providing robustness for the fixed effect methodology used in this study.

5.3.3 Significance of Abnormal Returns Based on Country and Industry

Extending the methodology by Liu et al. (2017), we investigate if the abnormal returns are statistically significant, sorting for both country and industry. Prior event studies have conducted empirical analysis for firms in different countries and industries (Abbassi et al., 2022; Ahmed et al., 2022). We use this as a robustness check to check for exogenous shocks in the countries. We remove the fixed effect of country and industry and group firms in different industries and countries to show disparities in those dimensions. The results in Appendix G and

H shows no strong evidence of some countries or industries being more affected by the Nord Stream events. However, to be noted, some sub-groups have very few firms and thus it might be hard to draw significant results from it.

5.4 Permutation Test

To determine if the three events are exogenous shocks that impact political uncertainty, several permutation tests are conducted. The permutation tests are crucial in this study since the results will tell us if it is the noise that we are picking up in the regressions or if our event dates give extreme coefficients for the policy sensitivity proxies. Permutation tests for three different periods will bring insights into whether the results depend on which period we are investigating. The permutation tests sample random event days during an estimation period and plot the coefficients per sample. This should result in a close-to-normal distribution of values of the coefficient on the x-axis and the number of observations on the y-axis. The permutation test will show us whether the coefficients we use are significant by plotting each coefficient per event; navy line for the first event, green line for the second, and red line for the third. If the coefficients from our events are in the tails of the normal distribution, we can conclude that it is extraordinary and that it does not appear regularly. If the coefficient is close to the mean of the distribution, it is just random noise that we are picking up.

For the permutation test, we use the same regression as for the cross-section regression, thus fixed effects for country, industry, and firm characteristics as well as two-way clustering for standard errors. We do not control for other macroeconomic events in these tests since we use a large sample of observations. The first permutation test for each independent variable is in the estimation window (11th of February 2022 to 10th of August 2022), the *during-war period,* picking a random sample of 100 days. Since the estimation period is taking place at the same time as the Russia-Ukraine war, we construct a permutation test for a *pre-war period*. The *pre-war period* is the same calendar dates as the estimation window but for the year 2021 (11th February 2021 to 10th August 2021), also picking in 100 random sample dates. We use the same calendar dates for the *during-war* and *pre-war period* to control potential seasonality, a problem Liu et al. (2017) brings up. The third test is constructed by looking at a *three-year period* before the first event (20th August 2019 to 17th August 2022) and choosing 700 random sample dates. The last test will provide additional information about how the coefficient values have been for a longer time, including both the *pre-war* and the *during-war* period, and give us insight into if our results show more significance if it is benchmarked to another period. By conducting this analysis, we will be able to get a sense of whether the events are exogenous shocks and if the regression allows us to draw conclusions about the events.

6. Empirical Results

6.1 Summary Statistics

In Table 2, the summary statistics show each variable used in the tests and regressions below. The CARs for each event have a negative mean and are in the same size dimension as Liu et al. (2017), implying that the political uncertainty increased after each event. The statistics indicate that our chosen events are relevant to investigate and to make a replication of the Liu et al. (2017) article. The summary statistics of CARs are similar, however slightly less negative compared to the descriptive statistics in the article by Abbassi et al. (2022), examining when the Russia-Ukraine war emerged. For the first event, the mean of CAR1 and CAR2 are -1.110 percent and -1.193, respectively, suggesting that the events result in political uncertainty as argued by Liu et al. (2017). In addition, the variable *Energy Sensitivity* is inspired by "Policy announcements" by Liu et al. (2017) and has similar results with a mean of 0.500 and standard deviation of 0.288, and "Policy announcement" mean of 0.431 and standard deviation of 0.280.

Table 2. Summary statistics
The table shows summary statistics for the different variables. *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all variables. CAR1 is derived from the market model. CAR2 is derived from market-adjusted return model. Firm-specific control variables are firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol).

Variable	Mean	S.D.	P25	P50	P75
Energy Sensitivity	0.500	0.288	0.251	0.500	0.749
Bordering	0.303	0.460	0	0	1
Trade	0.000	1.000	-0.416	-0.344	0.0812
Russian Gas	0.000	1.000	-0.625	-0.468	0.836
All Variables	0.000	1.000	-0.717	-0.483	0.838
CAR1 event 1 (%)	-1.110	2.788	-2.780	-1.105	0.571
CAR1 event 2 (%)	-0.259	2.716	-1.539	-0.276	1.036
CAR1 event 3 (%)	-0.638	4.309	-2.754	-0.057	1.783
CAR2 event 1 (%)	-1.193	3.160	-3.151	-1.184	0.842
CAR2 event 2 (%)	-0.170	2.730	-1.546	-0.196	1.186
CAR2 event 3 (%)	-0.657	4.299	-2.794	0.000	1.804
LnSZ	9.660	1.329	8.571	9.494	10.501
B/M	0.659	0.661	0.218	0.436	0.942
Leverage	0.243	0.151	0.128	0.229	0.342
BHR (%)	0.880	3.555	-0.959	0.792	2.549
Ivol	2.006	1.217	1.504	1.810	2.279

6.2 Baseline Results

6.2.1 Univariate Tests for Policy Sensitivity Proxies

Table 3 presents the results from the test with different CARs when grouping firms based on three of the policy sensitivity proxies' values. We look for evidence of the "highest" extreme group being most negative and significant, as the univariate tests showed in Liu et al. (2017). For the first event, the "highest" groups for the proxies *Energy Sensitivity* and *All Three* are most negative and significant, with CAR1 of 1.213% (*t*-stat=0.261) at 1% significance and -1.979% (*t*-stat=0.793) at 5% significance, respectively. Both CAR1 and CAR2 give similar results, showing robustness for the results. The variables *Energy Sensitivity* and *All Three* in the first event are also similar in effect size and significance as Liu et al (2017). For the second event, the proxy *Russian Gas* show most negative returns for the extreme group "highest", at CAR1 -3.348% (*t*-stat=1.196) at 5% significance. The Russian gas proxy for the second event is in line with the univariate test in Liu et al (2017). For the third event, we do not see any proxy that is more negative for the "highest" group. This is in line with our Hypothesis 3, stating that the last event should have less impact on political uncertainty. Liu et al. (2017) find that all "highest" groups of policy sensitive firms had significantly negative CARs. Our results show inconsistency of negative returns around the three events and lack of evidence for firms with "higher" policy sensitivity proxies being more negative. This is inconsistent with Hypothesis 1 and 2 and the findings of Liu et al. (2017).

Table 3. Univariate tests for the three policy sensitivity proxies
The table shows a univariate test for three policy sensitivity proxies for the three events. CARs are based on the market model (CAR1) and market-adjusted return model (CAR2). Firms are group based on each policy sensitivity proxy. Panel A shows *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all variables. *All Three*, being the three variables summarised together. For each event, "highest" is the top quantile of the firms who ranks the highest corresponding policy sensitivity proxy and "lowest" is the lower quantile ranking of firms for each proxy. ***, **, and * indicates a statistical significance at 1%, 5% and 10% respectively.

	Event 1			Event 2			Event 3		
	1 (Highest)	2	3 (Lowest)	1 (Highest)	2	3 (Lowest)	1 (Highest)	2	3 (Lowest)
Panel A: Energy Sensitivity									
CAR1 (%)	- 1.213***	0.060	1.135***	-0.426	0.114	0.275	0.792*	0.696*	0.131
	(0.261)	(0.231)	(0.262)	(0.262)	(0.228)	(0.263)	(0.411)	(0.357)	(0.413)
CAR2 (%)	-1.554***	0.016	1.533***	-0.042	0.013	0.024	0.712*	-0.759*	0.294
	(0.295)	(0.262)	(0.295)	(0.265)	(0.230)	(0.265)	(0.411)	(0.357)	(0.412)
Panel B: Russian Gas									
CAR1 (%)	0.560	-0.432	-0.581	-3.348**	2.631**	3.210	-1.530	3.056*	-9.242**
	(1.217)	(1.188)	(2.855)	(1.196)	(1.170)	(2.820)	(1.889)	(1.839)	(4.415)
CAR2 (%)	0.518	-0.199	-2.162	-3.596**	2.755**	3.858	-1.662	3.313*	-10.005**
	(1.384)	(1.351)	(3.141)	(1.204)	(1.178)	(2.840)	(1.888)	(1.838)	(4.411)
Panel C: Trade									
CAR1 (%)	-1.105	-0.432	0.544	2.068*	2.631**	1.029	0.286	3.056*	1.101
	(1.179)	(1.188)	(1.153)	(1.164)	(1.170)	(1.140)	(1.832)	(1.839)	(1.790)
CAR2 (%)	-0.715	-0.119	0.218	2.069*	2.755**	1.252	0.543	3.313*	0.973
	(1.341)	(1.351)	(1.312)	(1.173)	(1.178)	(1.148)	(1.831)	(1.838)	(1.790)
Panel D: All Three									
CAR1 (%)	-1.979**	-0.259	2.637**	-0.901	1.271	0.365	0.814	-4.072**	1.430
	(0.793)	(1.151)	(0.886)	(0.787)	(1.137)	(0.882)	(1.237)	(1.778)	(1.384)
CAR2 (%)	-1.881**	-0.567	2.699***	-0.598	0.666	0.349	0.985	-4.490	1.467
	(0.903)	(1.308)	(1.008)	(0.794)	(1.146)	(0.889)	(1.236)	(1.776)	(1.384)

6.2.2 Cross-Section Regression

Table 4 shows the results from the cross-section regression which examines the causal connection between the policy sensitivity proxies and cumulative abnormal returns for the first event. CAR1 for the first event shows that the only variables that have a negative impact are *Energy Sensitivity* at -1.179 (t-stat = 0.459) and *All Variables* at -0.584 (t-stat = 0.334), at a 1% and 10% significance level respectively. CAR2 showed similar results, illustrating the robustness of the results.

Table 4. Cross-sectional regression results for the first event

The table shows a cross-sectional regression for the first event. Panel A shows CARs based on the market model (CAR1). Panel B shows CARs based on the market-adjusted return model (CAR2). *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all four variables. The four policy sensitivity proxies are regressed independently in separate regressions. Firm-specific control variables are firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol). N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: CAR from the market model (CAR1)					
	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-1.791***				
	(0.459)				
Bordering		-1.055			
		(1.216)			
Trade			-0.090		
			(0.244)		
Russian Gas				0.121	
				(0.313)	
All Variables					-0.584*
					(0.344)
LnSZ	-0.124	-0.111	-0.117	-0.116	-0.118
	(0.096)	(0.098)	(0.098)	(0.098)	(0.097)
B/M	-0.020	-0.046	-0.042	-0.039	-0.049
	(0.207)	(0.210)	(0.211)	(0.210)	(0.210)
Leverage	0.586	0.531	0.500	0.528	0.445
	(0.813)	(0.824)	(0.826)	(0.825)	(0.823)
BHR	0.009	0.016	0.016	0.016	0.015
	(0.035)	(0.036)	(0.036)	(0.036)	(0.036)
IVol	-0.306***	-0.503***	-0.501***	-0.503***	-0.463***
	(0.105)	(0.094)	(0.094)	(0.094)	(0.096)
Intercept	1.931	1.543	1.357	1.862	-0.093
	(2.860)	(2.896)	(2.940)	(3.014)	(3.046)
N	576	576	576	576	576
Adjusted R^2	0.087	0.063	0.062	0.062	0.066

Panel B: CAR from the market-adjusted returns (CAR2)					
	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-3.259***				
	(0.521)				
Bordering		-0.286			
		(1.412)			
Trade			-0.149		
			(0.283)		
Russian Gas				0.138	
				(0.363)	
All Variables					-1.031***
					(0.398)
LnSZ	-0.133	-0.120	-0.119	-0.119	-0.122
	(0.109)	(0.114)	(0.113)	(0.114)	(0.113)
B/M	0.048	0.017	0.010	0.016	-0.003
	(0.235)	(0.244)	(0.245)	(0.244)	(0.242)

(continued on next page)

Table 4. *(continued)*

Panel B: CAR from the market-adjusted returns (CAR2)					
	(1)	(2)	(3)	(4)	(5)
Leverage	0.956	0.834	0.802	0.843	0.704
	(0.925)	(0.957)	(0.958)	(0.957)	(0.952)
BHR	0.009	0.022	0.023	0.023	0.020
	(0.040)	(0.042)	(0.042)	(0.042)	(0.041)
IVol	0.030	-0.327***	-0.326***	-0.328***	-0.259**
	(0.119)	(0.109)	(0.109)	(0.109)	(0.111)
Intercept	1.762	1.052	0.746	1.418	-1.834
	(3.251)	(3.363)	(3.412)	(3.498)	(3.523)
N	576	576	576	576	576
Adjusted R^2	0.088	0.023	0.023	0.023	0.034

In Table 4, the results are also confirmed by the findings from Table 3. These findings are similar to Liu et al. (2017) in terms of effect size and significance. For the other policy sensitivity proxies, there is no evidence of these having negative explanatory value on CARs for the first event. Liu et al. (2017) find that all their policy sensitivity proxies were negative and significant for both CAR1 and CAR2. Thus, the results are inconsistent with Liu et al. (2017) since we only find a negative impact on CARs for *Energy Sensitivity* and *All Variables*. Hence, we do not find enough evidence for the results to be consistent with Hypothesis 2. In addition, we show disparity from Liu et al. (2017) since they find significant negative coefficients for all their firm-characteristic control variables.

To provide evidence for the implication on CARs for the four policy sensitivity proxies, we in Table 5 conduct the same regressions as in Table 4 but for the second event. In Panel A for CAR1, the coefficients that are negative and statistically significant are *Energy Sensitivity*, -0.810 (*t*-stat = 0.472) at 10% significance, and *Russian Gas*, -0.869 (*t*-stat = 0.307) at a 1% significance level. In Panel B for CAR2, the coefficient that is statistically significant and negative is the one for *Russian Gas*. From Panel A and B, we can conclude that the coefficient that has the most explanatory value for the second event is *Russian Gas*, which is in line with the results in Table 3. The results showing that *Russian Gas* affect CARs negatively is consistent with the arguments in previous articles (Ahmed et al., 2022; Di Bella et al., 2022), arguing that the suspension of natural gas supply should have an adverse negative outcome on firms in Europe. Since the results only show a robust negative implication from *Russian Gas*, the results show low support for Hypothesis 2 and weak evidence for the other policy sensitivity proxies negatively impacting CARs as argued by Liu et al. (2017).

In Table 6, we conduct the same regressions as in Table 4 for the third event to provide evidence for the implications on CARs for the four policy sensitivity proxies. In Panel A, *Trade* is negatively significant having a value of -0.650 (*t*-stat=0.385) at a 10% significance level. These results are supported by CAR2 in Panel B. However, since the significance level is high at 10%, we cannot draw any robust conclusions. This is also supported in Table 3 where we cannot see any negative pattern for *Trade* for the third event. The results are inconsistent with previous articles (Abbassi et al., 2022; Boubaker et al., 2022; Boutchkova et al., 2012) arguing that trade dependency strongly negatively affects abnormal returns during a period of war. The results show low support for Hypothesis 2 and weak evidence for the other policy sensitivity proxies negatively impacting CARs as argued in Liu et al. (2017).

For all three events, seen in Tables 4, 5, and 6, the adjusted R^2 are lower compared to the adjusted R^2 for the policy sensitivity proxies in Liu et al. (2017). This could show evidence for the low explanatory value of the policy sensitivity proxies. However, the complicated events are not expected to be fully explained by our variables.

Table 5. Cross-sectional regression results for the second event

The table shows a cross-sectional regression for the second event. Panel A shows CARs based on the market model (CAR1). Panel B shows CARs based on the market-adjusted return model (CAR2). *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all four variables. The four policy sensitivity proxies are regressed independently in separate regressions. Firm-specific control variables are firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol). N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: CAR from the market model (CAR1)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-0.810*				
	(0.472)				
Bordering		1.675			
		(1.235)			
Trade			0.303		
			(0.246)		
Russian Gas				-0.869***	
				(0.307)	
All Variables					-0.407
					(0.341)
LnSZ	0.138	0.128	0.134	0.124	0.142
	(0.099)	(0.099)	(0.099)	(0.099)	(0.099)
B/M	0.256	0.266	0.272	0.270	0.237
	(0.213)	(0.213)	(0.214)	(0.212)	(0.213)
Leverage	-1.104	-1.158	-1.083	-1.205	-1.181
	(0.837)	(0.837)	(0.839)	(0.833)	(0.838)
BHR	0.024	0.027	0.027	0.026	0.027
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
IVol	0.016	-0.071	-0.075	-0.065	-0.046
	(0.108)	(0.095)	(0.095)	(0.095)	(0.098)
Intercept	-0.831	-1.015	-0.905	-1.769	-1.589
	(1.533)	(1.526)	(1.536)	(1.530)	(1.566)
N	576	576	576	576	576
Adjusted R^2	-0.008	-0.010	-0.010	0.001	-0.011

Panel B: CAR from the market-adjusted returns (CAR2)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-0.007				
	(0.477)				
Bordering		1.502			
		(1.245)			
Trade			0.321		
			(0.248)		
Russian Gas				-0.938***	
				(0.309)	
All Variables					-0.219
					(0.344)
LnSZ	0.146	0.135	0.139	0.128	0.147
	(0.100)	(0.100)	(0.100)	(0.099)	(0.100)
B/M	0.135	0.150	0.160	0.158	0.129
	(0.215)	(0.215)	(0.216)	(0.213)	(0.215)

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Table 5. *(continued)*

Panel B: CAR from the market-adjusted returns (CAR2)					
	(1)	(2)	(3)	(4)	(5)
Leverage	-1.299	-1.318	-1.241	-1.372	-1.323
	(0.845)	(0.844)	(0.845)	(0.838)	(0.846)
BHR	0.015	0.015	0.015	0.014	0.015
	(0.037)	(0.037)	(0.037)	(0.037)	(0.037)
IVol	-0.039	-0.038	-0.043	-0.032	-0.025
	(0.109)	(0.096)	(0.096)	(0.095)	(0.099)
Intercept	-0.664	-0.543	-0.403	-1.331	-0.900
	(1.549)	(1.538)	(1.548)	(1.540)	(1.580)
N	576	576	576	576	576
Adjusted R^2	-0.018	-0.016	-0.016	-0.002	-0.018

Table 6. Cross-sectional regression results for the third event

The table shows a cross-sectional regression for the third event. Panel A shows CARs based on the market model (CAR1). Panel B shows CARs based on the market-adjusted return model (CAR2). *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all four variables. The four policy sensitivity proxies are regressed independently in separate regressions. Firm-specific control variables are firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol). N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: CAR from the market model (CAR1)					
	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	1.005				
	(0.741)				
Bordering		1.886			
		(1.939)			
Trade			-0.650*		
			(0.385)		
Russian Gas				-0.193	
				(0.486)	
All Variables					-0.433
					(0.535)
LnSZ	0.026	0.009	0.036	0.019	0.024
	(0.155)	(0.156)	(0.155)	(0.156)	(0.156)
B/M	-0.389	-0.363	-0.431	-0.377	-0.394
	(0.335)	(0.335)	(0.335)	(0.335)	(0.335)
Leverage	-0.245	-0.229	-0.322	-0.220	-0.252
	(1.314)	(1.315)	(1.315)	(1.317)	(1.317)
BHR	0.015	0.011	0.012	0.010	0.010
	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
IVol	0.062	0.174	0.177	0.173	0.200
	(0.170)	(0.149)	(0.149)	(0.150)	(0.154)
Intercept	-2.005	-1.450	-2.139	-1.742	-2.068
	(2.408)	(2.397)	(2.408)	(2.418)	(2.460)
N	576	576	576	576	576
Adjusted R^2	0.013	0.010	0.014	0.009	0.010

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Table 6. *(continued)*

Panel B: CAR from the market-adjusted returns (CAR2)					
	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	0.357	2.320			
	(0.740)				
Bordering		2.320			
		(1.933)			
Trade			-0.680*		
			(0.384)		
Russian Gas				-0.211	
				(0.484)	
All Variables					-0.636
					(0.533)
LnSZ	0.023	0.005	0.036	0.018	0.024
	(0.155)	(0.156)	(0.155)	(0.155)	(0.155)
B/M	-0.391	-0.366	-0.440	-0.383	-0.407
	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)
Leverage	-0.062	-0.078	-0.170	-0.064	-0.117
	(1.312)	(1.311)	(1.310)	(1.313)	(1.312)
BHR	0.011	0.010	0.011	0.010	0.009
	(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
IVol	0.256	0.298**	0.301**	0.297**	0.337**
	(0.170)	(0.149)	(0.149)	(0.149)	(0.153)
Intercept	-1.872	-1.539	-2.288	-1.879	-2.410
	(2.404)	(2.389)	(2.401)	(2.411)	(2.451)
N	576	576	576	576	576
Adjusted R^2	0.012	0.012	0.015	0.010	0.012

6.2.3 Panel Data with Aggregate Event Windows

Table 7 illustrates the panel data regression that aggregates the three events to examine the effects of the Nord Stream as one phenomenon. The only coefficient negative and significant for CAR1 is *All Variables*, with value -0.474 (t-stat=0.240) at a 10% significance level. This is supported by CAR2 in Panel B. For CAR2 in Panel B, *Energy Sensitivity* is negative and significant at a 1%, however, not supported using CAR1 in Panel A. The lack of significant negative results for the other variable is inconsistent with the findings in Liu et al. (2017), where all the policy sensitivity proxies as well as the sum of all proxies had a negative explanatory value on CARs. Furthermore, in the article by Egger and Zhu (2020), they find stock markets to react negatively to events hindering trade, when aggregating all the events into one panel dataset. Our results from the panel data regression are, thus, also inconsistent with Egger and Zhu (2020). Even when we increase the degrees of freedom, the policy sensitivity proxies seem to have a small impact on CARs. The lack of significant results provides low support for Hypothesis 2 and is inconsistent with Liu et al. (2017). When examining the three Nord Stream events as one phenomenon, we cannot identify negative effects on CARs from the policy sensitivity proxies.

Table 7. Panel data with aggregate event widow for the first, second and third event

In the table, we use a regression with panel data where all events days are aggregated into one event window. Panel A shows CARs based on the market model (CAR1). Panel B shows CARs based on the market-adjusted return model (CAR2). *Energy Sensitivity* is each firms' absolute stock price reaction to policy announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is sum of all four variables. The four policy sensitivity proxies are regressed independently in separate regressions. Firm-specific control variables are firm size (lnSZ), book-to-market equity (B/M), leverage, return over the past week (BHR) and daily idiosyncratic risk (IVol). N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: CAR from the market model (CAR1)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-0.532				
	(0.333)				
Bordering		0.839			
		(0.872)			
Trade			-0.147		
			(0.174)		
Russian Gas				-0.321	
				(0.218)	
All Variables					-0.474*
					(0.240)
LnSZ	0.013	0.009	0.018	0.009	0.016
	(0.070)	(0.070)	(0.070)	(0.070)	(0.070)
B/M	-0.051	-0.047	-0.067	-0.048	-0.069
	(0.150)	(0.151)	(0.151)	(0.151)	(0.151)
Leverage	-0.255	-0.287	-0.303	-0.301	-0.327
	(0.591)	(0.591)	(0.592)	(0.591)	(0.591)
BHR	0.016	0.018	0.018	0.018	0.017
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
IVol	-0.076	-0.133**	-0.133**	-0.131*	-0.103
	(0.076)	(0.067)	(0.067)	(0.067)	(0.069)
Intercept	-0.796	-0.938	-1.128	-1.235	-1.510
	(1.089)	(1.084)	(1.091)	(1.092)	(1.111)
N	1,728	1,728	1,728	1,728	1,728
Adjusted R^2	0.016	0.015	0.015	0.016	0.017

Panel B: CAR from the market-adjusted returns (CAR2)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-0.970***				
	(0.345)				
Bordering		1.182			
		(0.903)			
Trade			-0.171		
			(0.180)		
Russian Gas				-0.345	
				(0.226)	
All Variables					-0.615**
					(0.249)
LnSZ	0.012	0.007	0.019	0.009	0.017
	(0.072)	(0.073)	(0.073)	(0.073)	(0.072)
B/M	-0.069	-0.065	-0.090	-0.069	-0.095
	(0.156)	(0.156)	(0.157)	(0.156)	(0.156)

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Table 7. *(continued)*

Panel B: CAR from the market-adjusted returns (CAR2)					
	(1)	(2)	(3)	(4)	(5)
Leverage	-0.135	-0.189	-0.204	-0.201	-0.241
	(0.612)	(0.613)	(0.614)	(0.613)	(0.612)
BHR	0.012	0.016	0.016	0.015	0.015
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
IVol	0.082	-0.023	-0.022	-0.021	0.017
	(0.079)	(0.070)	(0.070)	(0.070)	(0.071)
Intercept	-0.745	-1.033	-1.027	-1.375	-1.758
	(1.127)	(1.123)	(1.130)	(1.131)	(1.150)
N	1,728	1,728	1,728	1,728	1,728
Adjusted R^2	0.017	0.013	0.012	0.013	0.015

6.3 Robustness Checks and Additional Tests

6.3.1 Cross-section Regression with Extended Event Window

Table 8. Cross-section regressions results with extended event window
The table shows results for the policy sensitivity proxies for an extended event window. The event window is extended to a maximum of [-5, 5]. Panel A show extended event windows for the first event, Panel B for the second event, and Panel C for the third event. *Energy Sensitivity* is each firms' absolute stock price reaction to announcements about energy price and supply. *Bordering* is measuring bordering to Nord Stream. *Trade* is dependency on trade with Russia. *Russian Gas* is dependency on Russian gas. *All Variables* is the four variables summarised together. The four policy sensitivity proxies are regressed together in one regression. CAR2, measured based on the market-adjusted return model is used as the dependent variables in the regressions. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: Cross-section regression with extended event window for event 1 (CAR2)						
Event Windows	Energy Sensitivity	Bordering	Trade	Russian Gas	N	Adjusted R^2
Around event						
0	-1.982***	1.299	-0.080	0.057	576	0.054
	(0.345)	(0.969)	(0.190)	(0.233)		
[-1, 1]	-3.269***	0.074	0.003	0.203	576	0.083
	(0.525)	(1.472)	(0.292)	(0.366)		
[-3, 3]	-3.930***	1.527	0.340	0.409	539	0.017
	(0.945)	(2.621)	(0.518)	(0.667)		
[-5, 5]	-5.455***	4.195	-0.305	1.255	539	0.019
	(1.326)	(3.680)	(0.728)	(0.936)		
Pre-event						
[-3, -1]	-1.709***	0.504	0.378	0.147	539	0.001
	(0.596)	(1.651)	(0.323)	(0.410)		
[-5, -1]	-1.875***	1.869	-0.317	0.297	539	-0.005
	(0.675)	(1.872)	(0.366)	(0.465)		
Post-event						
[1, 3]	-0.258	-0.642	-0.001	0.174	576	-0.001
	(0.503)	(1.410)	(0.280)	(0.350)		
[1, 5]	-0.527	0.398	-0.076	0.528	576	0.015
	(0.699)	(1.960)	(0.389)	(0.487)		

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Table 8. *(continued)*

Panel B: Cross-section regression with extended event window for event 2 (CAR2)						
Event Windows	Energy Sensitivity	Bordering	Trade	Russian Gas	N	Adjusted R^2
Around event						
0	-0.653**	0.360	-0.053	-0.020	562	0.001
	(0.309)	(0.862)	(0.169)	(0.216)		
[-1, 1]	0.036	0.261	0.198	-0.810**	562	-0.010
	(0.480)	(1.338)	(0.262)	(0.335)		
[-3, 3]	-0.863	0.180	0.886**	-1.286**	562	0.010
	(0.787)	(2.191)	(0.429)	(0.548)		
[-5, 5]	-0.619	-1.796	1.123**	0.566	561	-0.002
	(1.038)	(2.888)	(0.565)	(0.722)		
Pre-event						
[-3, -1]	-0.775*	0.647	0.328	-1.033***	576	0.028
	(0.443)	(1.243)	(0.244)	(0.299)		
[-5, -1]	-0.985	-1.495	0.660*	-1.064**	575	0.014
	(0.659)	(1.847)	(0.362)	(0.445)		
Post-event						
[1, 3]	0.468	-0.643	0.593*	-0.407	562	-0.0001
	(0.600)	(1.671)	(0.327)	(0.418)		
[1, 5]	2.093***	-0.277	0.663*	-0.371	562	0.012
	(0.726)	(2.023)	(0.396)	(0.506)		

Panel C: Cross-section regression with extended event window for event 3 (CAR2)						
Event Windows	Energy Sensitivity	Bordering	Trade	Russian Gas	N	Adjusted R^2
Around event						
0	0.459	-0.397	-0.009	-0.161	576	0.001
	(0.413)	(1.159)	(0.227)	(0.279)		
[-1, 1]	0.482	3.611*	-0.949*	-0.189	576	0.017
	(0.740)	(2.077)	(0.407)	(0.500)		
[-3, 3]	-3.470***	4.268	-1.258**	0.014	575	0.039
	(1.000)	(2.801)	(0.549)	(0.674)		
[-5, 5]	-2.164	5.275	-1.738**	-0.181	435	0.028
	(1.559)	(4.390)	(0.754)	(1.051)		
Pre-event						
[-3, -1]	-2.206***	-0.525	-0.177	-0.074	575	0.029
	(0.587)	(1.646)	(0.323)	(0.396)		
[-5, -1]	-0.949	-1.553	-0.364	-0.265	435	-0.021
	(0.900)	(2.533)	(0.435)	(0.607)		
Post-event						
[1, 3]	-1.704**	5.186**	-1.087***	0.248	576	0.026
	(0.718)	(2.015)	(0.395)	(0.485)		
[1, 5]	0.878	3.470	-0.492	-0.214	576	0.006
	(0.798)	(2.238)	(0.439)	(0.539)		

In the extended event window regression, seen in Table 8, we investigate the exogenous shocks by looking at different event windows. Consistent with the results from Table 4, the results from Panel A in Table 8, indicate that *Energy Sensitivity* is negative and has a significant impact on CAR for the first event. This coefficient has the most economic impact in the largest event window [-5, 5] where the value is -5.455 (t-stat = 1.326) at 1% significance level. The economic significance of CARs for the coefficient is larger in the pre-event window, which might indicate that there was anticipation in the market before the event.

The results from the second event are shown in Panel B and demonstrate that *Russian Gas* is negative and significant, consistent with the results from Table 5. The coefficients for *Russian Gas* in the period around the event and the pre-event period are negative and significant, at least at a 5% level. The results in the pre-event window could indicate anticipation of the second event. There was an ECB announcement on the day [+3], however, since we see no evidence of lower returns on the post-event windows, we conclude that the macroeconomic shock does not impact our results. The variable for *Trade* is significantly positive for the second event, contradicting Hypothesis 2. Additionally, the variable for *Energy Sensitivity* is negative and significant for the second event day [0] at a 5% significance level, however, due to the lack of robustness, we consider the results as weak.

Empirical findings from the third event, in Panel C, show mixed results for the policy sensitives proxies. *Trade* is negative and significant in the periods around the event and the post-event period but not the pre-event period. These results are consistent with the results from Table 6. The fact that *Trade* does not show similar results in all extended event windows is in line with previous articles. Abbassi et al. (2022) find significant and negative results for their corresponding variable, with some disparity between windows around the event. Boubaker et al. (2022) find that their corresponding variable, used to examine the Russia-Ukraine war event, had negative coefficients in the pre-event period but not for the post-event period. However, in contrast to the articles mentioned, we did not find support for all sensitivity policy proxies. In addition, *Energy Sensitivity* seems to have a negative impact on CARs in the around-event, pre-event, and post-event period, inconsistent with results in Table 6. The coefficient for *Bordering* is positive and significant in the period around the event, and the post-event period, inconsistent with Hypothesis 2. The disparity in results for the significance of coefficients depending on the event window indicates that our results are to some extent sensitive to our chosen event window [-1,1].

We find differences in the pre-event windows of the events which could show anticipation for the events, according to MacKinlay et al. (1997). However, there are not always more negative stock returns in the pre-event window and thus we cannot draw conclusions about the anticipation of our events. When extending the event window, we find some additional variables having a negative and significant impact on CARs, consistent with Hypothesis 2. Nevertheless, we only find a few coefficients significantly negative per event, inconsistent with the findings in prior studies (Abbassi et al., 2022; Boubaker et al., 2022) and indicating a lack of evidence for Hypothesis 2. Thus, changing the event window will not provide further evidence for the hypotheses and we are potentially only picking up noise in the regression.

6.3.2 Permutation Test

In prior regressions, we find that there is a disparity in results as our coefficients are not consistently significantly negative for the events. This is inconsistent with the findings of Liu et al. (2017) who find that all their independent variables had a negative effect on CARs in the event window. The disparity in significances of policy sensitivity proxies in prior regressions could demonstrate that our tests are only picking up noise. To be certain about whether our three events were exogenous shocks impacting political uncertainty, we conduct permutation tests for different periods. To be certain that our variables have a negative effect on CARs the coefficients from our events should be on the far left of the graphs.

Figure 3 illustrates the results from the permutation test using 100 random sampled days for the *during-war* period. The permutation tests show evidence of our coefficients only capturing noise with lack of significance. The results indicate that the *during-war* period have many days in which the variables take extreme values. The only coefficient that shows some significance is *Russian Gas* for the second event, where the green line is far out to the left. The variables *Energy Sensitivity* for the first event, *Russian Gas* for the second event and *Trade* for the third event seem to be less part of the noise, however, the values are very scattered in the figures. Therefore, for these variables, it is challenging to draw conclusions using normal distribution analysis, and thus, inconsistent with Hypothesis 2.

Figure 3. Permutation tests for the during-war period (100 samples)
In the figures, the y-axis is the number of times the coefficients take a value (frequency), and the x-axis is the value of the coefficient. The coefficients from our results per event are illustrated using different colours. The first event has a navy line, the second event has a green line, and the third event has a red line. The permutation tests for the during-war period are 11th of February 2022 until 10th of August 2022. The coefficients are derived based on CAR2, estimated with the market-adjusted return model.

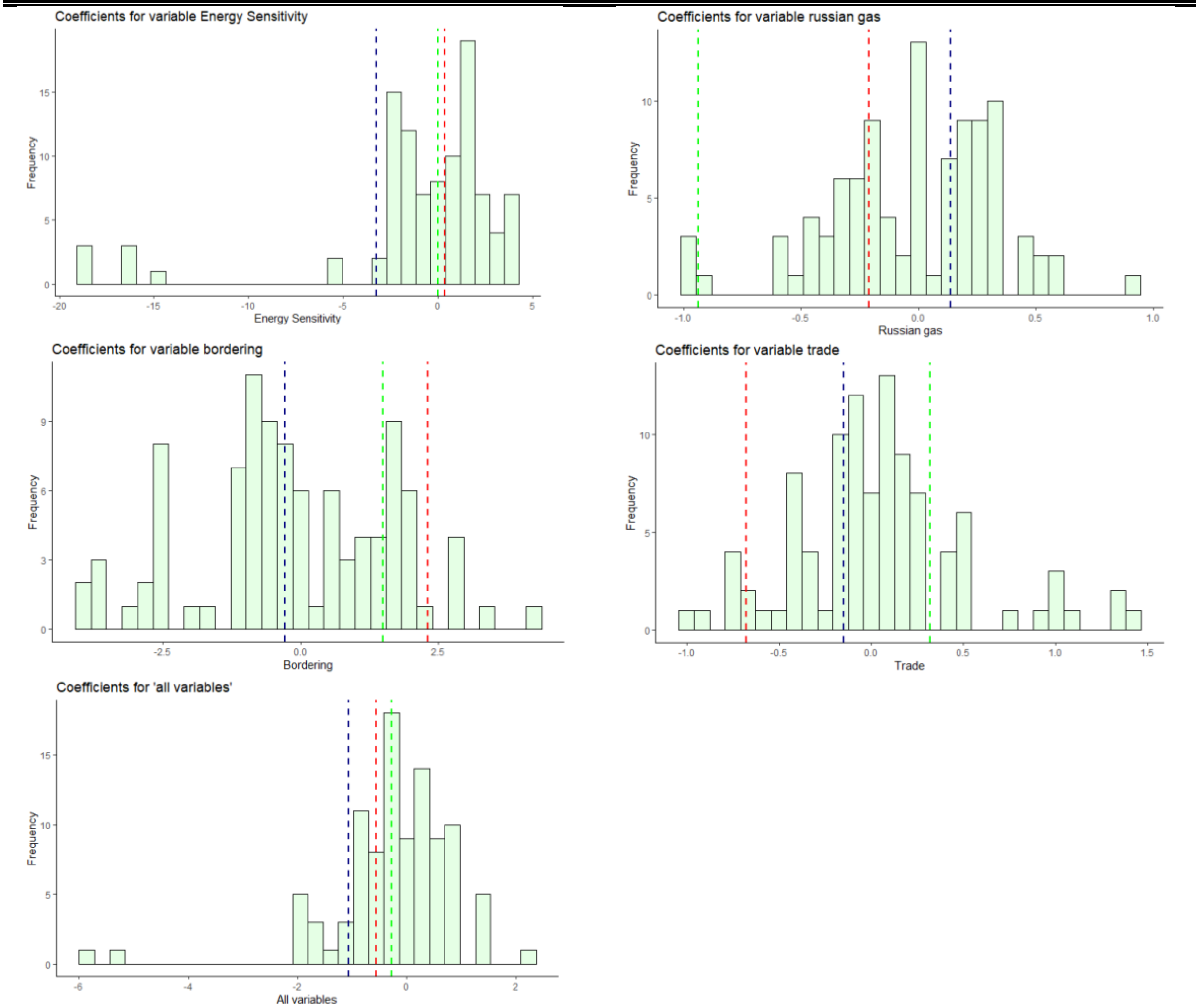


Figure 4, results for the permutation test using a random sample from the *pre-war* period, illustrates that there are more coefficients that end up in the tail of the distributions. Therefore, during this period, the coefficients show more significance. For the *pre-war period*, the coefficients for *Energy Sensitivity* and *All Variables* show significance for the first event, *Russian Gas* show significance for the second event, and *Trade* show significance for the third event. These results strengthen our findings from Figure 3. The coefficient for *Bordering* shows significance for the second and third event, however, this coefficient has a positive value, which is inconsistent with the hypotheses.

Figure 4. Permutation tests for the pre-war period (100 samples)

In the figures, the y-axis is the number of times the coefficients take a value (frequency), and the x-axis is the value of the coefficient. The coefficients from our results per events are illustrated using different colours. The first event has a navy line, the second event has a green line, and the third event has a red line. The permutation tests for the pre-war period are 11th of February 2021 until 10th of August 2021. The coefficients are derived based on CAR2, estimated with the market-adjusted return model.

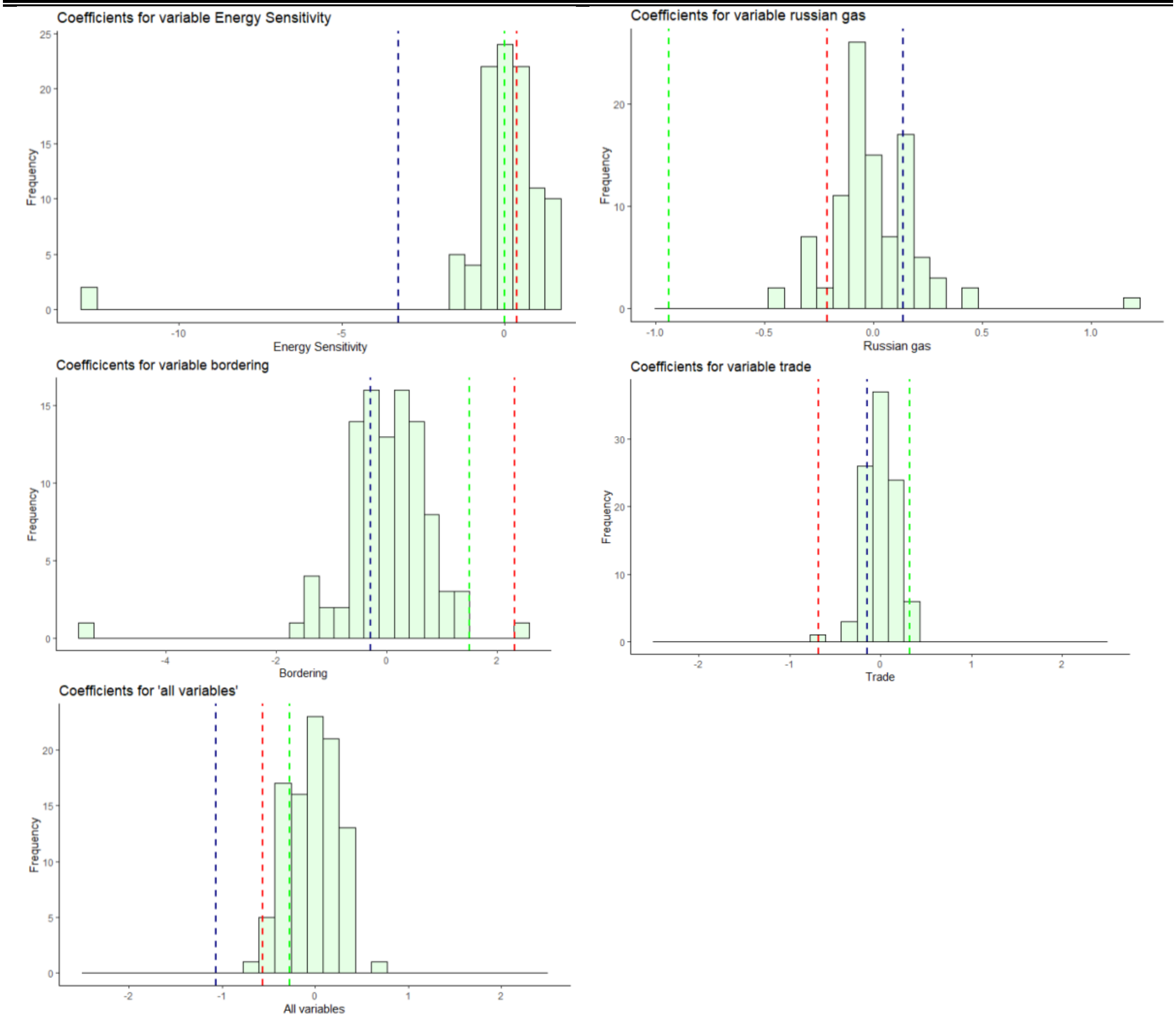
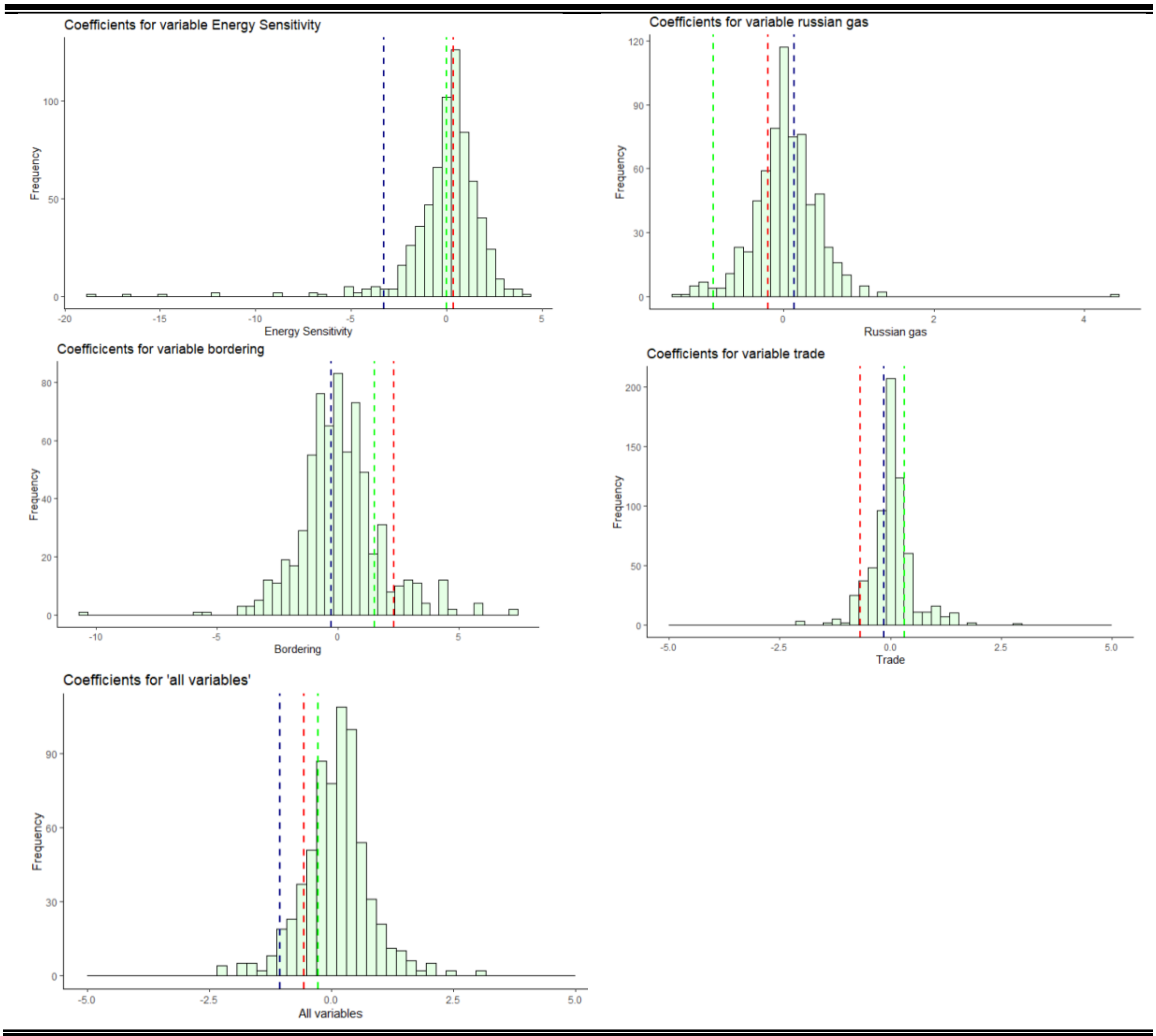


Figure 5 shows the results for the permutation test with a longer estimation period of *three-years* (700 samples), including both the *pre-war* and the *during-war* period. In this test we can see that most of the coefficients are part of the noise and, thus, not significant. Figure 5 shows similar results to the permutation test in the *pre-war* period. For the individual coefficients, *Russian Gas* for the second event show significance in this permutation test. The coefficient for *Energy Sensitivity* for the first event is somewhat in the tails, indicating significance. *All Variables* for the first event are in the tail of the normal distribution, which speaks for the significance of this coefficient and is consistent with Hypothesis 2. Additionally, the coefficient for *Trade* for the third event is to some extent in the tails of the distribution, however, it could still be part of the noise.

Figure 5. Permutation tests based on a three-year period (700 samples)

In the figures, the y-axis is the number of times the coefficients take a value (frequency), and the x-axis is the value of the coefficient. The coefficients from our results per events are illustrated using different colours. The first event has a navy line, the second has a green line, and the third has a red line. The permutation tests for the more extended period are 20th of August 2019 until the 17th of August 2022. The coefficients are derived based on CAR2, estimated with the market-adjusted return model.



The results from the permutation tests show that we see the most significance for the *three-year* period and the *pre-war* period. From those periods' permutation tests, we can clearly see that the variables *Energy Sensitivity* and *Russian Gas* are negatively significant for the first event and second event, respectively. However, from the *during-war* period, the results are less clear and there are multiple days in the period in which our variables have more extreme coefficients. This indicates that in the context of during the Russian-Ukraine war, our events are more part of the noise.

7. Discussion

From the empirical results, our findings show a large disparity between events and variables indicating that we cannot be certain of the existence of priced political risk. Prior studies find large market movements for political uncertainty events, arguing that the event they investigate entails substantial negative economic consequences (Abbassi et al., 2022; Ahmed et al., 2022; Boubaker et al., 2022; Brogaard et al., 2020; Egger and Zhu, 2020; Liu et al., 2017; Pástor and Veronesi, 2012; Pástor and Veronesi, 2013).

The evidence is weak for the proxies for policy sensitivity. For the first event, the results show that a higher level of *Energy Sensitivity* has an impact on CARs. This is emphasized in several of the tables and figures (Tables 3, 4, and 8 and Figures 4 and 5). The results for *Energy Sensitivity* are similar in significance and effect size to Liu et al. (2017) for their corresponding variable "Policy Announcements". The country-specific variable *Russian Gas* show significant and robust results in all regressions for the second event (Tables 3, 5, and 8 and Figures 4 and 5). Results from prior studies support these findings since they argue that a suspension of natural gas supply would have a negative impact on European firms (Ahmed et al., 2022; Di Bella et al., 2022). For the third event, the coefficients for the different regressions do not show consistency in the results, which provides proof that none of the proxies has explanatory value for CARs for that event. This is consistent with Hypothesis 3, stating that the market reaction to the third event should be smaller since the gas supply was already shut off and the economic implications would therefore be less severe. Our results are not in line with the findings in Liu et al. (2017) and prior studies (Abbassi et al., 2022; Berkman, Jacobsen and Lee, 2011; Boubaker et al., 2022; Boutchkova et al., 2012; Brogaard et al., 2020; Liu et al., 2017), who showed negative coefficients for all their policy variables. However, the setting for our events differs from earlier articles since we have previous, closely related events which might reduce the economic effects of our exogenous shocks and thus we might not expect the same results for our variables.

Different policy sensitivity proxies are significant for various event dates, indicating that our results are part of the noise. These findings are further emphasized in the permutation tests where we get similar results for other days, especially for the period during the Ukraine-Russia war. Because of the empirical results' weak support for the hypothesises and disparity in results, we conclude that either (i) priced political risk does not exist, (ii) our events were not exogenous shocks, or (iii) our events might be exogenous shocks but due to measurement errors we are not able to capture them.

7.1 Implications of Priced Political Risk

In Liu et al. (2017), all results indicate the existence of priced political risk for their exogenous shock. Therefore, there is a risk that the economic implications of our events did not have enough substantial effect to generate political uncertainty that affected the stock market. Following the insights from Boutchkova et al. (2012), political events with larger economic consequences have more effect on stock market reactions. The fact that political uncertainty has implications for the economy is further emphasized by Smales (2017), who investigate the connection between political and economic uncertainty by examining an event that had negative implications for trade. This is also argued by Egger and Zhu (2020), who show that the event they investigate resulted in negative stock market reactions due to protectionist policy actions on international trade. Since earlier studies find priced political risk, the results in this study could indicate that the economic implications of the Nord Stream event were not enough to generate a political uncertainty risk premium.

If a priced political risk is not present in this study, we would be inconsistent with findings in prior studies (Broogard, 2020; Liu et al. 2017; Pástor and Veronesi, 2012; Pástor and Veronesi, 2013). However, since we are uncertain about the empirical results, we are not able to draw any conclusions about findings in prior studies. From the results, it is not possible to justify if there is a risk premium associated with political uncertainty, as argued in Liu et al. (2017). We think there are two possible explanations of why we cannot draw any conclusions, (i) either our events did not generate exogenous shocks, or (ii) they were exogenous shocks, but due to measurement errors we cannot capture them.

7.2 Are the Events Exogenous Shocks?

We initially argued that our events create exogenous shocks to political stability since they are unanticipated shocks that impact markets. Further support for our chosen events being exogenous shocks originates from the study by Berkman et al. (2011), who argued that exogenous shocks often stem from global political events. However, after investigating the empirical results, we are sceptical about whether our events generate exogenous shocks. The permutation tests show that if we move the event days randomly, we get similar results for most of the variables. This is especially true for the permutation test from the *during-war* period, where our variables show less significance of having effects on cumulative abnormal returns. The results could be explained by the fact that the war is ongoing, resulting in a continuous stream of war-related news announcements. Thus, our results might be part of the noise during the war period since news that potentially impact trade and policy uncertainty reoccurs often. However, even in the *pre-war* period, when we do not experience war-related news, we experience the same problem. Thus, the lack of results in all three permutation tests indicated that our variables are part of the noise, which suggests that our events might not be exogenous shocks.

MacKinlay et al. (1997) argue that there is a problem with some events that make it challenging to measure the impact on the actual event days. They bring up the example of how political regulations are often debated in the media ahead of time and thus gradually integrated into the firm’s market value when the probability of the occurrence of the event changes. One could argue that this might also be the case for the Nord Streams events. Since the war commenced, there have been a lot of political uncertainty and tensions between Russia and Europe reported in the media, as well as speculations about the future natural gas supply to Europe (Di Bella et al., 2022). During the Russia-Ukraine conflict, the risk of Nord Stream's supply reduction has gradually increased. Despite initially arguing for the political and economic implications of the events, our results indicate that investors may have speculated about the implications of the events before they happened. Prior studies investigated the stock market reaction when the Russia-Ukraine war started (Abbassi et al., 2022; Ahmed et al., 2022; Boubaker et al., 2022; Yousaf, 2022). They find a large negative shock to the stock market which could indicate that the financial implications of the war, including Nord Stream, were priced in. Therefore, there is a risk that the political uncertainty of Nord Stream events was already priced at the beginning of the war. Berkman et al. (2011) argue that it is not the actual event that creates an international political crisis but instead it stems from the perceived shift in the risk of threat. In conjunction with insights from Berkman et al. (2011), it can be argued that the economic and political effects from the Nord Stream events occurred before the actual events. Thus, there is a possibility that investors had already reacted to these speculations about the political and economic effects of shutting down the gas supply before the events happened, which means our events did not create exogenous shocks.

Prior studies, such as Liu et al (2017) have been able to capture exogenous shocks during political uncertainty. However, we can argue that our event setting is different from theirs as we investigate a period during war that has many related events happening. Earlier related events might have reduced the economic and political implications of our events and thus mitigated the exogenous shock for our events. Even in earlier studies looking at the Russia-Ukraine war, we differ in the setting since they investigate the period when the war emerged. We examine a turbulent period that have been present for a long time, in comparison with some of the other event studies looking at the beginning of a turbulent period. Thus, they have less anticipation and, to our knowledge, no prior events that would reduce the effect of their events as we have. Therefore, our setting differs from prior studies that we compare with which might be a reason for the lack of exogenous shocks.

7.3 The Problem of Measurement Errors

Since the events were unanticipated, we argue that it might still be that the events are exogenous shocks but due to measurement errors we cannot capture the timing of the shocks. We have thoughtful tried to reduce measurement errors by altering data for a cleaner test and evaluated multiple methodologies to capture the exogenous effects of our events. We have utilised the methodology from previous articles which have inspired us to include country, industry, and firm fixed effects, two-way clustering of standard errors, and controlling for other macroeconomic events. However, despite our extensive methodology, we cannot capture any evidence of exogenous shocks. These results could be a consequence of measurement errors still existing in our tests. In the turbulent setting of 2022 that we are investigating, there are numerous events on monetary policy, inflation, war, and political uncertainty impacting movements in the financial markets. These events can create exogenous shocks that are interfering with the Nord Stream shocks we intend to capture. Thus, it is very hard to draw causal conclusions from this period. Econometrically, the techniques available to derive the results are not sufficient for this period when the data is not ideal. This suggests that we cannot measure the effect due to there being so many other events going on.

Discussions on exogenous shocks and measurement errors bring us to other insights. Earlier studies argue that the events should ideally be exogenous shocks to investigate political uncertainty and political crisis risk (Berkman et al., 2011; Liu et al., 2017). However, with insights from our results, we are questioning if the ideal setting to test the causality between political uncertainty on asset pricing from an exogenous shock even exists. There are very few shocks to the stock market that are completely unexpected and unrelated. To test the exogenous shocks from Nord Stream events on the European stock market, we would have to create an ideal setting. In this hypothetical setting, there would be no other events during the period and no anticipation of political and economic shocks, so we could completely isolate the surprising effect of the shocks. However, since this ideal setting is not present in our case, we cannot draw conclusions about the relationship between asset pricing and political uncertainty. Nevertheless, prior studies' results indicate that they have had more success in capturing the effect. This could be due to the difference in settings since they investigate a less turbulent period. Nevertheless, in event studies, as you look at the stock market, you can never be certain that you are only isolating the effect you intend to capture. Measurement errors are always present and limit the empirical research for event studies for similar settings. For future event studies intended to test exogenous shocks and political uncertainty, the insight from this study could indicate that the traditional econometric methods may not capture the market reaction during periods of turbulence.

8. Conclusion

In our study, we investigate if the Nord Stream events are exogenous shocks to test whether priced political risk exists in the market. We do this by replicating an article that find evidence of priced political risk, Liu et al. (2017), and applying their methodology to three Nord Stream events we believed would yield higher political risk. We look at how daily returns for the firms in STOXX Europe 600 are influenced by the four policy sensitivity proxies: (i) firm price sensitivity to energy announcements, (ii) country dependency on Russian gas, (iii) country dependency on trade with Russia, and (iv) country bordering to Nord Stream. We find evidence that firms sensitive to energy announcements had a more reduction in stock price when Gazprom announced unexpected maintenance work on the 19th of August 2022. In addition, we find evidence of firms in countries more dependent on Russian gas to have a drop in share prices for when Gazprom announced an infinitive stop of gas supply on the 5th of September 2022. We find no evidence that firms in countries bordering to the Nord Stream pipeline or dependent on trade with Russia experience more negative returns for any of the events. To be noted, our variables are significant on different dates and for the other proxies and events, we do not find any true relationship. This adds to the idea that we capture noise.

Since we cannot see strong results or significant negative results for our events, we conclude that either (i) priced political risk does not exist, (ii) our events were not exogenous shocks, or (iii) due to measurement errors we are not able to capture the exogenous shocks. First, looking at our empirical evidence, it is not possible to draw conclusions about whether there is a risk premium associated with political uncertainty, as argued by Liu et al. (2017). Our results could indicate that the economic consequences and implications of the Nord Stream event were not enough to generate a political uncertainty risk premium. Second, there is a possibility that our events were not exogenous shocks due to our setting. The reason is that investors already reacted to speculations about the political and economic implications of shutting down Nord Stream before it happened, which could have a dampening effect on the stock returns at our event days. Lastly, the events might be exogenous shocks, but we are not able to capture their effects. There is a lack of econometric techniques that allows us to capture results from our events during a period when there are a lot of things happening. These insights add to the literature that in some periods it is very hard to draw conclusions when there is an unstable economic and political environment, as Europe in the year 2022. We cannot be certain what explanation drives our results and thus we cannot add insight to other studies in terms of priced political risk. However, for future event studies, we highlight the notion of considering earlier related events as well as difficulties to capture the exogenous shocks during periods of economic and political turbulence.

Future event studies could compare the stock market reaction to political announcements that are closely related to earlier political events with stand-alone events. By looking at other articles and our results, we can see evidence of the first announcements of the Russia-Ukraine war gave more market reaction than the during-war events of the Nord Stream pipelines. This could be investigated further by comparing announcements at the beginning of a politically turbulent period compared with following news during the period.

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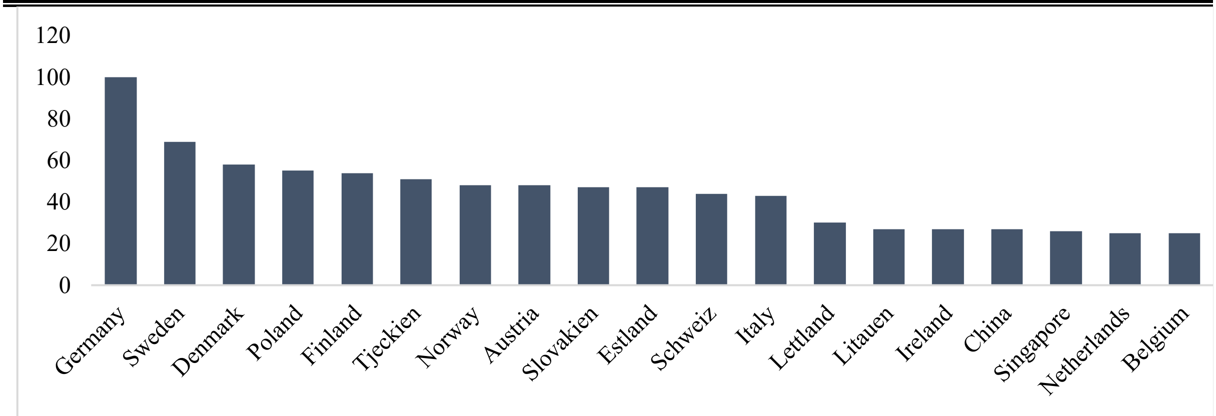
Appendix

Appendix A. Figure of countries searching on Google for “Nord Stream”

Appendix A. The figure shows which countries have searched for “Nord Stream”
This graph shows where the search term “Nord Stream” was most popular during Q3 2022. The numbers are an index between 1 to 100 where 100 is the country where the search term was most popular compared to the total amount of searches in that country. For the period the 15th of August 2022 to the 21st of October 2022.



Appendix B. Nord Stream announcements in the estimation window

Appendix B. Nord Stream Events in the Estimation Window
This table shows announcements and events relating to the Nord Stream pipelines since January to October 2022.

Announcement date	Announcements
February 22, 2022	“Germany freezes Nord Stream 2 gas project as Ukraine crisis deepens” (Reuters, 2022)
July 11, 2022	“Nord Stream 1 gas flows stop as maintenance begins” (Reuters, 2022)
July 20, 2022	“Gas flows through Nord Stream to resume after 10-day maintenance” (Euronews, 2022)
July 21, 2022	“Nord Stream 1 restarts with fears of reduced capacity” (Euronews, 2022)
July 26, 2022	“Russia to make drastic cuts to EU gas supply via Nord Stream pipeline” (Euronews, 2022)
August 19, 2022	“Gazprom declares three-day Nord Stream 1 closure at end of August” (Financial Times, 2022)
August 31, 2022	Gazprom starts it three-days maintenance (Financial Times, 2022)
September 2, 2022	“Nord Stream 1: Gazprom announces indefinite shutdown of pipeline” (The Guardian, 2022)
September 26, 2022	Three explosions on Nord Stream 1 and 2 (Dagens Industri, 2022)
September 27, 2022	A lot of media attention around explosions (Dagens Industri, 2022)

Appendix C. Macroeconomic news announcements since 1st January 2022

Appendix C. Macroeconomic announcements in the estimation window
This table shows inflation announcements and monetary policy announcements between January to October 2022. The inflation data is extracted from Eurostat release calendar. The monetary policy decision data from ECB is extracted from the European Central Bank website for a period of February to September 2022.

Announcement Date	Macroeconomic Event	Source
January 20, 2022	Inflation (HICP)	Eurostat (2022)
February 3, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
February 23, 2022	Inflation (HICP)	Eurostat (2022)
March 10, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
March 17, 2022	Inflation (HICP)	Eurostat (2022)
April 14, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
April 21, 2022	Inflation (HICP)	Eurostat
May 18, 2022	Inflation (HICP)	Eurostat (2022)
June 9, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
June 17, 2022	Inflation (HICP)	Eurostat (2022)
July 19, 2022	Inflation (HICP)	Eurostat (2022)
July 21, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
August 18, 2022	Inflation (HICP)	Eurostat (2022)
September 8, 2022	Monetary policy decisions (ECB)	European Central Bank (2022)
September 16, 2022	Inflation (HICP)	Eurostat (2022)
October 19, 2022	Inflation (HICP)	Eurostat (2022)

Appendix D. Vladmir Putin Announcements about Wars and Politics

Appendix D. Putin announcements in the estimation window
The announcements about Vladmir Putin are obtained from *The Guardian* after searching for "Vladmir Putin". We have focused on events when Putin announced new information about the war.

Announcement Date	Description
February 21, 2022	"Putin orders troops into eastern Ukraine on 'peacekeeping duties'"
February 24, 2022	"Russia has invaded Ukraine: what we know so far"
February 25, 2022	"Putin references neo-Nazis and drug addicts bizarre in speech"
March 11, 2022	"Putin plays down western sanctions on Russia after US bans oil imports"
March 22, 2022	"Putin weighting use of chemical weapons in Ukraine, says Biden"
March 31, 2022	"Putin demands Russian gas to be paid for in roubles"
April 12, 2022	"Putin insists Russia will achieve its 'noble' goals in Ukraine"
April 27, 2022	"Putin warns of 'lightning fast' retaliation against inference in Ukraine"
May 9, 2022	"Putin ties Ukraine invasion to second world war in Victory Day speech"
May 14, 2022	"Putin warns Finland that joining Nato would harm Russia relations"
June 5, 2022	"Russia will strike harder if Ukriane is supplied with longer-range missiles, says Putin"
June 17, 2022	"Putin calls Ukraine war sanctions 'insane' in combative speech"
July 8, 2022	"Putin warns Russia is just getting started in Ukraine"
September 7, 2022	"Putin threatens to 'freeze' west by cutting gas and oil supplies if price caps imposed"
September 15, 2022	"Putin thanks Xi for Chinas 'balanced' stance on Ukraine invasion"
September 21,	"Putin announces partial mobilisation and threatens nuclear retaliation in escalation or Ukraine war"
October 7, 2022	"Biden warns world would face 'Armageddon' if Putin uses a tactical nuclear weapon in Ukraine"
October 9, 2022	"Putin calls Crimea bridge attack an "act of terrorism""
October 12, 2022	"Vladmir Putin blames the west for energy market disruptions"

Appendix E. European announcements about energy supply and prices

Appendix E. Announcements from the European Council about energy supply and prices
Announcements are obtained from the European Council's website. The information is related to energy supply and prices in the European union. The announcements are used for deriving values for the "Sensitivity" variable used as a policy sensitivity proxy.

Announcement Date	Description	Included
February 24, 2022	"EU leaders call for emergency measures on energy"	No
February 28, 2022	"Energy ministers discuss energy market situation following Ukraine crisis"	Yes
March 10-11, 2022	"EU leaders consider measures to mitigate energy price impacts and secure energy supply"	No
March 24-25, 2022	"EU leaders consider measures to mitigate energy price impacts and secure energy supply"	Yes
May 2, 2022	"Energy ministers hold extraordinary meeting to discuss gas supply following Gazprom's delivery suspension"	Yes
May 11, 2022	"Member states agree on negotiating"	Yes
May 19, 2022	"Gas storage: Council and Parliament reach a provisional agreement"	Yes
May 30-31, 2022	"EU leaders agree on oil ban and priorities to strengthen the EU's energy independence"	Yes
June 3, 2022	"EU adopts sixth package of sanctions against Russia"	Yes
June 23-24, 2022	"European Council urges efforts to secure energy supply at affordable prices"	Yes
June 27, 2022	"Energy ministers welcome REPowerEU plan". "Council adopts regulation on gas storage"	Yes
June 26-28, 2022	"G7 leaders commit to immediate action to secure energy supply and reduce prices"	No
July 26, 2022	"Member states commit to reducing gas demand by 15% next winter"	Yes
August 5, 2022	"Council adopts regulation on reducing gas demand by 15%"	Yes
September 9, 2022	"Ministers discuss options to mitigate energy prices and review progress on winter preparedness"	Yes
September 30, 2022	"Council agrees on emergency measures to reduce energy prices"	Yes
October 6, 2022	"Council formally adopts emergency measures to reduce energy prices"	Yes
October 7, 2022	"EU leaders discuss measures to reduce energy demand, ensure security of supply and guarantee affordable prices"	No

Appendix F. Fixed Effect Regressions

Appendix F. Fixed effect regressions for the policy sensitivity proxies

The table shows results for the policy sensitivity proxies for an extended event window based on CARs. Panel A and D show the regression for the first event, Panel B and E for the second event, and Panel C and F for the third event. *Energy Sensitivity* is a ranking of firms based on each firm's absolute cumulative abnormal returns from reactions about policy announcements about European energy prices and supply. *Bordering* is countries whose economic or geographical zones crosses the Nord Stream. *Trade* is each country's imports and exports from Russia, as a percentage of its total GDP. *Russian Gas* is each country's natural gas imported as a percentage of its final energy consumption. The four policy sensitivity proxies are regressed together in one regression. Each column have different fixed effects with; (1) No fixed effects, (2) Industry, (3) Country, (4) Country and Industry, and (5) Country*Industry. N is the observations. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

Panel A: Fixed effect regression for event 1 (CAR2)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-1.866***	-1.802***	-1.838***	-1.796***	-1.893***
	(0.453)	(0.457)	(0.459)	(0.461)	(0.492)
Bordering	0.037	0.050	-0.718	-0.949	-1.762
	(0.265)	(0.267)	(1.291)	(1.294)	(1.521)
Trade	-0.005	0.014	0.021	0.057	-0.205
	(0.128)	(0.128)	(0.256)	(0.257)	(0.361)
Russian Gas	0.129	0.087	0.191	0.109	0.057
	(0.140)	(0.142)	(0.320)	(0.322)	(0.581)
N	576	576	576	576	576
Adjusted	0.071	0.077	0.075	0.083	0.103

Panel B: Fixed effect regression for event 2 (CAR2)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	-0.968**	-0.891*	-0.878*	-0.804*	-0.768
	(0.458)	(0.464)	(0.465)	(0.471)	(0.508)
Bordering	0.323	0.313	0.577	0.649	1.088
	(0.262)	(0.266)	(1.308)	(1.321)	(1.567)
Trade	0.124	0.135	0.177	0.198	0.241
	(0.129)	(0.130)	(0.256)	(0.259)	(0.276)
Russian Gas	-0.262*	-0.299**	-0.746**	-0.772**	-0.597
	(0.134)	(0.137)	(0.314)	(0.318)	(0.423)
N	576	576	576	576	576
Adjusted	0.025	0.037	0.047	0.058	0.229

Panel C: Fixed effect regression for event 3 (CAR2)

	(1)	(2)	(3)	(4)	(5)
Energy Sensitivity	1.077	0.923	1.260*	1.130	1.172
	(0.731)	(0.739)	(0.735)	(0.742)	(0.783)
Bordering	0.069	0.120	3.168	3.069	1.545
	(0.418)	(0.423)	(2.068)	(2.081)	(2.414)
Trade	-0.190	-0.199	-0.938**	-0.914**	-0.914**
	(0.206)	(0.207)	(0.405)	(0.408)	(0.424)
Russian Gas	0.038	0.073	-0.251	-0.211	-0.600
	(0.214)	(0.218)	(0.497)	(0.501)	(0.651)
N	576	576	576	576	576
Adjusted	0.012	0.031	0.053	0.072	0.273

Panel D: Fixed effect regression for event 1 (CAR2)

	(6)	(7)	(8)	(9)	(10)
Energy Sensitivity	-3.283***	-3.214***	-3.320***	-3.269***	-3.346***
	(0.514)	(0.519)	(0.521)	(0.525)	(0.568)
Bordering	0.134	0.151	0.300	0.074	-0.751
	(0.301)	(0.304)	(1.466)	(1.472)	(1.754)
Trade	0.002	0.024	-0.035	0.003	-0.270
	(0.145)	(0.146)	(0.291)	(0.292)	(0.416)
Russian Gas	0.123	0.075	0.285	0.203	0.051
	(0.159)	(0.161)	(0.363)	(0.366)	(0.670)
N	576	576	576	576	576
Adjusted R^2	0.075	0.079	0.078	0.083	0.078

Panel E: Fixed effect regression for event 2 (CAR2)

	(6)	(7)	(8)	(9)	(10)
Energy Sensitivity	-0.138	-0.073	-0.048	0.008	0.013
	(0.463)	(0.470)	(0.469)	(0.476)	(0.510)
Bordering	0.156	0.150	0.276	0.345	0.919
	(0.264)	(0.269)	(1.319)	(1.334)	(1.572)
Trade	0.111	0.124	0.162	0.189	0.239
	(0.130)	(0.132)	(0.259)	(0.261)	(0.276)
Russian Gas	-0.266*	-0.304**	-0.857***	-0.880***	-0.725*
	(0.136)	(0.139)	(0.317)	(0.321)	(0.424)
N	576	576	576	576	576
Adjusted R^2	-0.001	-0.008	0.002	-0.006	0.007

Panel F: Fixed effect regression for event 3 (CAR2)

	(6)	(7)	(8)	(9)	(10)
Energy Sensitivity	0.476	0.317	0.616	0.482	0.525
	(0.729)	(0.736)	(0.734)	(0.740)	(0.780)
Bordering	0.067	0.121	3.710*	3.611*	2.131
	(0.417)	(0.422)	(2.064)	(2.077)	(2.405)
Trade	-0.192	-0.199	-0.976**	-0.949**	-0.951**
	(0.205)	(0.206)	(0.405)	(0.407)	(0.423)
Russian Gas	0.026	0.057	-0.229	-0.189	-0.648
	(0.214)	(0.217)	(0.496)	(0.500)	(0.648)
N	576	576	576	576	576
Adjusted R^2	-0.001	0.001	0.015	0.017	0.063

Appendix G. Significance Test for Countries

Appendix G. Significance test results for countries

The table shows results from the significance tests of CARs for different European countries in the STOXX Europe 600 derived using both the market model (CAR1) and market-adjusted returns (CAR2). The event window is between [-1, 1]. N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

	N	Event 1		Event 2		Event 3	
		CAR (1) (%)	CAR (2) (%)	CAR (1) (%)	CAR (2) (%)	CAR (1) (%)	CAR (2) (%)
Belgium	16	-0.246	-0.500	0.650	0.489	0.118	-0.102
		(0.955)	(1.085)	(0.935)	(0.940)	(1.472)	(1.471)
Denmark	27	0.491	0.224	-0.042	-0.270	0.451	0.203
		(0.857)	(0.974)	(0.828)	(0.833)	(1.304)	(1.303)
Finland	17	1.763*	1.632	0.276	-0.252	-1.374	-1.650
		(0.940)	(1.069)	(0.921)	(0.926)	(1.449)	(1.448)
France	73	0.887	0.583	0.149	-0.184	-0.226	-0.540
		(0.741)	(0.842)	(0.716)	(0.720)	(1.128)	(1.127)
Germany	69	0.830	0.703	0.641	0.213	-0.887	-1.113
		(0.742)	(0.842)	(0.720)	(0.724)	(1.134)	(1.133)
Italy	27	1.756**	1.251	0.333	-0.067	0.908	0.441
		(0.846)	(0.961)	(0.828)	(0.833)	(1.304)	(1.303)
Netherlands	34	0.630	0.305	-0.305	-0.621	0.209	-0.110
		(0.922)	(1.047)	(0.793)	(0.798)	(1.249)	(1.248)
Norway	16	-0.583	-0.725	0.163	0.131	0.201	0.100
		(0.961)	(1.092)	(0.935)	(0.940)	(1.472)	(1.471)
Other	53	0.018	-0.628	-0.555	-0.663	-1.790	-2.248
		(0.915)	(1.039)	(0.895)	(0.900)	(1.409)	(1.408)
Spain	26	1.120	1.222	-0.389	-0.695	-2.449*	-2.486*
		(0.871)	(0.989)	(0.835)	(0.839)	(1.314)	(1.313)
Sweden	62	0.376	0.095	0.485	-0.046	0.713	0.341
		(0.764)	(0.868)	(0.729)	(0.733)	(1.147)	(1.146)
Switzerland	54	0.418	-0.022	0.888	0.711	-0.153	-0.498
		(0.757)	(0.860)	(0.741)	(0.745)	(1.166)	(1.165)
United Kingdom	142	-1.116	-1.274	0.152	-0.160	0.168	-0.075
		(2.653)	(3.014)	(0.681)	(0.685)	(1.072)	(1.071)

Appendix H. Significance Test for Industries

Table 10. Significance test results for industries
The table shows results from the significance tests of CARs for different industries in the STOXX Europe 600 derived using both the market model (CAR1) and market adjusted returns (CAR2). The event window is a between [-1, 1]. N are total observations in the sample. ***, **, and * indicates a statistical significance at 1%, 5% and 10%, respectively.

	N	Event 1		Event 2		Event 3	
		CAR (1) (%)	CAR (2) (%)	CAR (1) (%)	CAR (2) (%)	CAR (1) (%)	CAR (2) (%)
Basic Materials	42	1.067	1.242	-0.534	-0.457	1.610	1.738
		(0.781)	(0.887)	(0.767)	(0.772)	(1.214)	(1.211)
Consumer Goods	70	0.266	0.355	-0.653	-0.504	1.308	1.410
		(0.734)	(0.833)	(0.719)	(0.724)	(1.138)	(1.136)
Consumer Services	55	-0.350	-0.221	-1.137	-1.002	0.881	1.002
		(0.756)	(0.858)	(0.739)	(0.744)	(1.170)	(1.167)
Financials	131	0.265	0.298	-0.709	-0.621	1.412	1.458
		(0.699)	(0.793)	(0.684)	(0.689)	(1.083)	(1.081)
Healthcare	54	0.043	0.067	-0.818	-0.575	0.845	0.937
		(0.755)	(0.857)	(0.741)	(0.746)	(1.172)	(1.170)
Industrials	126	-0.085	0.029	-1.142*	-0.987	0.811	0.930
		(0.699)	(0.794)	(0.686)	(0.691)	(1.085)	(1.083)
Oil and Gas	18	0.357	0.451	-1.213	-0.830	2.298	2.488*
		(0.925)	(1.049)	(0.907)	(0.914)	(1.436)	(1.433)
Other	41	-0.621	-0.871	-1.400	-1.004	2.460*	2.471*
		(0.875)	(0.993)	(0.857)	(0.863)	(1.356)	(1.353)
Technology	33	0.732	0.932	-0.442	-0.424	-0.161	-0.040
		(0.813)	(0.922)	(0.798)	(0.803)	(1.262)	(1.260)
Utilities	30	1.350	1.496	-0.529	-0.412	1.491	1.619
		(0.828)	(0.939)	(0.812)	(0.817)	(1.284)	(1.282)