Energy Transition, Financial Markets and EU Interventionism*

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Abstract

A successful energy transition requires the reallocation of private capital away from fossil fuel assets to greener alternatives. This transition is usually hindered by investors' myopic focus on today's returns. In times of crisis, however, credible political signals about the future profitability of green industries, we argue, can steer investments towards low-carbon assets. Drawing on European Union interventions during the onset of the Russian invasion of Ukraine, we present an event study of daily stock market data following the most salient policy announcements by the European Commission in 2022. Our analysis shows that markets for shares of EU-based energy firms were initially prepared to move capital to cleaner companies, suggesting support for the clean energy transition. However, the short-lived distributional effects materialized only for announcements that could unmistakably be understood as unwavering commitments to the EU's green renewal, while less direct announcements did not have the same distributional implications. Our findings emphasize that, in times of crisis, repeated and unambiguous political signals can create favorable conditions, at least in the short-term, to support capital reallocation towards greener stocks.

Keywords: energy transition; EU interventionism; credible signaling; communication; stock markets; event study analysis.

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Introduction

Decarbonizing the world economy necessitates unprecedented amounts of money. Despite the increasing capitalization of the low-carbon sector, the *International Energy Agency* in its 2023 World Energy Outlook estimates that investments in clean energy need to triple to about US$4.3 trillion annually until 2030 to keep net zero emissions by 2050 within reach (IEA, 2023). Ambitious climate targets require greater investments in green assets and, at the same time, substantial capital reallocation away from fossil fuels. With markets as the primary conduit for steering capital allocation, concerns about financial investors' short time horizons dampen the prospect of a market-led energy transition. Existing research, therefore, highlights the politicization of public policy for speeding up the transition (Aklin and Urpelainen, 2018; Stokes, 2020; Mildenberger, 2020; Nahm, 2021; Colgan, Green, and Hale, 2021; Gazmararian and Tingley, 2023).

In the spirit of this work, this paper studies the response of stock markets to energy transition policy signals in a specific crisis moment. We examine if and under what conditions political reassurances about the future profitability of green industries can boost capital allocation towards low-carbon assets at the very onset of the exogenous economic instability caused by the Russian invasion of Ukraine. We motivate this case choice with the observation that—despite initial commentary to the contrary—the war did not have much of a catalyzing effect for the energy transition because it did not hit fossil fuel producers with full force.[1] Consistent with the argument that we develop in this paper, we attribute this turn of events to weak top-level political commitments by the European Union (EU) leadership to its long-term green renewal.

Our study hones in on an important point, namely the conditions of credible communication of future energy policy between policymakers and markets to spur a robust energy transition. In the context of the EU response to the Russian invasion of Ukraine, we extrapolate the effect of EU

[1] In fact, the war generated record profits for oil majors and other fossil-fuel intensive industry. See "World's largest oil companies have made $281bn profit since invasion of Ukraine." *The Guardian*, 19 February 2024. Our data show a similar pattern extends beyond oil majors to the broader fossil fuel industry (Figure A.1).

Commission announcements throughout 2022. Doubling down on a similarly interventionist approach as seen in the "directionist coordination" during the Covid-19 pandemic (European Council, 2022), the Commission combined sanction packages against Moscow with announcements about speeding up the clean energy transition to reduce dependence on Russian oil and gas. These greater state-led policies hoped to address economic risks and stagnation while seeking to overcome the impasse of ambitious climate action, which requires targeted political strategies (Meckling et al., 2015; Bayer and Urpelainen, 2016; Breetz, Mildenberger, and Stokes, 2018; Gaikwad, Genovese, and Tingley, 2022; Green et al., 2022). But while the effect of these types of (green) industrial policy is being increasingly researched (Allan, Lewis, and Oatley, 2021; Allan and Nahm, 2024; Juhàsz and Lane, 2024), direct market responses to greater interventionism and the conditions for markets' preparedness to adjust to swiftly emerging political visions laid out by such policies remain largely understudied.[2]

Our argument focuses on how markets perceive the credibility of policy signals by the European Union as *the* most important policy actor at that point in time. While some scholars tend to be skeptical about the EU's ability to communicate credibly (Majone, 2000; Meunier and Nicolaidis, 2019; Zeitlin, Nicoli, and Laffan, 2019), concerns about diluted communication due to the EU's complex, multi-level governance should be lower in times of crisis. When macroeconomic uncertainty is large and market volatility is high, as was the case in Europe at the beginning of the war in Ukraine, markets value political steer to protect profits and minimize transition risks. We argue that, in such moments, financial investors understand political reassurances about the future profitability of low-carbon investments as EU commitments to a sustained energy transition. This logic translates into the expectation of observable market responses of increased returns for green companies as well as divestment from fossil fuel assets. We also claim that these distributional effects of credible policy signals will be stronger for directly climate relevant announcements relative to indirect ones.

[2] See Bauer, Offner, and Rudebusch (2023) for an exception in the case of the U.S. Inflation Reduction Act.

While such effects may only matter for brief periods right after an EU announcement, short-term capital reallocation is an important necessary condition to sustain the energy transition in the long run. Therefore, we empirically test our central expectations by studying short-term stock market returns of EU-based fossil fuel and renewable energy companies at the start of the Ukraine war.[3] Our event-study of a sample of 71 EU-based energy companies shows that fossil fuel (33 companies) and renewable energy firms alike (38 companies) experienced abnormally high stock returns that were significantly above market expectations and comparable across both groups, when the EU Commission announced sanction packages that targeted Russian assets and severed ties to Russian oil and gas firms.

We also find that initial announcements that *directly* shaped the EU's climate and decarbonization strategy—primarily through the €300 billion REPowerEU clean energy investment package—had even larger positive effects on the returns of EU-based energy firms and were stronger for green companies. Following the announcement of REPowerEU, European renewable energy companies saw returns that were 5.1% higher than market expectations, while their fossil fuel counterparts' abnormal returns were not significantly above market expectations. All these effects dissipate quickly, however: Once the EU's broader policy vision in response to the war had been communicated through sanction and energy policy announcements, markets internalize the information and market responses become muted.

Our findings contribute to existing comparative political economy research in two major ways. First, they speak to broader debates about the relationship between politics and markets (Przeworski, 2003; McNamara and Newman, 2020). We provide an argument about the *types* of policy announcements and the *conditions* under which markets respond to such announcements in ways that are consistent with the policy vision that is conveyed in them. In line with other work, we show that the ability of interventionist policy announcements to steer markets—i.e., by reallocat-

[3] Consistent with our distributional logic, we find muted responses to Commission policy announcements among non-European renewable and fossil fuel firms in a robustness analysis.

ing capital from fossil fuels to renewables—depends on the perceived credibility of the announcements and sustained efforts to direct markets. In the absence of repeated and unambiguous signals about strong political commitments to the clean energy transition, market support will falter (Gard-Murray, Hinthorn, and Colgan, 2023), and well-studied institutional barriers for long-term policymaking prevail (Finnegan, 2022*b*,*a*).

Second, our findings have implications for the growing firm-level literature in climate politics (Kennard, 2020; Genovese, 2021; Cory, Lerner, and Osgood, 2021; Bayer, 2023) and the literature on government-firm interactions more generally (Kim, 2017; Kim and Osgood, 2019; Baccini, Pinto, and Weymouth, 2017; Malesky and Mosley, 2018; Juhàsz and Lane, 2024; Wellhausen, 2014). We demonstrate that firm nationality (whether a company is based/traded inside *versus* outside of the EU) does not only shape the relationship between policymakers and firms (Hansen and Mitchell, 2000; Rickard and Kono, 2013; Malesky, Gueorguiev, and Jensen, 2015), but also matters for how markets respond to policy announcements by political actors in the same (national) jurisdiction. Scholars of firms, therefore, need to pay careful attention to differences both in firm ownership across countries and within sectors. In the case of the clean energy transition, understanding the interaction of these two dimensions has proven essential to avoid forgoing opportunities of systematic change towards a more sustainable future.

The Return of Market Interventions in EU Energy Policy

Much of the making of the European Union since the 1950s happened through the expansion of markets and was centered on neoliberal fundamentals of competition and openness (McNamara, 2023; Meunier and Nicolaidis, 2019). In the area of EU environmental and energy policy, this tradition took over in the late 1990s when market principles found their way into the Union's main governance frameworks. The turn away from command-and-control regulation towards market-based instruments was on prominent display in international climate negotiations when the EU gave up its initial opposition to the flexible mechanisms in the Kyoto Protocol. As a result, the European Union Emissions Trading System (EU ETS), still the largest carbon market worldwide bar China's, started operating in 2005 and was praised by the Commission as the "*EU's key tool for cutting greenhouse gas emissions*." It remains a central instrument in the bloc's climate strategy 20 years on. Notwithstanding its importance, the EU ETS was not the exception in the Commission's new regulatory paradigm. Policies on renewable energy production and energy efficiency that flanked the introduction of the carbon market as part of the "20-20-20" package were equally guided by market principles in an increasingly liberalized Internal Energy Market.

Despite their central role in EU climate and energy policy, there is increasing evidence that the success of market-based approaches is mixed (Green, 2021; Perino, Ritz, and van Benthem, 2022). Some find that carbon pricing across Europe helped reduce CO_2 emissions (Bayer and Aklin, 2020; Colmer et al., 2024) while stimulating investments in innovation (Calel and Dechezlepretre, 2016). Others warn of political risks and distorted economic incentives. Just like studies have shown that market competition shapes firms' preferences for climate policy (Green, 2013; Genovese, 2019; Kennard, 2020), research also finds that firms were able to shape policy provisions to their benefit (Ellerman, Buchner, and Carraro, 2007; Genovese and Tvinnereim, 2019; Bayer, 2023).

More recently, a significant change in approach to climate policymaking has occurred, with state intervention making a come back both in Europe and globally. In the case of the EU, the return to more active market interference is rooted in lessons from the 2009 European financial crisis and momentum from the EU's response to the Covid-19 pandemic. Large-scale EU investment programs "NextGenerationEU" (€800bn investments for post-Covid recovery) and "REPowerEU" (€300bn investments in affordable, secure and sustainable energy for Europe) are emblematic of this "interventionist turn" underpinned by a broad shift in policy vision. This new approach ranges from massive Green New Deal infrastructure investments to regulatory reform, such as the introduction of a carbon border tax (Shum, 2024; Bayer and Schaffer, 2024).

The revival of interventionist policymaking links to two important drivers which have implications for the (re)allocation of capital for the purposes of the energy transition. The first driver is the desire among policymakers for a 21st century industrial policy as a strategic lever to protect national economic interests (Allan, Lewis, and Oatley, 2021; Allan and Nahm, 2024; Juhàsz and Lane, 2024). Indeed, institutions scholars have shown that state-led industrial policy can create buy-in from investors, especially if these policies come in the form of subsidies (Rickard, 2012; Colgan and Hinthorn, 2023). Green industrial policy can also induce new global competition, but the extent to which this happens depends on the domestic political economy and the country context (Nahm, 2021; Kupzok and Nahm, 2024). This literature suggests that green industrial policy can create the initial conditions for a successful green renewal, but markets are needed to sustain and scale up demand.

The second driver for a re-orientation of regulatory paradigms is often a crisis that serves as a critical juncture. Just like the oil crisis in the 1970s became a catalyst for global energy markets reform (Meckling et al., 2022), so does the post-pandemic polycrisis invite a strong policy response. Geopolitical considerations have become paramount for future-proofing supply chains, and supply security was a core motivation for speeding up the clean energy transition in the United States and China (Colgan and Hinthorn, 2023). In times of crisis, when uncertainty is large, institutional responses by policymakers can stabilize markets. They can do so by shaping market expectations and by creating business opportunities, two effects that materialize when policy announcements and underlying political institutions are seen as credible (Meckling and Nahm, 2022).

Treating the Russian invasion of Ukraine in February 2022 both as such a crisis moment and an exogenous shock to Europe's energy security, we study the effect of public policy announcements by the EU Commission on market responses. Our key inferential goal is to parse whether the EU's move towards interventionist policymaking, conceptualized as announcements of sanctions packages and clean energy investment promises, triggers observable responses in stock market returns—and if so, under what conditions. We first discuss possible market effects of EU interventionist announcements to underpin our theoretical priors and then describe the research design that allows us to test our expectations.

Market Responses to EU Public Policy Announcements in Times of Crisis

We start our argument about the observable market effects of EU interventionist announcements from the vantage point of a large political economy literature that characterizes when and how political communication moves expectations of financial markets. Accordingly, announcements by sovereign political authorities will have reverberating effects in domestic markets as long as they have legitimacy and credibility.

In contrast to announcements by domestic political elites, EU announcements may, however, be perceived differently for two reasons. First, the multi-level governance and long delegation chains in EU decision-making can dilute messages from Brussels, breaking the link between announcements and the material implications for businesses.[4] The empirical evidence about market responses to EU announcements is indeed mixed: Some find that decisions taken at EU summits move financial markets (Bechtel and Schneider, 2010; Gray, 2009), yet others point to a lack of clarity in EU communication (Majone, 2000; Zeitlin, Nicoli, and Laffan, 2019). Second, even if markets were receptive to EU announcements, contents matters. As such, markets might understand interventionist public policy announcements as protectionism, depressing profit expectations (Wolf, 2023).

Following these considerations, we argue that the EU has likely a more significant role to play for market responses in times of crisis. While financial investors may find it cumbersome to decipher the material consequences of EU public policy announcements for their portfolios during normal times, EU announcements carry special weight in moments when political and economic uncertainty are high and markets are volatile. This is both a function of the size of the EU Single

[4] Systematic evidence about mixed market signals from EU public policy announcements are documented in a review of the "Economic Effects of the European Single Market" by Sweden's National Board of Trade. Available at https://www.kommerskollegium.se/globalassets/publikationer/rapporter/2016-och-aldre/publ-economic-effects-of-the-european-single-market.pdf.

Market—with 450 million people and an output of US$16 trillion—and its institutional stability. Multi-level governance is a boon during crises as interlocked decision-making institutions create the very credibility that markets seek. Political commitments cannot simply be undone at a whim of a single government, so they are likelier to stand the test of time. It is hence not by accident that the "credibility premium" of EU institutions tends to be highest in turbulent times (Jones, Kelemen, and Meunier, 2016; Schimmelfennig, 2018).

This logic holds for any crisis, but becomes the more important the more existential a crisis is. The European financial crisis, the Covid-19 pandemic, and the 2022 Russian invasion of Ukraine all serve as good examples. The protective umbrella of the EU as a bloc of 27 member states is most valuable for outsized crises that threaten to overwhelm the crisis-management capacity of individual states. EU intervention quelled market speculation about Greek liquidity during the country's debt crisis. Coordinated procurement and rollout of Covid-19 vaccines had a similar effect for charting a way out of lockdowns towards economic recovery. We therefore expect that announcements by the EU Commission in response to the Russian invasion of Ukraine, as the latest crisis in a string of geopolitical challenges to Europe's peace and security, are likely to invite clear market reactions.

Taking this basic claim to the case of the EU energy transition, we argue that how and for whom interventionist EU announcements matter depends on both *the type of announcement* (i.e., whether it directly concerns the energy transition or not) and *the type of affected assets* (i.e., whether the announcement targets green or fossil fuel firms). In developing our expectations about the distributional effects of public policy announcements—and how they translate into market responses—we therefore concentrate on these two key dimensions.

Expectations

Confronted with the Russian attack on Ukraine, the European Commission responded with two types of announcements that could have implications for energy markets: some announcements were targeted sanctions against Russia's exports; others were commitments to the EU's clean energy transition as a way to reduce European import dependence from (Russian) oil and gas. While both types of announcements matter for energy markets and the respective actors involved in them, we argue that distributionally relevant differences in the announcements' contents exist.[5] The sanctions packages were varied in whom they targeted, and were broader than just hitting energy markets and associated oil and gas infrastructure. Sanctions importantly demonstrated the EU's resolve against the Russian aggression in spite of unavoidable price spikes in energy costs for European businesses and households. By contrast, clean energy transition announcements focused on the renewables portion of the energy market, in particular, and served as tailored reassurances of the EU's long-term commitment to a green renewal.

The difference in relative focus of these two types of announcements translates into different growth and profit expectations for fossil fuel-intensive and renewable energy companies. Credible policy announcements that promise to create business opportunities for some firms should see their stocks rise, while stocks for companies with grim prospects should drop (McNamara and Newman, 2020).

Since sanction packages restricted cheap energy supply to Europe from one day to the next, we expect that *European Commission sanctions announcements would increase stock market returns of energy producers of all types (Hypothesis 1)*. The war in Ukraine reminded Europeans of the geopolitical importance and strategic value of secure energy access (Meunier and Nicolaidis, 2019). This endowed energy companies with considerable political leverage. Even though the EU and many of its member states champion the idea of climate leadership and net zero targets, they scrambled to quickly diversify their energy imports after the war had started. To keep the lights on, policymakers searched for alternatives—not necessarily green ones, as the German rush towards

[5] Our argument focuses on the downstream effects of European Commission announcements in terms of market responses. While recognizing the importance of political bargaining over the exact contents and timing of European Commission announcements, we leave the analysis of EU decisionmaking about its communication and sanctions strategy for future research.

building liquefied natural gas (LNG) terminals in break-neck speed showed.[6] Sanction package announcements therefore should be promising news for the energy sector as a whole.

This contrasts with announcements that emphasize the need for an increased pace of economy-wide decarbonization. Political commitments by Brussels to a sustained clean energy transition creates justified growth expectations among financial investors for the renewables sector within the energy market. As a result, we hypothesize that *European Commission announcements in support of the clean energy transition would increase stock market returns only for renewable energy companies (Hypothesis 2).* The wedge in market responses to announcements about green renewal are similar to findings in the literature on green industrial policies that often simultaneously squeeze the market share of fossil fuel producers and open markets to non-incumbent firms (Meckling et al., 2015; Bayer and Urpelainen, 2016). Compared to sanction package announcements, which largely lack the capacity to differentiate between brown and green firms, we expect to see separation between brown and green firms from distributionally relevant announcements that are direct affirmations of the clean energy transition as an overriding policy vision.

Case Study: Russia's Invasion of Ukraine

The European Commission's commitment to transition EU economies away from fossil fuels predates the Russian invasion of Ukraine by several years. The European Green Deal, launched by the Commission president von der Leyen in 2019, set out the vision of carbon neutrality by 2050. This long-term target was translated into the goal to reduce greenhouse gas emissions by 55% by 2030 in the "Fit for 55" package. These broader contours help contextualize the threat the war in Ukraine has been posing to the EU's immediate decarbonization efforts as well as to its longer-term climate ambition.

At the beginning of the 2022 invasion of Ukraine, several EU countries were highly dependent on Russian oil and gas, including Central and Eastern European member states like Czechia,

[6] "Germany: Scholz opens country's first LNG terminal." *Deutsche Welle*, 17 December 2022.

Hungary and Poland, as well as the EU's economic powerhouses of Germany, France, and Italy (Noël, 2022). Since Russian natural gas figured prominently in the EU's decarbonization strategy as a "transition fuel" away from more carbon intensive oil, some observers quickly pointed to the difficulties the war would create for the EU's net zero plans.[7] Others, including the International Energy Agency (IEA, 2022), wanted the war to be harnessed as an opportunity to reduce reliance on Russian energy imports and, at the same time, increase domestic renewable production. Just days before the invasion, Kadri Simson, EU Commissioner for Energy, wrote on X:

> `Just had a phone call w/ French minister @barbarapompili, to discuss #EU preparedness & to coordinate action on #energy security. We have to reduce dependency on Russian gas, diversify our suppliers & invest in #renewables. #EU is strong, united & stands in solidarity with #Ukraine.`

Financial markets were largely sympathetic. While investors expected the European Union to diversify gas supply to alternative sources outside Russia in the short term, they adopted an upbeat stance on investment in renewables and greater domestic production in the longer run. Notable private consultancy groups came to a similar conclusion when they found that the Russian invasion could be "a turning point in seizing the opportunity to address the globe's unfolding climate crisis" (McKinsey & Company, 2022).

For our analysis, we draw on six key announcements by the European Commission in response to the Russian invasion of Ukraine on 24 February 2022 (see Figure 1 for a timeline). These events were identified through a review of the EU timeline events in 2022 as well as a content analysis of the packages themselves to establish their energy market relevance. In light of these decisions, we focus on announcements of sanctions packages 2-4 (the first package was already adopted on 23 February 2022, i.e., the day *before* the invasion), shown in blue, and three energy transition policy announcements as part of the REPowerEU plan, marked in green.[8]

On the first day after the attack (25 February, package 2), the EU announced an immediate ban

[7] "Russia's Invasion of Ukraine Adds Urgency to Europe's Green Power Transition." *Scientific American*, 25 February 2022.

[8] A full timeline of all EU response measures since the start of the war can be found at https://www.consilium.europa.eu/en/policies/eu-response-ukraine-invasion/timeline-eu-response-ukraine-invasion/.

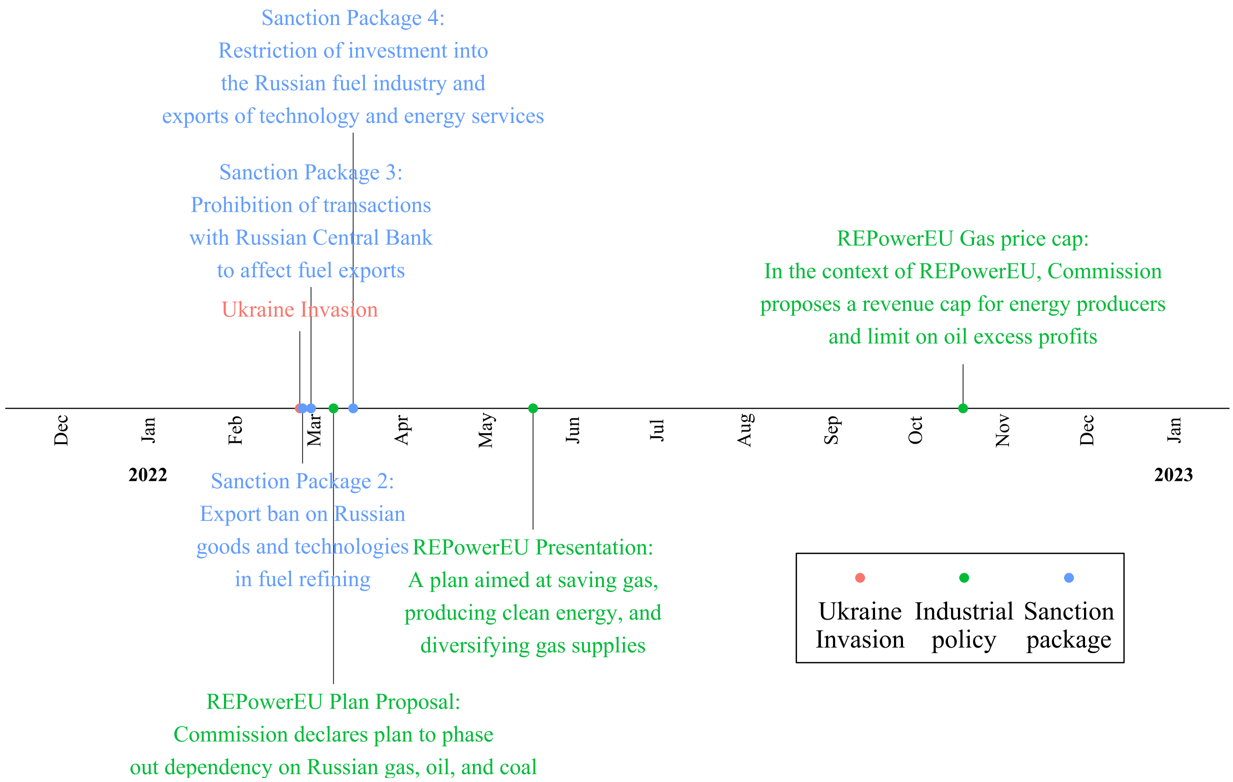

FIGURE 1: *Timeline of EU Commission announcements by the type of event*. The figure marks announcement dates for sanction packages 2–4 in blue and REPowerEU policy measures in green. The red dot indicates the invasion of Ukraine on 24 February 2022.

of trade in Russian goods and services, including technologies for fuel refining. Three days later (28 February, package 3), in an effort to damage fuel exports, transactions with the Russian Central Bank were prohibited for all individuals and companies based in the EU. The next package of sanctions followed after another two weeks (15 March, package 4). It restricted new investments in the Russian energy sector, banned imports of Russian technology and energy services, and imposed trade restrictions on iron, steel, and luxury goods. Altogether we expect these packages to be meaningful to energy market participants.

The announcements of sanctions were flanked by announcements about the then-new REPowerEU policy—a plan to speed up the clean energy transition and to improve EU member states' energy security. This policy was initially proposed on 8 March 2022 (European Commission, 2022*c*). Afterwards, a more complete version of the plan, built on energy saving measures, increased renewables capacity, and reduced energy import dependence, was presented on 18 May 2022 (European Commission, 2022*b*). As part of wider policy adjustments under the REPowerEU umbrella, the European Commission eventually announced the enactment of emergency regulation on 18 October 2022 (European Commission, 2022*a*) to cap fossil fuel producers' revenues, which was intended to limit excess profits and ease budgetary pressures for energy customers. A media analysis confirms that these steps were swiftly decided upon. This defends our assumption that, while investors would have known the direction of the energy policies dictated by the Green Deal, the timing of these events was not obvious and in fact full of uncertainty.

Our analysis leverages the occurrence of these six events, which we expect to shape market responses during the moments of geopolitical and macroeconomic instability in 2022, peaking in February 2022, right after the invasion.

Research Design

We use a stock market event study design to test our expectations about the effects of European Commission announcements on energy markets. Our empirical analysis examines stock market returns for EU energy firms *on the day* of each of the six announcements identified above. We first present the sample and data, and then discuss the estimation approach and results.[9]

Sample and Stock Market Returns Data

We collect data on stock market returns for European publicly traded energy producers. We sample fossil fuel producers (66 firms) and renewable energy producers (49 firms) that are either head-

[9] Our analysis tracks immediate capital movements in stock markets. This gives us analytical traction to speculate about the preparedness of markets to respond, in the short term, to the moves and turns of the energy transition. Because of this focus on market reactions, we do not study firms as actors and the agency they hold, for instance, through issuing bonds.

quartered or primarily traded (or both) in a European state.[10] We list firms in these two samples—alongside their headquarters country, primary exchange, and industry—in the appendix.[11] For our third data set, we obtain information on companies listed in the Standard & Poor's 500 index (S&P 500), which serve as a baseline sample of firms to capture broader market trends and economy-wide shocks.[12]

We assign companies to the fossil fuel and renewable energy samples based on industry classifications at a high level of granularity. Relying on six-digit North American Industry Classification System (NAICS) codes, we code a company to belong to the fossil fuel sample when its core activities are fossil fuel electric power generation; petroleum refining; natural gas or crude petroleum extraction; natural gas distribution; or underground, surface, bituminous coal, or lignite mining. Companies that operate as electric power generators from biomass, geothermal, hydroelectric, solar, wind or other renewable sources are grouped into the renewable energy sample. Offering face validity, our assignment process correctly identifies the largest (European or not) publicly traded fossil fuel companies—such as Aramco, BP, Chevron, Eni, Equinor, ExxonMobil, Marathon Petroleum, Phillips 66, Shell PLC, TotalEnergies, and Valero—as fossil fuel producers, while major renewables firms—e.g., NextEra, Jinko, and Brookfield Renewable—are correctly assigned to the renewables sample.[13]

Using industry codes to categorize firms as fossil fuel or renewable energy producers might mis-classify some fossil fuel producers that have partly diversified their assets into renewable energy production in anticipation of growing climate policy costs and for fear of stranded assets (although, at least for major fossil fuel producers, such transitions are still very circumscribed; see Green et al., 2022). We check our classification against other work that samples renewable energy and fossil fuel producers from firms in the Carbon Underground 200 and Clean 200 company lists

[10] We also collect data for 343 fossil fuel and 142 renewable energy firms that are neither headquartered nor primarily traded in a European country for a secondary analysis to explore the geographic scope conditions of our argument.
[11] See Tables A.1–A.2 for fossil fuel producers and A.3–A.4 for renewable energy companies.
[12] All data are retrieved from Eikon's API, and Appendix A presents details about data selection.
[13] Because we focus on publicly traded firms, our samples do not include wholly state-owned companies.

(Voeten, 2024).[14] In the appendix, we show that our results are robust to excluding firms that do not match this other classification.[15]

A second, potential threat to our classification comes from the fact that many renewable energy firms in our sample belong to the NAICS category of "Other electric power generation." This group explicitly excludes firms primarily generating power from sources that are not among those explicitly categorized by NAICS (which include fossil ones). NAICS itself provides renewable energy examples when describing the code.[16] However, it is possible that this "residual category" includes firms with mixed assets, potentially threatening our classification. Even if that were the case we contend that, for an at least somewhat diversified company, EU industrial policy announcements would lead to distributional impacts, capable to supply market confidence into the firm's green divisions.

Figure 2 provides the break-down of European firms in our sample by NAICS industrial sector (see Figure A.2 in the Appendix for non-European firms sampled in the same way). Histograms show the number of companies in each sector; crosses indicate companies' average share price over the month of December 2021. Note that, across fossil fuel (brown) and renewable (green) producers, companies are rather well balanced both in terms of the total number of firms in each group and the overall distribution of average share prices.

For each company, we construct our dependent variable from daily stock market prices at closing on a given trading day. Specifically, we measure a firm's stock returns as the percentage change in stock price between consecutive trading days. Since, for any level of supply, increases in returns are driven by greater demand, positive returns correspond to higher profitability of holding

[14] More information on the lists in Voeten (2024) can be found in the FFI Solutions' Carbon Underground 200 and As You Sow's Clean 200. Because these lists consider carbon intensity of assets owned by all kinds of firms, not only energy producers, overlap with our data is not perfect. However, we are able to find a match for 49 of our sampled firms. Among them, our coding is coherent with that of Voeten (2024) for 45 companies. Our procedure codes 4 firms as renewable energy producers, whereas Voeten (2024) classifies them as having some significant degree of fossil fuel production.

[15] See Figure C.6.

[16] See NAICS code description.

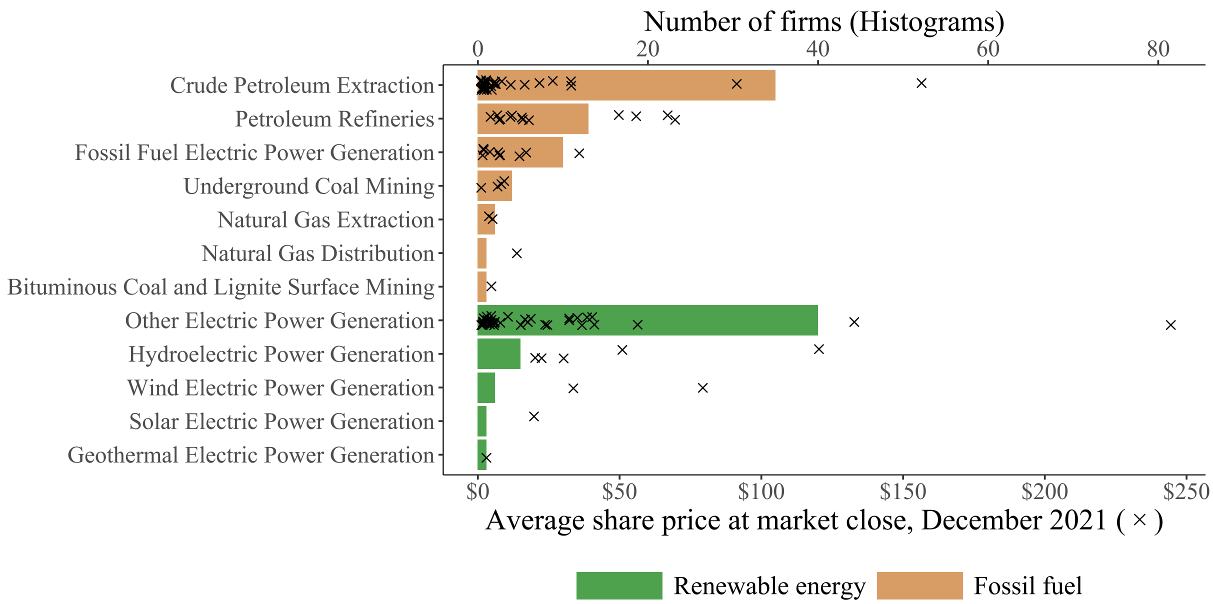

FIGURE 2: *Descriptive information for sampled fossil fuel and renewable energy firms based or traded in European countries.* Histograms report the number of firms by NAICS industrial sector code (top x-axis) and crosses show the average firm market price in December 2021 (bottom x-axis).

these stocks, and *vice versa*. Changes in market valuations therefore capture the distributional effects of political announcements in the form of companies' stock market performance.

Event Study Design

Our empirical analysis uses an event study design (MacKinlay, 1997) to estimate the effect of EU announcements (in response to the outbreak of the war in Ukraine) on profit expectations for fossil fuel and renewable energy stocks. According to the market efficiency hypothesis, financial markets process information in a hyper-rational way, so that market prices perfectly reflect all the information that is available to investors at any given point in time. New information from European Commission announcements, for example, leads investors to update their expectations about the profitability of stocks, causing stock prices to rise or fall. Following existing applications in political science research (Pelc, 2013; Wilf, 2016; Kucik and Pelc, 2016; Aklin, 2018; Genovese, 2019), we rely on the same methodological approach to assess the distributional effects of public statements by the European Commission in times of crisis on companies' stocks.

The basic idea of any event study design is that we can use past stock market performance to construct a counterfactual stock market price that would have prevailed had markets not obtained any new information. During an estimation window, which covers the days before and right up to the event, regressing each company's returns on market-wide indexes, such as the New York Stock Exchange (NYSE) Composite index, produces a set of coefficients that can be used to estimate out-of-sample counterfactual returns of what each company's predicted market price would have looked like, absent the event. Subtracting actual, observed returns from the prediction models' counterfactual returns over the event window, i.e., a set of days after the event, gives an estimate of abnormal returns. Any statistically significant differences in abnormal returns support claims about distributionally relevant effects of EU announcements.

We modify this procedure to account for the specificities of our substantive application. First, because EU announcements about sanctions and support for the energy transition happened in rapid succession, we lack well-spaced estimation and event windows. For our estimation window, we set a length of 60 trading days before any given announcement, which means that later announcements will necessarily include prior announcements in their estimation window, which we argue helps "purge" our estimates from carry-over effects of previous announcements. We also limit the event window to the day of the announcement and, hence, estimate abnormal returns for a single day, using simple t-tests to assess statistical significance.

Second, to avoid adding noise to our counterfactual estimates, we use daily stock market returns from companies listed in the S&P 500 (which are all US-traded) rather than the usual aggregate market indexes as predictive covariates in our estimation models (we therefore follow the procedure introduced by Wilf, 2016). The S&P 500 is an appropriate market baseline for our European sample given the high degree of integration of financial markets and the correlation of global market trends across the Atlantic. Most importantly for our purposes, this US-based sample provides us with a cleaner baseline than a European-based equivalent, given that it should be as affected as our European sample by the broader context of the war in Ukraine (whose impact we want to control for) but less impacted by the EU industrial policy measures (whose impact we want to estimate). In appendix, however, we show similar results when using a European baseline. Moreover, given that many fossil fuel and renewable energy firms also happen to be tracked by these market-wide indexes, our approach of using S&P-listed firms instead of market indexes minimizes the threat to inference from counterfactual and substantive effects being estimated from a partially identical set of firms.[17] To identify the estimation model in our event study design, which requires estimating a large number of model parameters (one for each of the S&P-listed firms), we use a LASSO variable selection model with 5-folds for each firm-specific model and select the firm-specific vector of LASSO weights that minimizes the mean error (Tibshirani, 1996).[18]

With these adjustments to the standard event study procedure, we can estimate abnormal returns (ARs) for fossil fuel and renewables firms as the deviation of a firm's observed returns from its S&P 500 LASSO-weighted counterfactual returns. We test our hypotheses by assessing the statistical significance of abnormal returns for each announcement type (Hypothesis 1) and the difference in means for firms grouped into the fossil fuel sample compared to those in the renewables sample (Hypothesis 2).

Results

We first present the results relative to the announcement days of the EU Commission sanction packages. In Figure 3, we show the estimated average abnormal returns for European energy companies distinguishing fossil fuel producers (brown) and renewable energy producers (green) for each of the relevant events, organized along the y-axis. We display 95% confidence intervals for

[17] We exclude all 24 firms from the S&P 500 list that are also part of our non-European fossil fuel and renewables samples to ensure that there is *no* overlap in the firms across our fossil fuel, renewables, and S&P 500 samples.

[18] In Appendix C, we show our results are robust to using aggregate market indexes and ordinary least squares (OLS) to predict firms' returns.

adjudicating whether point estimates are statistically distinguishable from zero at a 0.05 level of significance. Importantly for the distributional part of our theory, we also report 83.4% confidence intervals for testing whether point estimates for brown and green firms are statistically distinguishable from each other at the 0.05 level of significance.

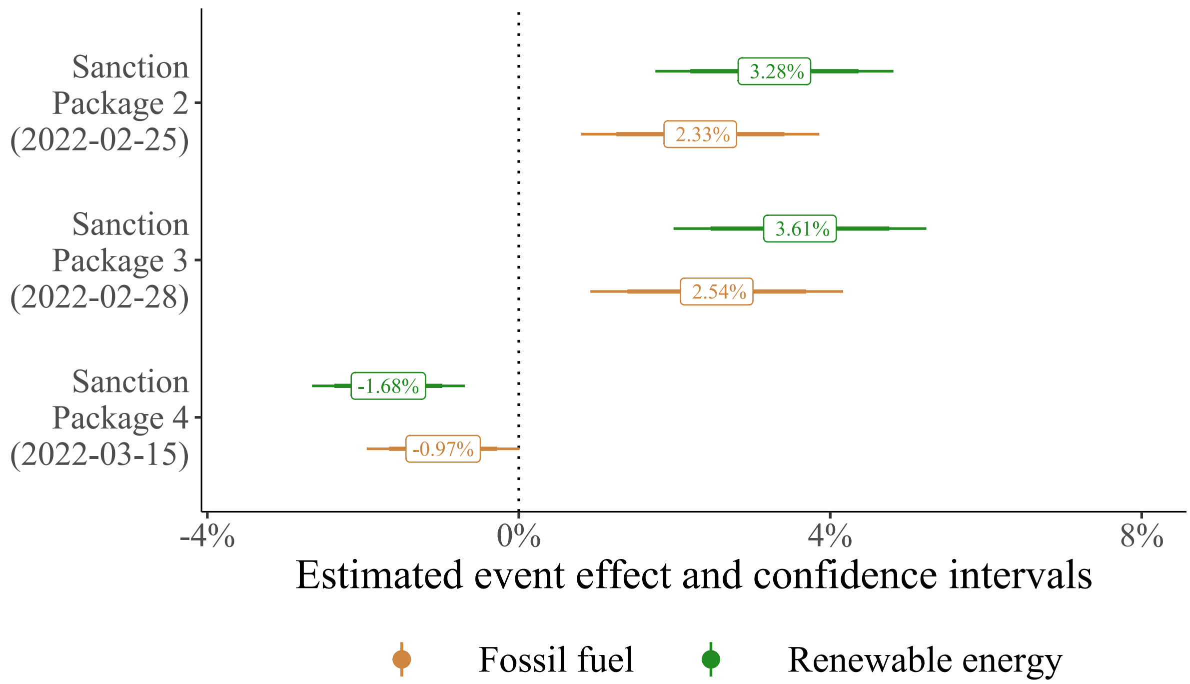

FIGURE 3: *Abnormal returns for European fossil fuel and renewable energy producers for sanction packages.* The figure shows the estimated average abnormal returns for energy companies based or traded in Europe on the day a given sanction package was announced, separately for fossil fuel producers (brown) and renewable energy producers (green). Horizontal bars denote 95% and 83.4% confidence intervals: the former shows the difference between an estimate and the 0 value, while the latter tests whether the point estimates for brown and green energy producers are statistically significantly different from each other at a 0.05 level of significance.

Consistently with our first set of expectations, the early sanction announcements by the EU Commission (second and third packages) moved market prices of European energy firms significantly and positively but to a similar degree across brown and green producers. EU sanctions against the Russian invasion, which targeted Russian energy links with the EU but did *not* directly reward decarbonization, increased investors' confidence in all energy producers indistinctly without any indication for distributional effects. Point estimates across brown and green firms are remarkably comparable and statistically indistinguishable, as evidenced by the overlap of the 83.4% confidence intervals.

The second and third sanction packages, which followed within a week of the invasion, triggered positive responses among fossil fuel energy investors generating returns to these firms that were 2.33%-2.54% above market expectations. Likewise, renewable energy firms experienced returns that were 3.28%-3.61% above those from their market baselines on these days. Effects are negative for both fossil fuel and renewable energy firms for the fourth package. The negative sign is possibly related to the fact that this package hit technology and energy services, hurting primarily the supply side of energy markets. In combination, we find that, while investors clearly reacted to the announcements of the sanctions by taking interventions as relevant and credible events for European assets in the short term, this evaluation did not discriminate between fossil fuel and green assets, hence not contributing to a green transition scenario where fossil fuel intensive energy production is punished at the expense of clean energy.

We now move to the distributional part of our expectations, which focuses on the more directly green policy announcements after the Russian attack. Here, we perform the same analysis as above with respect to REPowerEU milestones. The main results are displayed in Figure 4. We find that the early March REPowerEU proposal generated a significantly positive response among investors. Consistent with our argument, we observe the distributional nature of EU interventionist announcements that set up a path towards energy transition. The plan proposal, indeed, strongly (and statistically significantly) separates "winning," green companies from "losing," brown companies based on the expectation that carbon-intensive business models are incompatible with ambitious climate action. The documented effects are, however, short-lived: the plan presentation in May 2022 only produced substantively small effects. Substantively also small, but distributionally relevant effects pertain to the announcement of the REPowerEU gas price cap.

Among the events we consider, the REPowerEU plan proposal in March 2022 is the event with

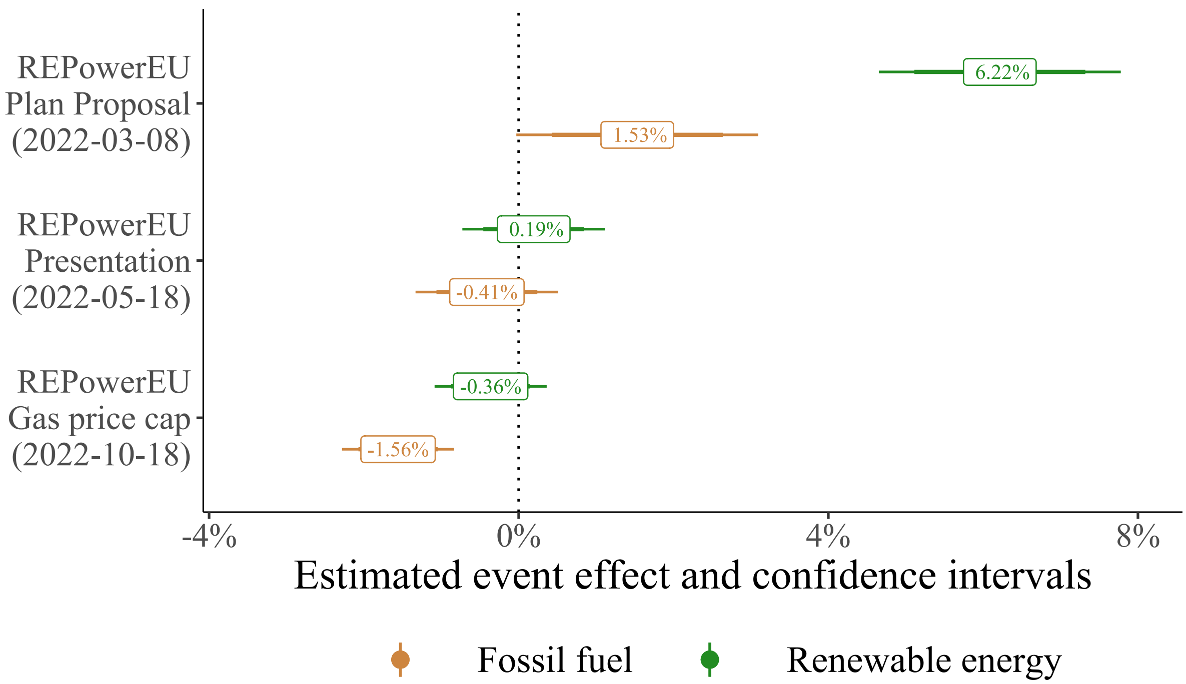

FIGURE 4: *Abnormal returns for European fossil fuel and renewable energy producers for RePowerEU milestones.* The figure shows the estimated average abnormal returns for energy companies based or traded in Europe on the day a given REPowerEU milestone was announced, separately for fossil fuel producers (brown) and renewable energy producers (green). Horizontal bars denote 95% and 83.4% confidence intervals: the former shows the difference between an estimate and the 0 value, while the latter tests whether the point estimates for brown and green energy producers are statistically significantly different from each other at a 0.05 level of significance.

the largest effect on energy producers' returns. The effect size is remarkable: the plan significantly boosted investors' profit expectations for European renewable energy producers, resulting in average abnormal returns of more than 6% above market expectations. European fossil fuel producers, on the other hand, saw market returns increase much less (about 1.5%). We attribute this positive, albeit smaller, effect in response to a pointedly green policy proposal to the realization that fossil fuel energy production will undoubtedly be needed to satisfy European consumers' demand in the absence of Russian supply, even if only in the short term and as a "transition fuel." In an effort to delineate the scope conditions of our distributional logic, in other results in the appendix we show that, despite strong effects for European producers, the *same* announcement had much smaller effects for companies outside the continent.[19] This offers compelling evidence that market participants reliably separate between the material consequences of Commission announcements for European and non-European firms. Given the focus of the REPowerEU program on infrastructure investment and green industrial policy in EU member states, most of the policy benefits will accrue to European-based companies or those linked to the bloc's Internal Energy Market.

It is noteworthy that announcements that were made five to six weeks after the invasion had overall much weaker effects, no matter the type. Neither the fourth sanctions package nor the formal presentation of the REPowerEU policy or the gas price cap did move European energy stock markets much. The gas price cap restricted windfall profits for fossil fuel producers by limiting maximum chargeable prices to gas customers, putting downward pressure on market valuations for fossil fuel producers in particular. Overall, the impacts of announcements from Brussels fizzled out as the war in Ukraine continued and as investors started pricing their expectations about the EU's net zero strategy into their market valuations.

Altogether, this evidence suggests that the European Commission's timely and unambiguous promises to intervene in the economy in 2022 moved financial capital in energy markets. However, for the purposes of the energy transition, the only signals that gave momentum to green markets were Green Deal announcements, while more indirect—yet still energy relevant—signals did not have the same consequences. Furthermore, the results indicate that the Commission moving at the peak of historical uncertainty, i.e., right after the Russian attack, maximized the impact of these announcements. An important implication of these results is that taking time to issue the most aggressive renewable packages or postponing burdensome energy sanctions fizzled the Commission's otherwise strong effects on financial markets.

[19] See Figure C.2.

Additional Results and Robustness

Our main results capture abnormal returns on the day of the announcement itself. In the Appendix (Figure B.1), we show how abnormal returns accumulate over a symmetric time window of ten days before and after each event for European companies.[20] For sanction packages, we find strong effects across the board, yet cumulative abnormal returns are largest for fossil fuel producers. As with the main analysis, REPowerEU-related announcements separate brown and green energy companies strongly, yet only for the initial announcement. The evidence from cumulative abnormal returns thus suggests that, rather than an opportunity to fast-track the energy transition, investors understood sanction packages more as opportunities for fossil fuel energy producers to cash in on massive windfall profits from making up the shortfall of Russian supply contraction. Instead, when communication was directly targeted at credibly raising the bloc's decarbonization ambition through the REPowerEU package, this did result in considerable capital reallocation towards renewables. Commission announcements can hence credibly steer investment flows away from fossil fuels, but practically only in the short term and for companies that can directly benefit from green investments.

Other extensive robustness tests are presented in Appendix C. First, we show that we obtain similar results when using a sample of major European publicly traded firms as a baseline to generate counterfactual returns for European energy companies (Figure C.1). Although we are confident that US-based firms provide a cleaner baseline given that they are least likely to be impacted by EU policy announcements, we find similar results when swapping S&P 500 constituents with STOXX Europe 600 ones. Next, we probe our procedure for defining an energy firm as a European producer. We show that we find similar effects when we look exclusively at firms which

[20] We obtain estimates of cumulative abnormal returns from a linear regression model which includes a post-event period dummy that is interacted with a fossil fuel/renewable firm dummy. We do not include firm fixed effects in these models as fixed effects are perfectly collinear with the time-invariant fossil fuel/renewable firm dummy. Since abnormal returns are calculated from firm-specific market models, firm features are already absorbed in the estimation of our counterfactuals, so that firm-level fixed effects do not help improve identification further. Indeed, subsetting firms by sample and including firm fixed effects produces numerically identical results.

are European-based (Figure C.3), European-traded (Figure C.4), or otherwise just based or traded in a EU member state (Figure C.5). Then, we probe our classification of green/brown firms by discarding from our renewable energy sample four firms that are coded as having fossil fuel assets by Voeten (2024) (Figure C.6). We continue by querying the validity of our market counterfactuals. Since our results depend on the accuracy with which we can estimate company-level counterfactuals, we show results are robust to considering only firms whose counterfactual is estimated with sufficient precision—that is, with R^2 values above 0.10, 0.30, and 0.50 (Figures C.7, C.8, and C.9). For more precisely estimated counterfactuals, we find similar, and generally larger, distributional effects for policy announcements tied to the REPowerEU investment initiative. Using standard ordinary least squares (OLS) regressions instead of LASSO also produces similar findings (Figure C.10), as does using raw returns measures (Figure C.11).[21]

Conclusion

In this paper we study the fundamental question of when and how markets respond to policy announcements in the context of the recent European turn towards greater interventionism into financial markets. At its core, the paper claims that, especially in times of crisis when markets seek stability, policy interventions—in Europe, as well as in other governmental contexts—can serve as credible signals to shape capital (re)allocation decisions in stock markets. Under such conditions, we argue that EU Commission announcements can trigger distributional effects from aligning market incentives with the policy vision to address governance challenges, such as the energy transition. At the same time, we maintain that sustaining credible interventionist signals is difficult in the long run as it requires consistent political effort and coordination that the Commission may not have.

Focusing on EU interventionism in energy markets in response to the Russian war in Ukraine,

[21] We also show that our results for the cumulative abnormal returns analysis are robust to dropping imprecisely estimated counterfactuals (Figures C.12, C.13, and C.14) and using different event window sizes (Figures C.15 and C.16).

we find compelling empirical support that policy announcements which *directly* articulate the EU's decarbonization ambition as part of the REPowerEU investment package substantially increased green, but not brown European energy producers' market valuation. Energy-related sanction packages, on the other hand, boosted market valuations across the board without any separation between fossil fuel and renewable energy producers. We take this as evidence that EU announcements were perceived as fuzzier signals that are only *indirectly* linked to the energy transition and, hence, not quite sustaining the efforts for greater climate ambition and for weaning Europe off energy generation from fossil fuels. Furthermore, the identified abnormal returns had mostly disappeared by autumn 2022. The preparedness in stock markets to align capital allocation with a low-carbon future existed right at the start of the Russian invasion, but fizzled out over the course of the year.

Our findings raise important questions for scholarship on the politics of the energy transition and political economy research on government-firm interaction in times of crisis. A major challenge for the global energy transition are time-inconsistent preferences that result from the temporal mismatch between election cycles and investment horizons for energy infrastructure. Political announcements of long-term decarbonization goals as part of larger green industrial policy programs, such as the IRA in the United States or the Green New Deal in the European Union, help quell uncertainty and signpost the overall "direction of travel." If these signals were taken onboard by markets, slow and incremental divestment away from fossil fuel producers to greener competitors would follow, helping break down opposition by incumbent carbon-intensive industry. Our paper builds on this intuition and finds empirical evidence in support of it, but currently remains silent on the exact mechanisms that map out how different types of political announcements translate into investors' beliefs and investment decisions as a function of the announcements' expected distributional effects on different types of firms.

Furthermore, the findings are relevant to the credibility of EU policies in a polycrisis world. In light of far-reaching debates about the effectiveness of institutions in the European politics literature, our findings suggest that EU pillars can generate important waves in financial markets if they leverage their interventionist power at the right time. As climate action remains a fundamental driver of EU internal and foreign policy, our paper suggests that leveraging opportunities to pass resolutions and pick winners and losers of the energy transition is fundamentally important for responding to the climate emergency.

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Appendix

Energy Transition, Financial Markets and EU Interventionism

A Data

Our effort to create the dataframe of market observations for our main analyses relies on the following steps. First, we use Eikon's API to sample publicly traded renewable energy companies. We start from the global sample of active publicly listed companies trading equities. From this sample, we select renewable energy companies based on their industry classification. Industry classifications capture significant granularity in firms' industrial activity (Bayer, 2023). We rely on the six-digit codes under the North American Industry Classification System (NAICS). A six-digit code represents the most granular level provided by this classification. We select, as renewable energy firms, those that are active in "Electric Power Generation, Transmission and Distribution" under any of the codes indicating generation of hydroelectric, solar, wind, geothermal, biomass, or other electric power.[22] This initial selection returns a sample of 436 publicly traded companies that we classify as renewable energy firms. They are traded and headquartered globally.

Next, we follow a similar procedure to sample fossil fuel producers that are publicly traded. Fossil fuel energy production is composed of extraction, manufacturing of petroleum and coal products, distribution of fuel, and energy production. These activities are classified separately under the NAICS. For this sample, we therefore consider companies from a much larger set of six-digit NAICS codes.[23] Our initial selection yields a sample of 1329 publicly traded fossil fuel companies. Most notably, the sample includes the so-called "oil majors" that are publicly traded (Green et al., 2022): Aramco, BP, Chevron, Eni, Equinor, ExxonMobil, Marathon Petroleum, Phillips 66, Shell PLC, TotalEnergies, and Valero.[24]

We also build a third sample comprising all publicly traded companies in the Standard and Poor's 500 (S&P 500) stock market index. As described in the next section, we use information on companies in this sample as a benchmark to control for general market trends. To ensure the 2022 events we study do not affect selection of firms inside the S&P 500, we consider S&P 500 constituent firms as of January 1st, 2016. REPowerEU announcements and the Russian invasion of Ukraine should not reasonably affect which companies are included in the S&P 500 as of 2016.

[22] We consider the following codes: "Hydroelectric Power Generation (221111)", "Solar Electric Power Generation (221114)", "Wind Electric Power Generation (221115)", "Geothermal Electric Power Generation (221116)", "Biomass Electric Power Generation (221117)", and "Other Electric Power Generation (221118)". The latter category includes "establishments primarily engaged in operating electric power generation facilities (except hydroelectric, fossil fuel, nuclear, solar, wind, geothermal, biomass). These facilities convert other forms of energy, such as tidal power, into electric energy". Source: https://www.naics.com/naics-code-description/?v=2022&code=221118. We thus consider it as a source of renewable energy production.

[23] We consider the following codes: "Crude Petroleum Extraction (211120)," "Natural Gas Extraction (211130)," "Fossil Fuel Electric Power Generation (221112)," "Petroleum Refineries (324110)," "Underground Coal Mining (212115)," "Surface Coal Mining (212114)," "Bituminous Coal Underground Mining (212112)," and "Natural Gas Distribution (221210)."

[24] The sample does not include information on very large big oil companies that are not public, *e.g.* Sinopec which is state-owned.

We discard from the S&P 500 sample any company that is also included in the two samples of renewable energy and fossil fuel firms. This results in a total of 476 firms in the S&P 500 sample.

The final step of our data collection consists in retrieving daily stock prices for the selected firms. From the Refinitiv API, we download daily observations on the price of equities traded on primary markets for all companies we considered, from January 1, 2016 until February 21, 2023. All prices are expressed in current dollars. We then measure each firms' daily stock *Returns* as the percentage change in stock price between the value observed at the close of a given trading day and that observed on the previous trading day.

Because we constructed our samples of interest using industry codes, and because of the large coverage of companies in Refinitiv, the lists of renewable and fossil fuel companies include firms trading "penny stocks", *i.e.* equities with very little value. These firms are often target of financial speculation: investment in their equities is typically not motivated based on expectations of future industrial performances and should not be a result of policy announcements. We therefore exclude them from our samples. For each company, we average the daily stock price at the closing of the stock market over the full month of December 2021. We keep only companies whose December 2021 average stock price was above 1$. Finally, we drop all Russian-based or Russian-traded companies from the sample, as we suspect that investors might direct their capital towards/away from Russian companies, in the context of the invasion of Ukraine, for reasons that are unrelated to our theory. After these selections, our final samples are made of 191 renewable energy firms and 408 fossil fuel companies.

In Figure A.1 we report the average daily stock price of firms in the two samples over the year 2022, normalized to their value at the end of December 2021 (value = 100). We also report the normalized value of the S&P 500 aggregate index, to show overall market trends in 2022. We highlight the day of the Russian invasion of Ukraine for context. Values above (below) 100 indicate that the sample's average stock price is higher (lower) than its end-of-December 2021 value. We start by observing that the broader financial market was overall depressed in 2022 with respect to the end of 2021, as indicated by the fact that the S&P 500 line is constantly below its December 2021 value. Broadly speaking, renewable energy firms followed this market trend over the full 2022: excluding days of high volatility, this sample tends to follow the direction of the S&P 500, closing the year with an average stock price that was about 85% of its December 2021 value. The fossil fuel sample displays the exact opposite trend. Starting from the day of the Russian invasion and until at least late July 2022, this group of firms traded at prices that were significantly higher than what they were in December 2021, up until more than 150% of that value. In the Fall and Winter of 2022, too, this sample kept trading significantly above its end-of-2021 average, finishing the year at about 120% of its December 2021 value.

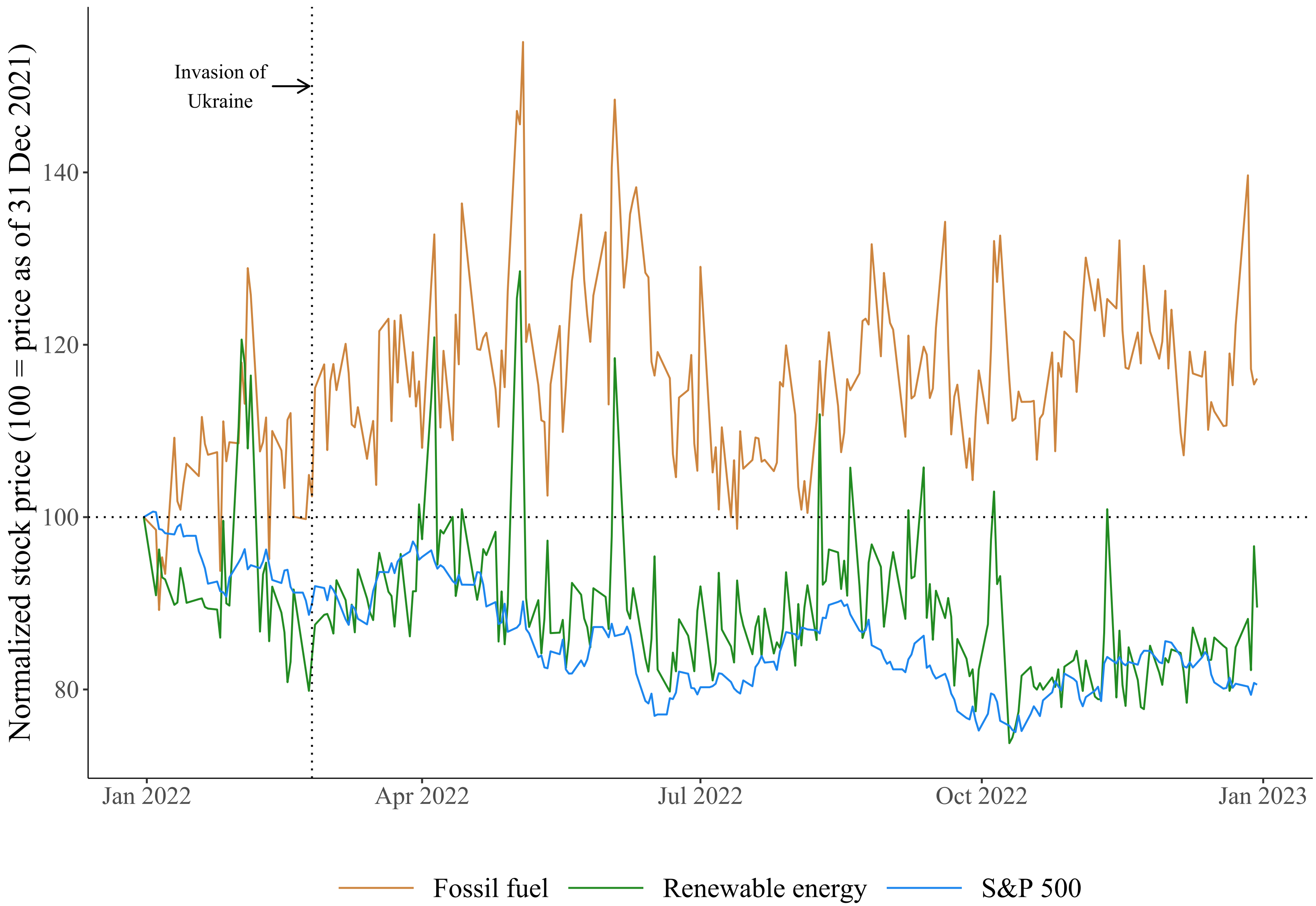

FIGURE A.1: Daily stock prices normalized as of December 2021, one year (YTD) trends

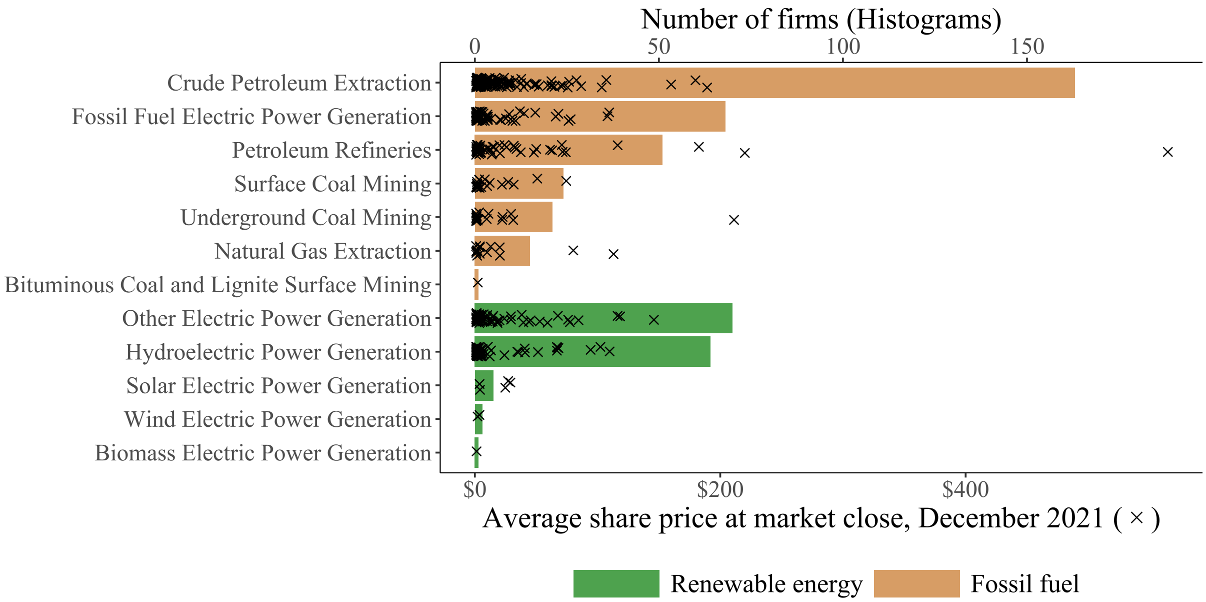

FIGURE A.2: *Description of non-EU based or non-EU traded fossil fuel and renewable energy firms*. Histograms report the number of firms by NAICS industrial sector code (top x-axis) and crosses show the average firm market price in December 2021 (bottom x-axis).

TABLE A.1: List of traded European companies in the fossil fuel sample (Firms 1–33)

N	Company name	Headquarter country	Primary exchange	NAICS-6 code name
1	Aker ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
2	Aker BP ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
3	BP PLC	United Kingdom	LONDON STOCK EXCHANGE	Petroleum Refineries
4	BW Energy Ltd	Bermuda	OSLO BORS ASA	Crude Petroleum Extraction
5	BW Ideol AS	Norway	MERKUR MARKET	Crude Petroleum Extraction
6	Bisichi PLC	United Kingdom	LONDON STOCK EXCHANGE	Underground Coal Mining
7	CEZ as	Czech Republic	PRAGUE STOCK EXCHANGE	Fossil Fuel Electric Power Generation
8	Capricorn Energy PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
9	Diversified Energy Company PLC	United States of America	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
10	Dno ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
11	Drax Group PLC	United Kingdom	LONDON STOCK EXCHANGE	Fossil Fuel Electric Power Generation
12	Elektrocieplownia Bedzin SA	Poland	WARSAW STOCK EXCHANGE	Fossil Fuel Electric Power Generation
13	Enea SA	Poland	WARSAW STOCK EXCHANGE	Fossil Fuel Electric Power Generation
14	Enel SpA	Italy	BORSA ITALIANA	Fossil Fuel Electric Power Generation
15	Energean PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
16	Engie SA	France	EURONEXT - EURONEXT PARIS	Fossil Fuel Electric Power Generation
17	Eni SpA	Italy	BORSA ITALIANA	Natural Gas Distribution
18	Equinor ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
19	Esso Societe Anonyme Francaise SA	France	EURONEXT - EURONEXT PARIS	Petroleum Refineries
20	Etablissements Maurel et Prom SA	France	EURONEXT - EURONEXT PARIS	Crude Petroleum Extraction
21	Gas Plus SpA	Italy	BORSA ITALIANA	Natural Gas Extraction
22	Genel Energy PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
23	Glencore PLC	Switzerland	LONDON STOCK EXCHANGE	Bituminous Coal and Lignite Surface Mining
24	Global Oil & Gas AG	Germany	BOERSE MUENCHEN	Crude Petroleum Extraction
25	Gulf Keystone Petroleum Ltd	Bermuda	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
26	HELLENiQ ENERGY Holdings SA	Greece	ATHENS EXCHANGE	Petroleum Refineries
27	H&R GmbH & Co KgaA	Germany	XETRA	Petroleum Refineries
28	Harbour Energy PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
29	Horisont Energi AS	Norway	MERKUR MARKET	Crude Petroleum Extraction
30	INA dd	Croatia	ZAGREB STOCK EXCHANGE	Petroleum Refineries
31	Imperial Petroleum Inc	Greece	NASDAQ CAPITAL MARKET	Crude Petroleum Extraction
32	Indus Gas Ltd	Guernsey	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
33	International Petroleum Corp	Canada	NASDAQ STOCKHOLM AB	Crude Petroleum Extraction

TABLE A.2: List of traded European companies in the fossil fuel sample (Firms 34–66)

N	Company name	Headquarter country	Primary exchange	NAICS-6 code name
34	Jadestone Energy PLC	Singapore	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
35	Jastrzebska Spolka Weglowa SA	Poland	WARSAW STOCK EXCHANGE	Underground Coal Mining
36	Jersey Oil and Gas PLC	Jersey	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
37	Jugopetrol ad Podgorica	Republic of Montenegro	MONTENEGRO STOCK EXCHANGE	Petroleum Refineries
38	Kistos Holdings Plc	United Kingdom	LONDON STOCK EXCHANGE	Natural Gas Extraction
39	La Francaise de l Energie SA	France	EURONEXT - EURONEXT PARIS	Crude Petroleum Extraction
40	Lubelski Wegiel Bogdanka SA	Poland	WARSAW STOCK EXCHANGE	Underground Coal Mining
41	MOL Magyar Olajes Gazipari Nyrt	Hungary	BUDAPEST STOCK EXCHANGE	Petroleum Refineries
42	Maha Energy AB	Sweden	NASDAQ STOCKHOLM AB	Crude Petroleum Extraction
43	Molecular Energies PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
44	Motor Oil Hellas Corinth Refineries SA	Greece	ATHENS EXCHANGE	Petroleum Refineries
45	Mytilineos SA	Greece	ATHENS EXCHANGE	Fossil Fuel Electric Power Generation
46	NIS ad Novi Sad	Republic of Serbia	BELGRADE STOCK EXCHANGE	Crude Petroleum Extraction
47	Norwegian Energy Company ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
48	OMV AG	Austria	WIENER BOERSE	Petroleum Refineries
49	Oil and Gas Exploration and Production AD	Bulgaria	BULGARIAN STOCK EXCHANGE	Crude Petroleum Extraction
50	Okea ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
51	Okta AD Skopje	Macedonia	MACEDONIAN STOCK EXCHANGE	Petroleum Refineries
52	PGE Polska Grupa Energetyczna SA	Poland	WARSAW STOCK EXCHANGE	Fossil Fuel Electric Power Generation
53	Panoro Energy ASA	Norway	OSLO BORS ASA	Crude Petroleum Extraction
54	Polski Koncern Naftowy Orlen SA	Poland	WARSAW STOCK EXCHANGE	Petroleum Refineries
55	RMU Banovici dd Banovici	Bosnia and Herzegovina	SARAJEVO STOCK EXCHANGE	Underground Coal Mining
56	Repsol SA	Spain	BOLSA DE MADRID	Petroleum Refineries
57	Seplat Energy PLC	Nigeria	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
58	Serica Energy PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
59	Shell PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
60	Societatea Nationala de Gaze Naturale Romgaz SA	Romania	SPOT REGULATED MARKET - BVB	Crude Petroleum Extraction
61	Tethys Oil AB	Sweden	NASDAQ STOCKHOLM AB	Crude Petroleum Extraction
62	TotalEnergies EP Gabon	Gabon	EURONEXT - EURONEXT PARIS	Crude Petroleum Extraction
63	TotalEnergies SE	France	EURONEXT - EURONEXT PARIS	Petroleum Refineries
64	Trinity Exploration and Production PLC	United Kingdom	LONDON STOCK EXCHANGE	Crude Petroleum Extraction
65	Ze Pak Sa	Poland	WARSAW STOCK EXCHANGE	Fossil Fuel Electric Power Generation
66	Zespol Elektrocieplowni Wroclawskich Kogeneracja SA	Poland	WARSAW STOCK EXCHANGE	Fossil Fuel Electric Power Generation

TABLE A.3: List of traded EU companies in the renewable energy sample (Firms 1 – 25)

N	Company name	Headquarter country	Primary exchange	NAICS-6 code name
1	7C Solarparken AG	Germany	XETRA	Other Electric Power Generation
2	A2A SpA	Italy	BORSA ITALIANA	Other Electric Power Generation
3	Adev Wasserkraftwerk AG	Switzerland	NA	Other Electric Power Generation
4	Advanced SolTech Sweden AB (publ)	Sweden	FIRST NORTH SWEDEN - SME GROWTH MARKET	Other Electric Power Generation
5	Alerion Clean Power SpA	Italy	BORSA ITALIANA	Other Electric Power Generation
6	Alteo Energiaszolgaltato Nyrt	Hungary	BUDAPEST STOCK EXCHANGE	Other Electric Power Generation
7	Alternus Energy Group PLC	Ireland; Republic of	MERKUR MARKET	Other Electric Power Generation
8	Arise AB	Sweden	NASDAQ STOCKHOLM AB	Other Electric Power Generation
9	Atlantica Sustainable Infrastructure PLC	United Kingdom	NASDAQ/NGS (GLOBAL SELECT MARKET)	Other Electric Power Generation
10	Clere AG	Germany	HANSEATISCHE WERTPAPIERBOERSE HAMBURG	Solar Electric Power Generation
11	Cloudberry Clean Energy ASA	Norway	OSLO BORS ASA	Other Electric Power Generation
12	Corporacion Acciona Energias Renovables SA	Spain	BOLSA DE MADRID	Other Electric Power Generation
13	DGB Group NV	Netherlands	EURONEXT - EURONEXT AMSTERDAM	Other Electric Power Generation
14	EDP Renovaveis SA	Spain	EURONEXT - EURONEXT LISBON	Other Electric Power Generation
15	ERG SpA	Italy	BORSA ITALIANA	Other Electric Power Generation
16	Edisun Power Europe AG	Switzerland	SIX SWISS EXCHANGE	Other Electric Power Generation
17	Elektro Ljubljana dd	Slovenia	LJUBLJANA STOCK EXCHANGE	Other Electric Power Generation
18	Elektroprivreda Crne Gore ad Niksic	Republic of Montenegro	MONTENEGRO STOCK EXCHANGE	Other Electric Power Generation
19	Encavis AG	Germany	XETRA	Other Electric Power Generation
20	Endesa SA	Spain	BOLSA DE MADRID	Hydroelectric Power Generation
21	Enefit Green AS	Estonia	NASDAQ TALLINN AS	Other Electric Power Generation
22	Energa SA	Poland	WARSAW STOCK EXCHANGE	Other Electric Power Generation
23	Energiedienst Holding AG	Switzerland	SIX SWISS EXCHANGE	Hydroelectric Power Generation
24	Energiekontor AG	Germany	XETRA	Wind Electric Power Generation
25	EnviTec Biogas AG	Germany	XETRA	Other Electric Power Generation

Table A.4: List of traded EU companies in the renewable energy sample (Firms 26 – 49)

N	Company name	Headquarter country	Primary exchange	NAICS-6 code name
26	Fastned BV	Netherlands	EURONEXT - EURONEXT AMSTERDAM	Other Electric Power Generation
27	Fintel Energija ad Beograd	Republic of Serbia	BELGRADE STOCK EXCHANGE	Other Electric Power Generation
28	Fortum Oyj	Finland	NASDAQ HELSINKI LTD	Hydroelectric Power Generation
29	Grupo Ecoener SA	Spain	BOLSA DE MADRID	Other Electric Power Generation
30	Hydro Exploitations SA	France	EURONEXT ACCESS PARIS	Hydroelectric Power Generation
31	Ignitis Grupe AB	Lithuania	AB NASDAQ VILNIUS	Other Electric Power Generation
32	Inter RAO Lietuva AB	Lithuania	WARSAW STOCK EXCHANGE	Other Electric Power Generation
33	MPC Energy Solutions NV	Netherlands	MERKUR MARKET	Other Electric Power Generation
34	Magnora ASA	Norway	OSLO BORS ASA	Other Electric Power Generation
35	Minesto AB	Sweden	FIRST NORTH SWEDEN - SME GROWTH MARKET	Other Electric Power Generation
36	Neoen SA	France	EURONEXT - EURONEXT PARIS	Other Electric Power Generation
37	Ocean Sun AS	Norway	MERKUR MARKET	Other Electric Power Generation
38	Orron Energy AB	Sweden	NASDAQ STOCKHOLM AB	Other Electric Power Generation
39	PannErgy Nyrt	Hungary	BUDAPEST STOCK EXCHANGE	Geothermal Electric Power Generation
40	Photon Energy NV	Netherlands	WARSAW STOCK EXCHANGE	Other Electric Power Generation
41	Public Power Corporation SA	Greece	ATHENS EXCHANGE	Other Electric Power Generation
42	Renew Energy Global PLC	United Kingdom	NASDAQ/NGS (GLOBAL SELECT MARKET)	Other Electric Power Generation
43	Scatec ASA	Norway	OSLO BORS ASA	Other Electric Power Generation
44	Solaria Energia y Medio Ambiente SA	Spain	BOLSA DE MADRID	Other Electric Power Generation
45	Terna Energy SA	Greece	ATHENS EXCHANGE	Other Electric Power Generation
46	Tion Renewables AG	Germany	XETRA	Wind Electric Power Generation
47	Toplofikatsia Ruse AD	Bulgaria	BULGARIAN STOCK EXCHANGE	Other Electric Power Generation
48	Voltalia SA	France	EURONEXT - EURONEXT PARIS	Hydroelectric Power Generation
49	clearvise AG	Germany	XETRA	Other Electric Power Generation

B Cumulative Abnormal Returns

In Figure B.1 we present our results for the analysis on cumulative abnormal returns (CAR). CAR are obtained by computing a running sum, for each firm, of daily abnormal returns. In our main specification, we consider a window of 10 days to the left and right of each event. Computed CAR are then regressed on a binary taking value of 1 on the event under consideration and in the 10 following days. Models are linear and estimated using OLS, with standard errors clustered at the firm level. We interact our binary event indicator with a variable coding whether the firm is a fossil fuel or renewable energy producer. Reported estimates correspond to the marginal effects of these regression models. For consistency with our abnormal returns analysis, and for distinguishing the effect among the two groups of firms, we report 95% and 83.4% confidence intervals.

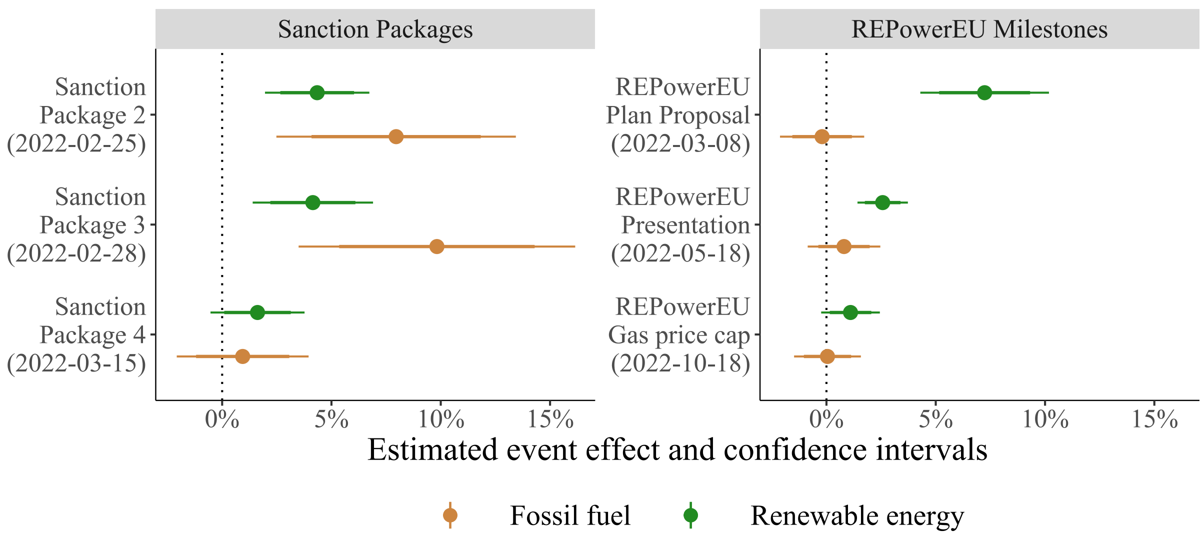

FIGURE B.1: *Cumulative average abnormal returns for fossil fuel and renewable energy producers (European firms).* The figure shows the estimated effect of an event on cumulative abnormal returns for energy companies based or traded in Europe, distinguishing between sanction packages and REPowerEU announcements, separately for fossil fuel producers (brown) and renewable energy producers (green). Horizontal bars denote 95% and 83.4% confidence intervals. Cumulative abnormal returns are here studied in a symmetric window of 10 days to the left and right of each event.

C Robustness tests

C.1 Results from counterfactual Returns built using STOXX Europe 600 constituents

Here, we test robustness of our results when using a European baseline of firms (as opposed to the US S&P 500 constituents) to generate the synthetic counterfactual Returns that supports our results. The US baseline we use in the main text is justifiable on methodological and theoretical grounds (being US-based, these firms are least likely to be impacted by EU policy announcements, thus they constitute a cleaner baseline), but one could object that the different nationality makes them too dissimilar from the European ones we consider. To counter this point, we show that results do not change significantly when replacing the S&P 500 baseline with a European equivalent.

In Figure C.1, we replicate our analysis on the same group of firms that we consider in the main analysis, but we generate the synthetic counterfactual Returns by considering individual constituents of the STOXX Europe 600 index. This index, designed by STOXX Ltd, comprises major European publicly listed firms. Importantly, it does not only consider stocks listed in the Eurozone. We replicate our estimation window with the same LASSO procedure used in the main text, just using this alternative sample of firms.

Similarly to our main results, we find that early sanction packages generated positive *Abnormal Returns* for fossil fuel and renewable energy firms alike, while sanction package 4 damaged significantly green ones. EU industrial policy announcements, instead, created a significant separation between the two groups of firms, with renewable energy companies benefitting from the REPowerEU plan proposal announcement and fossil fuel being damaged by the plan presentation.

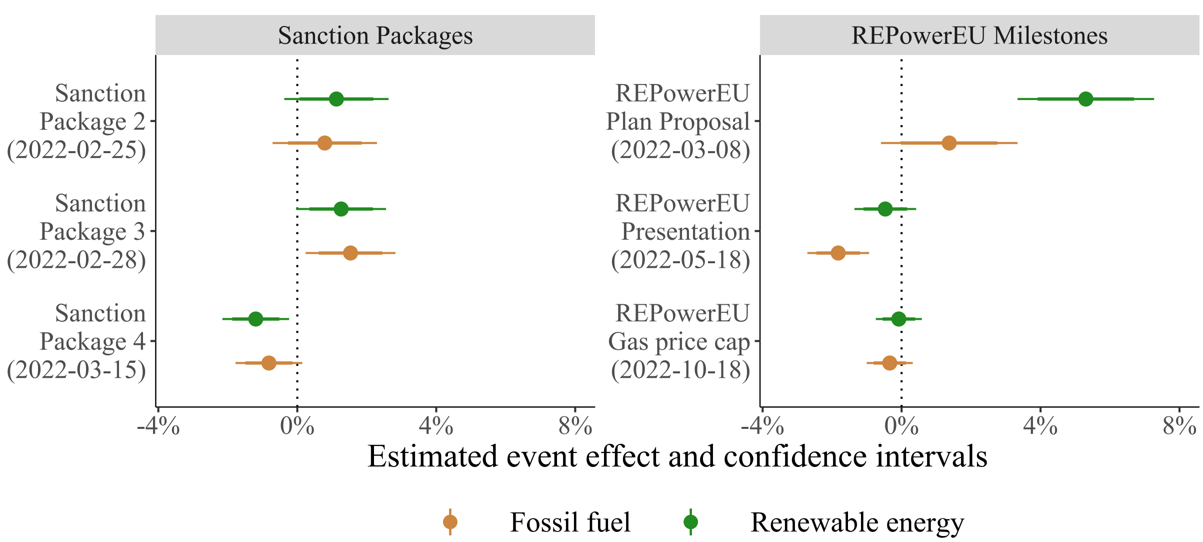

FIGURE C.1: Effects on *Abnormal Returns* obtained when constructing counterfactual Returns using STOXX Europe 600 constituents

C.2 Results for non-EU firms

In Figure C.2, we replicate our analysis on the group of firms that are neither headquartered nor primarily traded in a European country. Although we find that this group of firms also responded to the Commission's sanction packages in a manner that is not dissimilar to the response of EU firms, and although we find some distributional effects for subsequent REPowerEU events, effect sizes are significantly smaller than those detected in our main analysis, likely due to the larger distance of this group of firms from policymaking in Brussels.

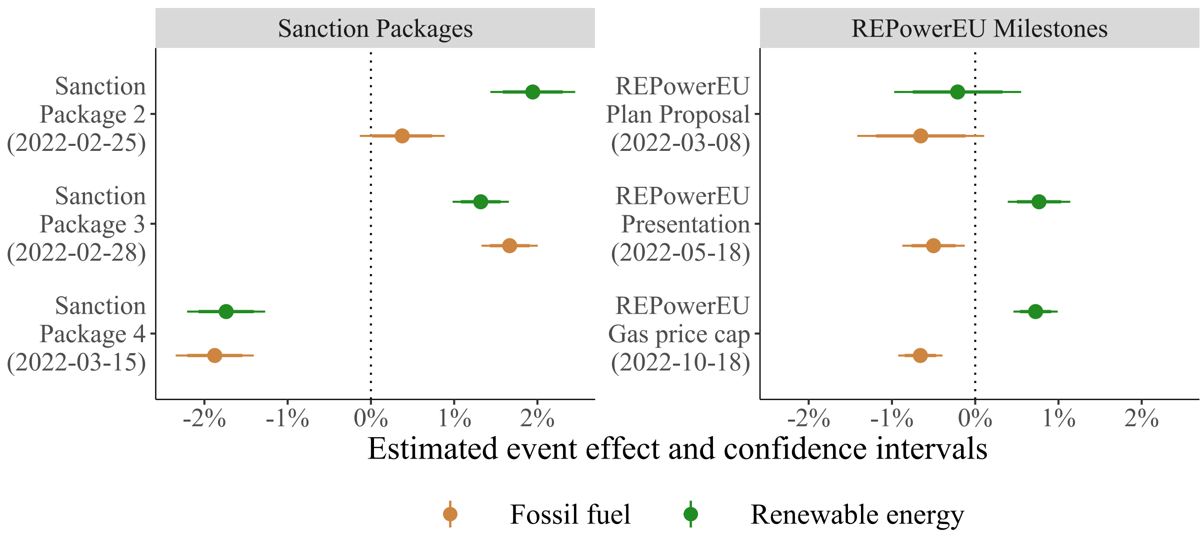

FIGURE C.2: Effects on *Abnormal Returns* obtained when considering firms that are neither headquartered nor primarily traded in a EU member

C.3 Alternative definitions of European-relevant sample

We probe our definition of the relevant sample of European energy firms by considering only European-based firms (Figure C.3), only European-traded firms (Figure C.4), and firms based or traded in EU member countries (Figure C.5).

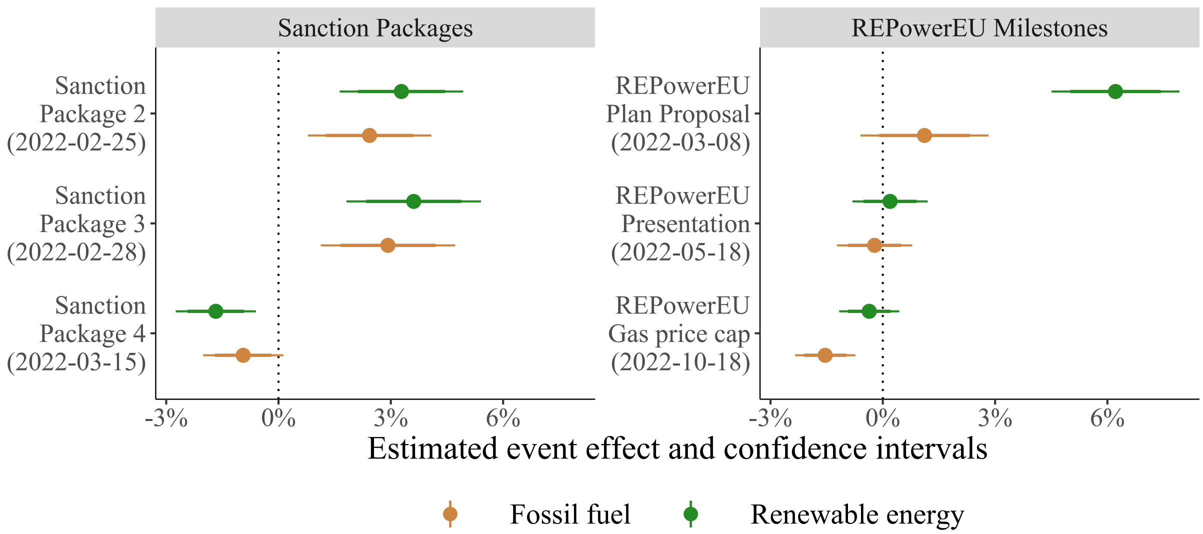

FIGURE C.3: Effects on *Abnormal Returns* obtained when considering only firms that are headquartered in a European country

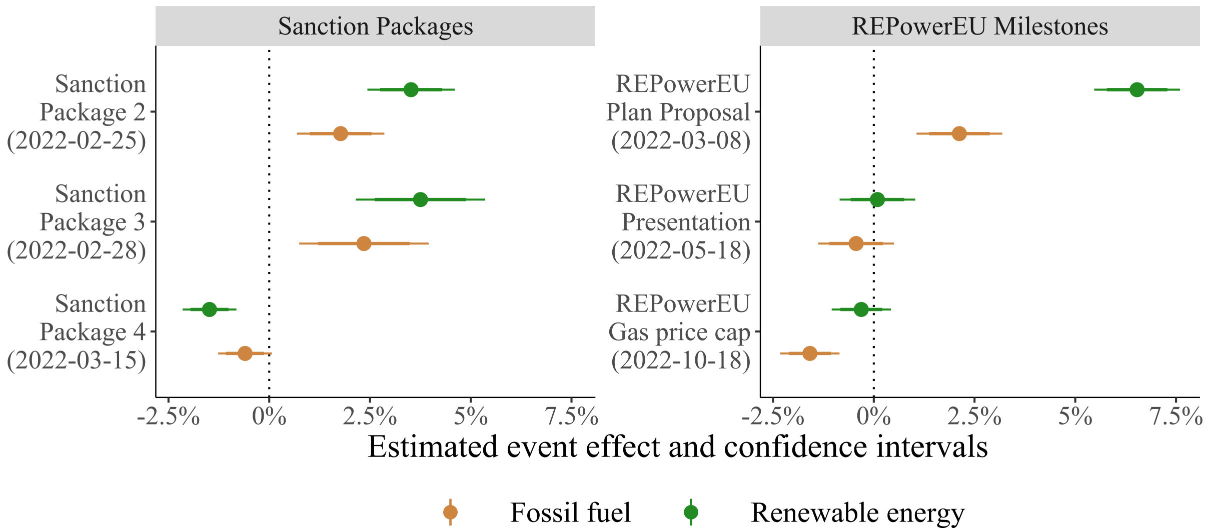

FIGURE C.4: Effects on *Abnormal Returns* obtained when considering only firms that are primarily traded in a European country

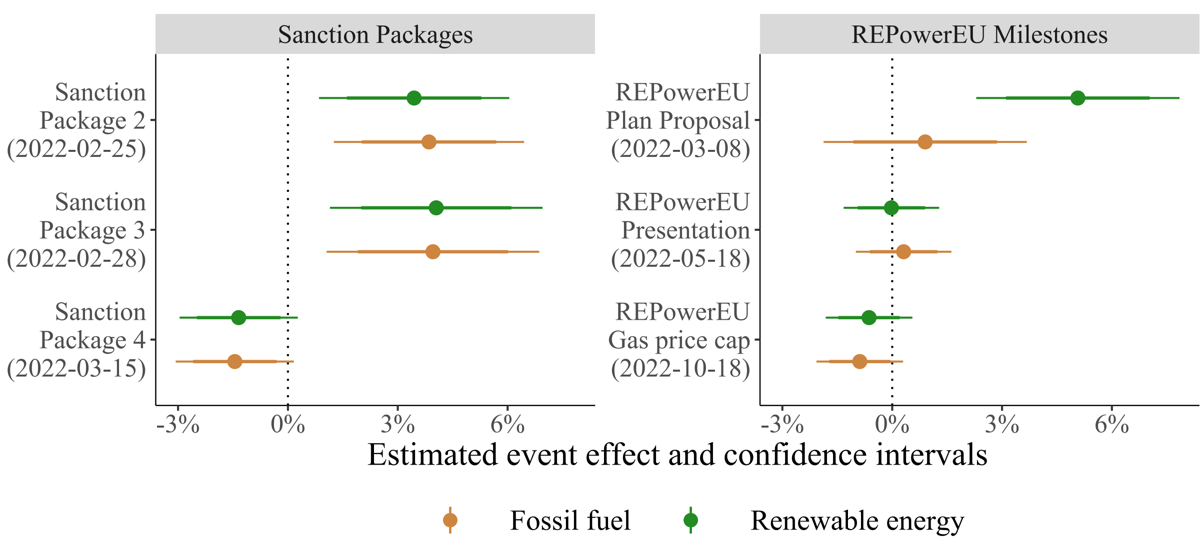

FIGURE C.5: Effects on *Abnormal Returns* obtained when considering only firms that are headquartered or traded in a EU member

C.4 Exclusion of Firms not Matching with Classification by Voeten (2024)

We exclude from our analysis firms that we classify as renewable energy producers and which Voeten (2024) classifies as fossil fuel. Results are in Figure C.6.

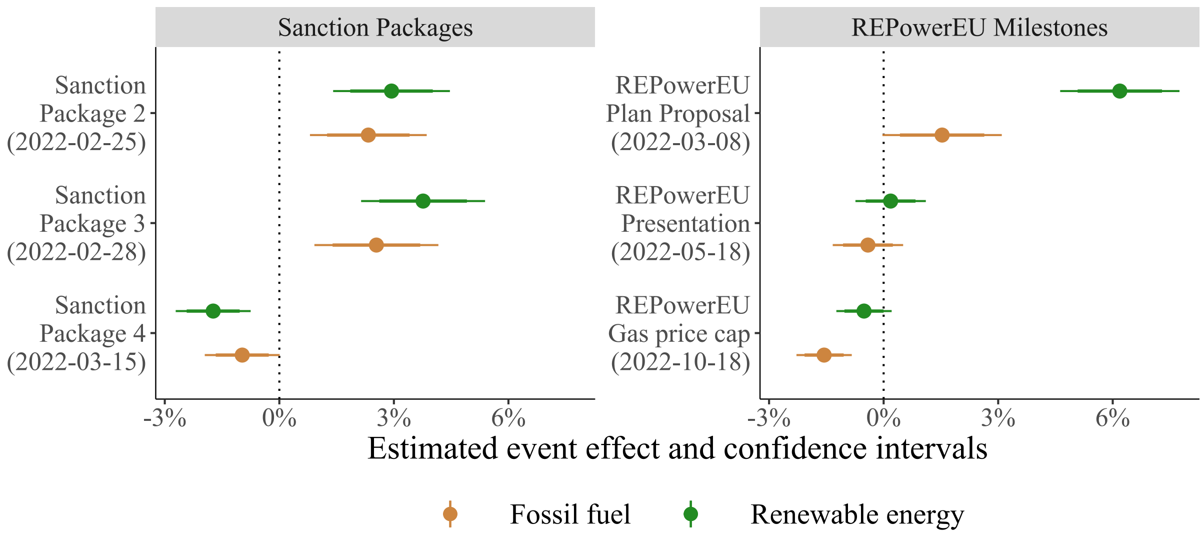

FIGURE C.6: Effects on *Abnormal Returns* obtained when excluding firms mis-classified based on data by Voeten (2024)

C.5 Exclusion of Firms with Imprecise Estimation

We test robustness of our results to the exclusion of firms whose counterfactual is based on market models with weak explanatory power. In Figures C.7, C.8, and C.9 we drop firms whose LASSO market models resulted in R2 lower than 0.10, 0.30, and 0.50 respectively. We still detect significant distributional effects, in the direction discussed in the main text, for REPowerEU events.

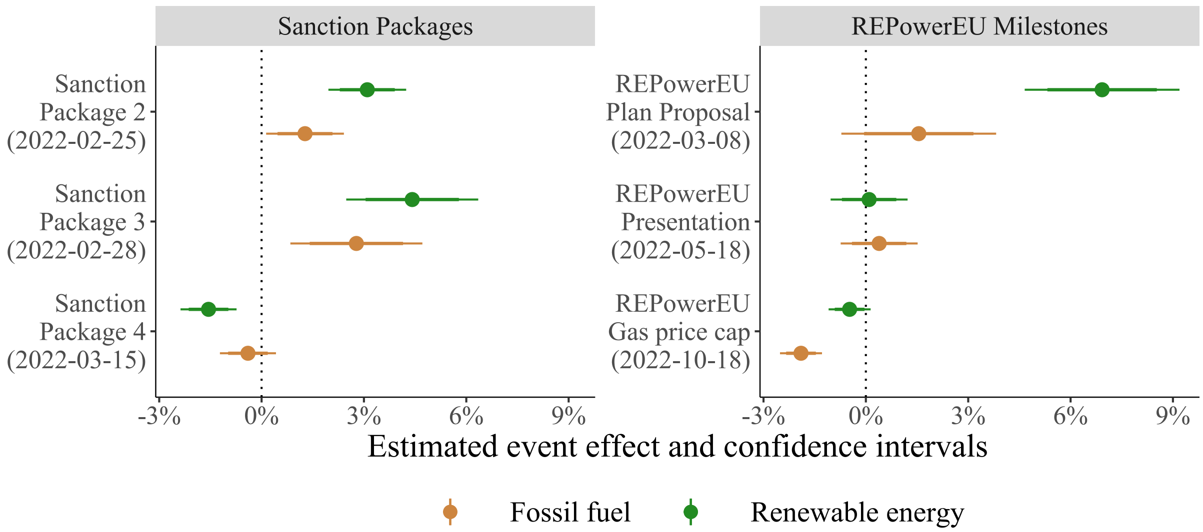

FIGURE C.7: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.10

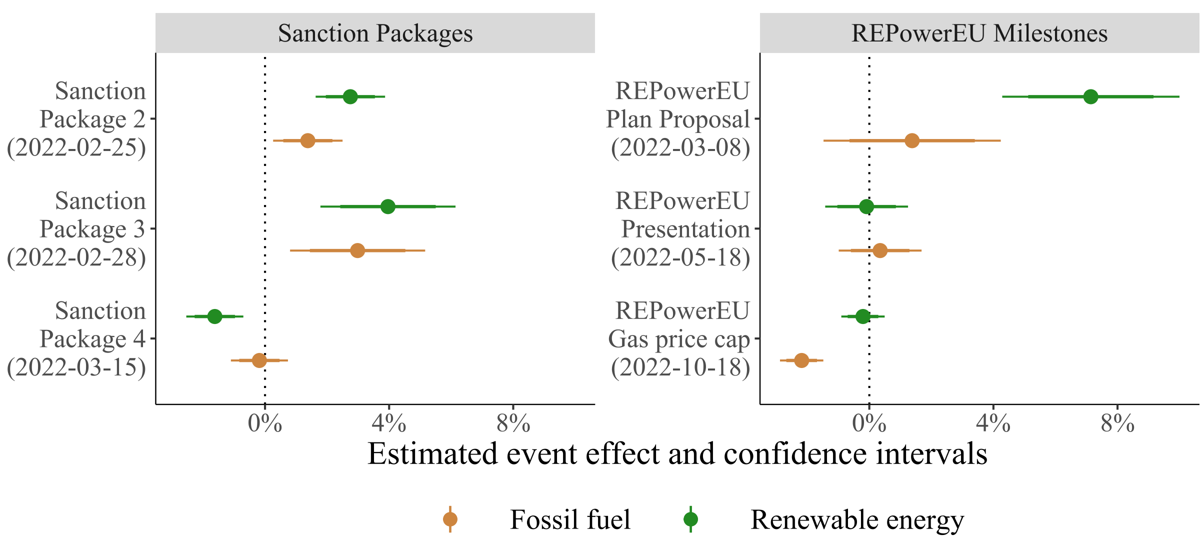

FIGURE C.8: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.30

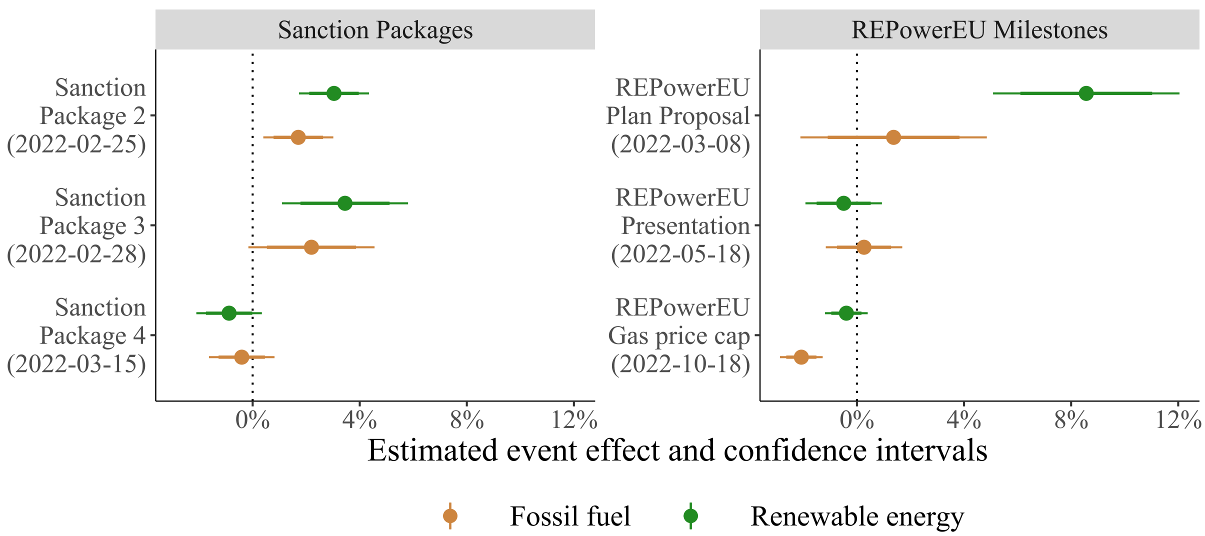

FIGURE C.9: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.50

C.6 OLS-imputed Counterfactuals

We replicate our analysis substituting LASSO-synthesized counterfactuals with OLS-imputed ones to test whether our results hinge on the chosen strategy. Because our matrix of S&P500 constituents includes 476 firms and estimation windows are 60 days long, using all 476 firms as predictors would result in unidentifiable OLS models with more predictors than observations. For this reason, in this test we substitute the 476 individual firms' returns used in the LASSO estimation with six market-wide aggregated indexes of firm financial performance: the S&P 500 aggregated index itself—as opposed to its individual constituents—(.SPX), the Dow Jones Industrial Average (.DJI), the Financial Times Stock Exchange 100 (.FTSE), the Frankfurt DAX Performance Index (.GDAXI), the Nasdaq-100 (.NDX), and the NYSE Composite (.NYA).

We predict firms' returns using the same procedure described in the main text (60 days-long estimation windows predating the event) including all six indexes as predictors. We then replicate the analysis as done in the main text: we perform a series of t-tests on the difference between *Returns* and predicted *Returns*—an OLS-imputed measure of *Abnormal Returns*. We test whether the average *Abnormal Returns* differ from zero for renewable and fossil fuel firms, distinguishing EU and non-EU based companies.

Figure C.10 reports our findings. We find similar effects as in our main analysis. The plan presentation of REPowerEU still has detectable distributional effects among EU companies, favoring renewable firms more than fossil fuel ones. Similarly, the plan presentation and October gas price cap had distributional (albeit more modest in size) effects among non-EU companies. Sanction packages had, instead, less clear-cut effects, with package 3 disproportionately benefiting non-EU fossil fuel producers.

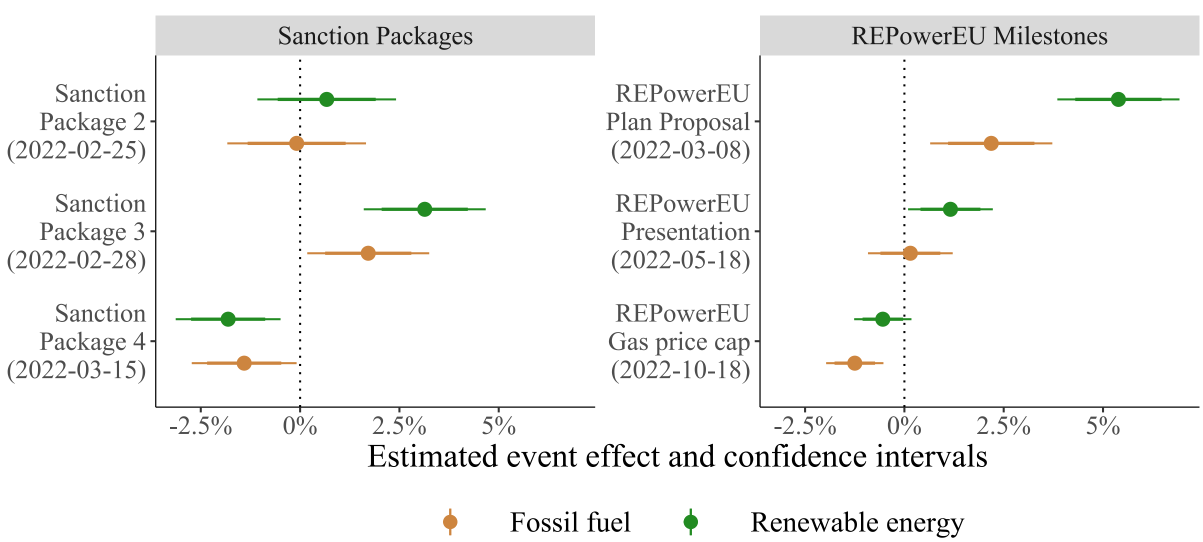

FIGURE C.10: Effects on *Abnormal Returns* obtained when using firm-level counterfactuals imputed using OLS models and market-wide indexes

C.7 Results from Modelling Raw Returns

For transparency, we report our findings when studying average raw firm *Returns* on the event days in Figure C.11. Although most effects are in line with those estimated using *Abnormal Returns*, we caution readers from interpreting these effects substantively as many of them change significantly once we account for market expectations.

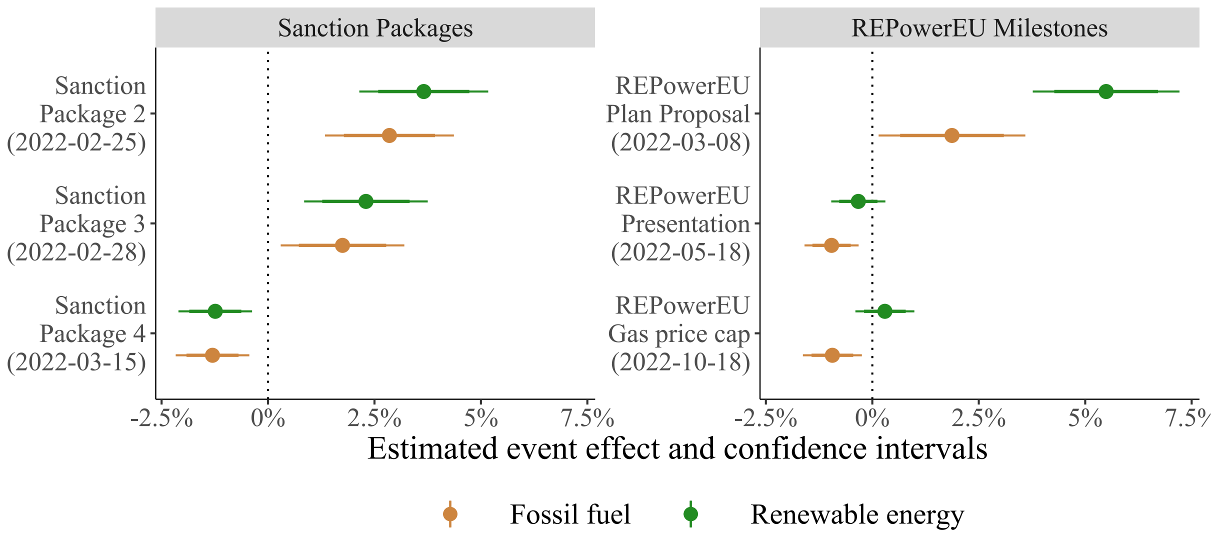

FIGURE C.11: Event effects on *Returns*. These estimates are obtained without discounting observed *Returns* from the market baseline.

C.8 Robustness of CAR Analysis: Exclusion of Firms with Imprecise Estimation

Similarly to what we did above, in Figures C.12, C.13, and C.14 we replicate our *Cumulative Abnormal Returns* analysis after excluding firms whose counterfactuals are based on LASSO market models with R2 smaller than 0.10, 0.30, and 0.50 respectively (all these analyses use windows of ten days to the left and right of each event). We find similar results to those reported in the main text, with a much larger spread between fossil fuel and renewable energy firms (favoring the latter group) in the EU in the context of the REPowerEU plan proposal.

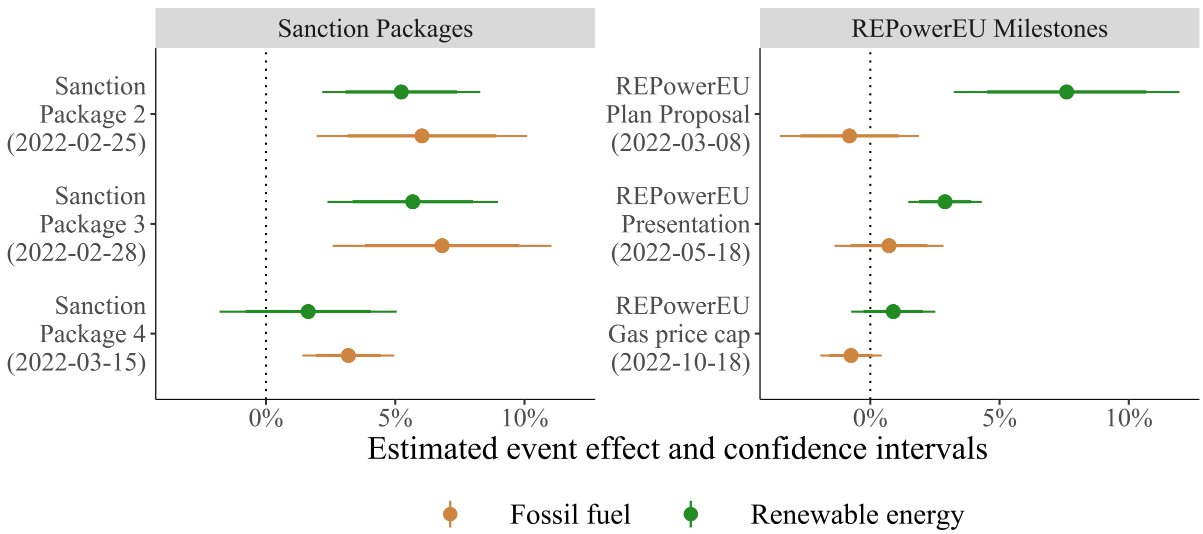

FIGURE C.12: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.10

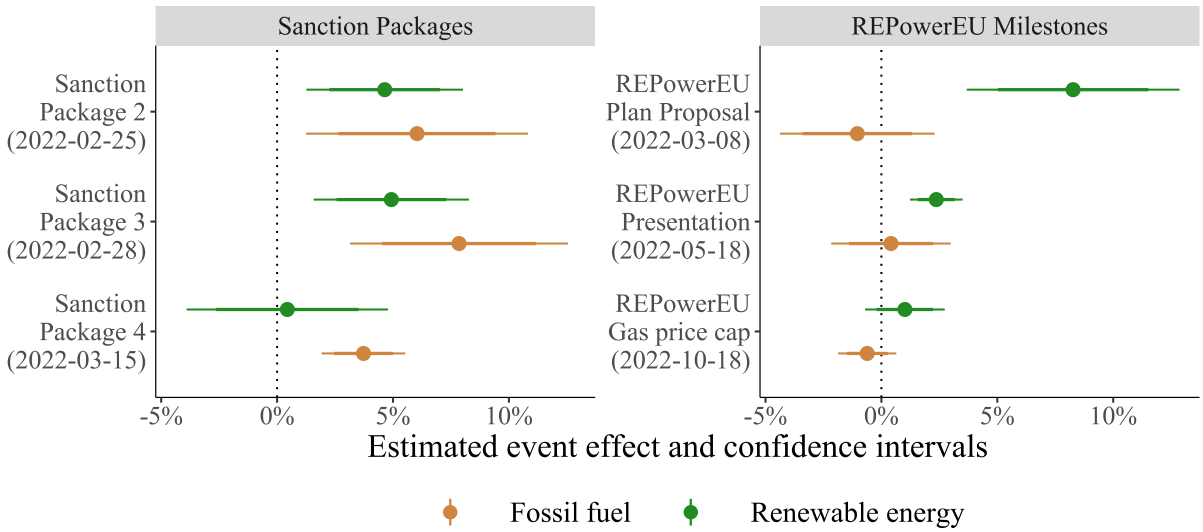

FIGURE C.13: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.30

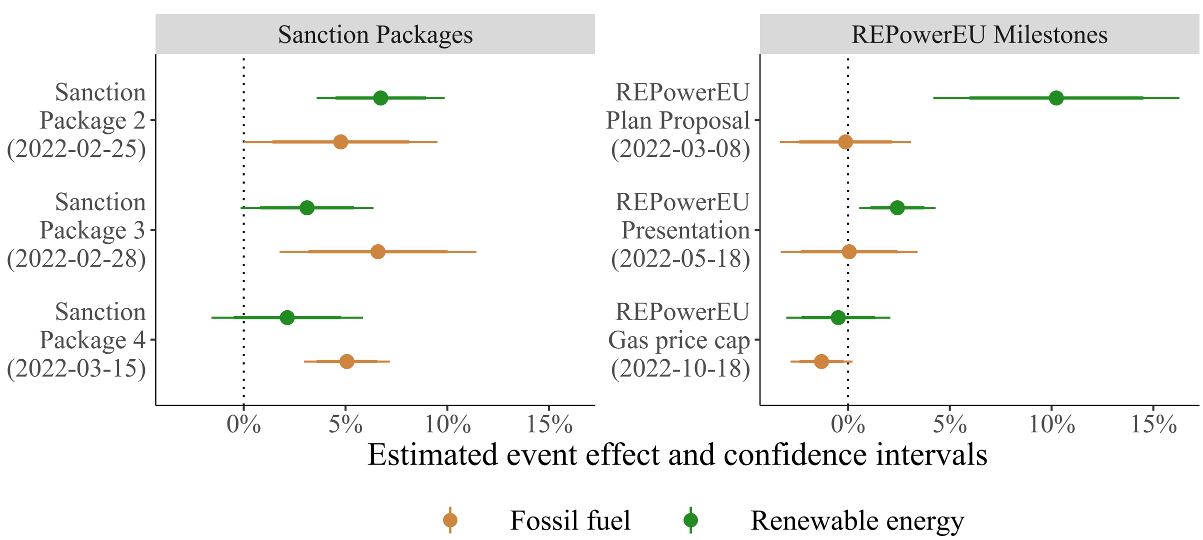

FIGURE C.14: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.50

C.9 Robustness of CAR Analysis: Different Time Window Sizes

In Figures C.15 and C.16, we replicate our *Cumulative Abnormal Returns* analysis after limiting the size of the time window used to twenty and five days to the left and to the right of each event, respectively. In this case, too, we find similar results to those reported in the text. The spread between fossil fuel and renewable energy firms in the EU becomes much larger on the day of the REPowerEU plan proposal when using a small window.

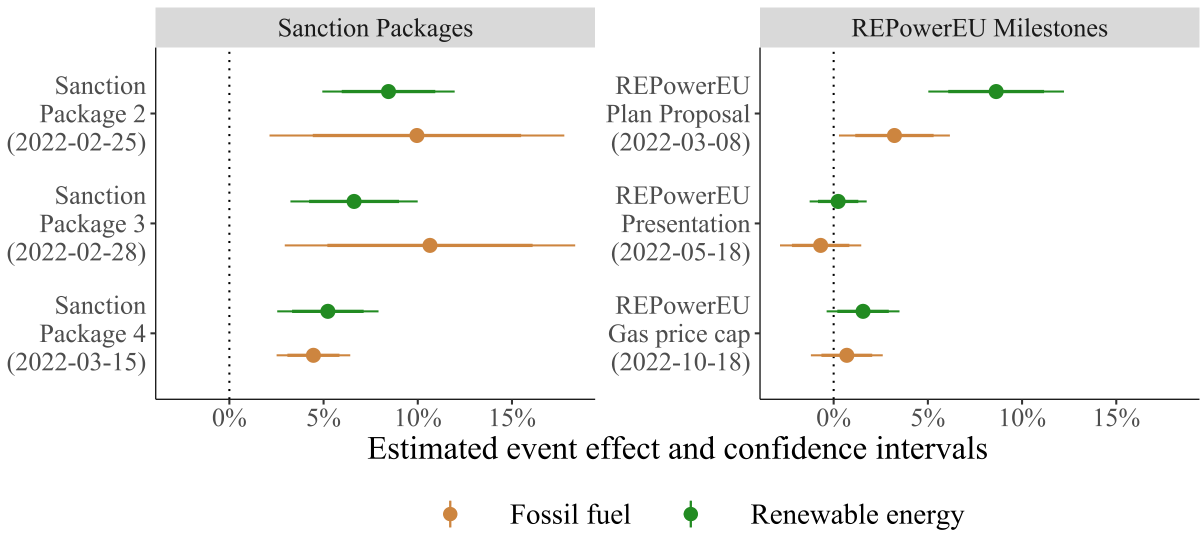

FIGURE C.15: Effects on *Cumulative Abnormal Returns* obtained when limiting time windows to 20 days to the left and right of each event

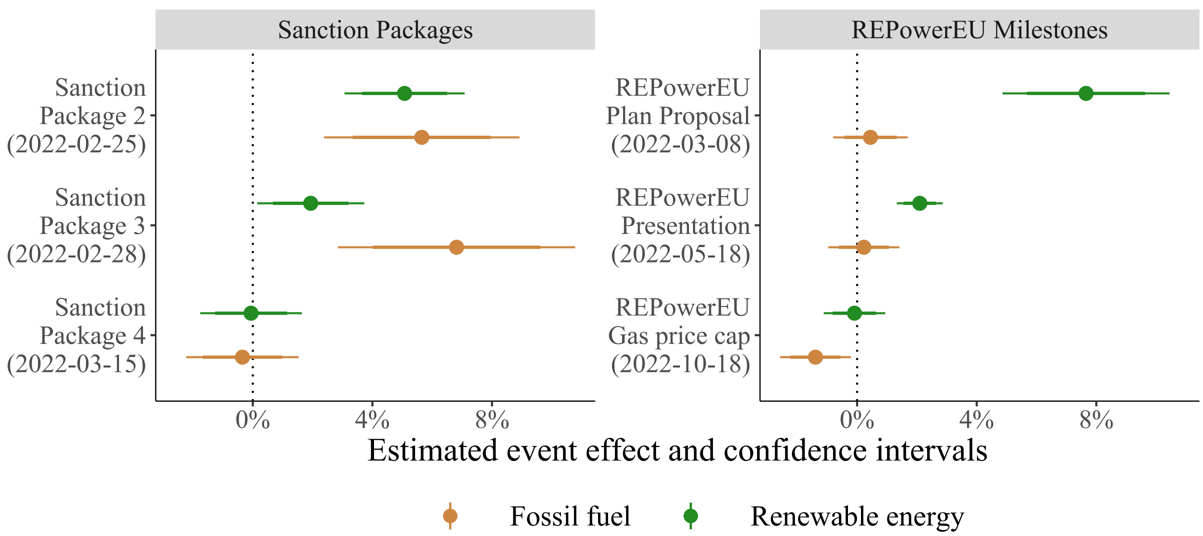

FIGURE C.16: Effects on *Cumulative Abnormal Returns* obtained when limiting time windows to 5 days to the left and right of each event