Energy Transition, Financial Markets and EU Interventionism*

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Abstract

A successful energy transition requires the sustained reallocation of private capital away from fossil fuel heavy assets to greener alternatives. In normal times, this transition is 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 policy interventions during the onset of the Russian invasion of Ukraine, our event study analysis of daily stock market data shows that markets were initially prepared to support a clean energy transition. These distributional effects, while short-lived, were strongest among EU firms and materialized only for policy announcements that could unmistakably be understood as unwavering commitments to the EU's green renewal. These findings emphasize that repeated and unambiguous political signals are necessary to create favorable conditions under which markets can support long-term policy goals.

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 low-carbon sectors, the *International Energy Agency* estimates in its 2023 World Energy Outlook 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 private investments, concerns about financial investors' short time horizons dampen the prospect of a market-led energy transition. Existing research, therefore, highlights the role of politics and 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 contrast to much of this work, which focuses on energy transition politics in normal times of policymaking, we study the response of financial investors to public policy signals in specific *crisis moments*. Namely, we examine if and under what conditions political reassurances about the future profitability of green industries can boost investments towards low-carbon assets in times of crisis and economic instability. We focus on market responses during the Russian invasion of Ukraine and motivate this choice with the observation that—despite initial commentary to the contrary—the war did not have a catalyzing effect for the energy transition because it did not hit fossil fuel producers with full force. [1] Consistent with the theoretical argument which we develop in this paper, we attribute this turn of events to weak top-level political commitments by the European Union (EU) leadership to the bloc's long-term green renewal.

Our study hones in on the conditions of credible communication of future energy policy between policymakers and markets in the context of the EU's response to the Russian invasion of

[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).

Ukraine in 2022. Doubling down on a similarly interventionist approach as seen in the "directionist coordination" (European Council, 2022) during the Covid-19 pandemic, the European 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 investors' preparedness to buy into the political vision laid out by such policies remain largely understudied.[2]

Against this background, our argument focuses on investors' perceptions of the credibility of policy signals by the European Union as *the* most important policy actor at this point in time. While some are skeptical about the EU's abilities for credible communication (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 looms large and market volatility is high, as was the case in Europe at the beginning of the war in Ukraine, markets seek guidance and 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 empirically observable market responses of increased returns for green companies as well as divestment from fossil fuel assets. To further qualify, we claim that these distributional effects of credible policy signals will be stronger for directly climate relevant announcements relative to indirect ones.

We empirically test these expectations by studying short-term stock market returns of EU-based

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

fossil fuel and renewable energy companies at the start of the Ukraine war.[3] Our event-study design of a sample of 70 EU-based energy companies shows that fossil fuel (38 companies) and renewable energy firms alike (32 companies) experienced abnormally high stock returns, significantly above market expectations and comparable across the two groups, when the EU Commission announced sanction packages that targeted the Russian economy 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 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 gains were not significantly above market expectations. However, all these effects, dissipate quickly: Once the EU's broader policy vision has been communicated through sanction and energy policy announcements, markets internalize this information and investors' responses become muted.

Our findings contribute to existing comparative political economy research in two important ways. First, they speak to broader debates about the relationship between politics and markets (Przeworski, 2003). Here, we provide a specific argument about the *types* of policy announcements and the *conditions* under which markets respond to such announcements in ways that are consistent with the overriding policy vision that is conveyed in them. We show that the ability of interventionist policy announcements to steer markets, in our case by reallocating capital and investment flows 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

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

policymaking will 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 international political economy more generally (Kim, 2017; Kim and Osgood, 2019; Baccini, Pinto, and Weymouth, 2017; Malesky and Mosley, 2018; Juhàsz and Lane, 2024). Existing research points to the nationality of company owners as a key fault line that structures the political interaction between governments and firms (Wellhausen, 2014). Adding to this line of work, we demonstrate that firm nationality (in our case, whether a company is based or traded inside *versus* outside of the EU) does not only shape the immediate 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. 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 to be essential to avoid forgoing opportunities of systematic, long-term change towards a more sustainable future.

Background: 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 the neoliberal fundamentals of competition and openness (McNamara, 2023). 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 regulatory 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, the success of market-based approaches is mixed (Green, 2021; Grischa 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 own 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 real momentum during 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" and are underpinned by a broad shift in policy vision. This new vision 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).

Such revival of interventionist policymaking links to two important drivers which have implications for the (re-)allocation of capital. 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, on the other hand, also induce new global competition, but the extent to which this happens depends on the domestic political economy and the country context (Nahm, 2021). In sum, 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 moment. Just like the oil crisis in the 1970s functioned as a catalyst for the global reform of energy markets (Meckling et al., 2022), so does the post-pandemic polycrisis invite policymakers to respond. 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 investor expectations and business opportunities, an effect that materializes 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 different types 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 investments, triggers observable responses in stock market returns—and if so, under what conditions.

The Argument: Market Responses to EU Public Policy Announcements in Times of Crisis

We start our argument about distributional effects of public policy announcements in market responses from the vantage point of a large political economy literature that characterizes when and how political communication moves expectations of financial markets (Benton and Philips, 2020; Voeten, 2024). 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 hence 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 may understand announcements of public policies that are interventionist in nature as protectionist, depressing financial actors' profit expectations (Wolf, 2023).

In view of this evidence, we argue that the EU has a more significant role to play for triggering 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 investment portfolios in more normal times, EU announcements carry special weight in crisis moments when political and economic uncertainty are high, and markets are volatile. This is both a function of the size of the EU Single Market—with 450 million people and an output of US$16 trillion—and its institutional stability. Multi-level governance is a boon during crisis episodes as interlocked decision-making

[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.

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 fundamental logic holds for any crisis, but grows in importance the more existential a crisis is. The European financial crisis, the Covid-19 pandemic, and the crisis induced by 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 its government 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, do hold the potential to invite clear market reactions.

We posit that how and for whom these announcements matter will depend on *the type of announcement* and *the type of firm*. We develop expectations about the distributional effects of public policy announcements—and how they translate into market responses—along these two key dimensions.

Confronted with the Russian attack on Ukraine, the European Commission, broadly put, responded with two types of announcements: some announcements—primarily of geopolitical nature—were targeted sanctions against Russia; 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 have implications for energy markets, we argue that distributionally relevant differences in contents exist.[5] The sanctions packages were varied in whom they targeted,

[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

and were broader than just hitting energy markets and associated gas and oil infrastructure. EU sanctions importantly demonstrated the bloc'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 in the energy market, in particular, and served as tailored reassurances of the EU's long-term and sustained commitment to a green renewal.

This 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 sanctions 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 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

strategy for future research.

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

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 akin to findings in the literature on green industrial policies that simultaneously squeeze fossil fuel producers' market share 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 do 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 von der Leyen, the European Commission president, in 2019, set out the policy 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 smaller, Central and Eastern European member states like Czechia, Hungary and Poland, as well as the EU's large 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, includ-

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

ing 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 in a tweet:

> 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). 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 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.

[8] A full timeline of all of the EU's 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/.

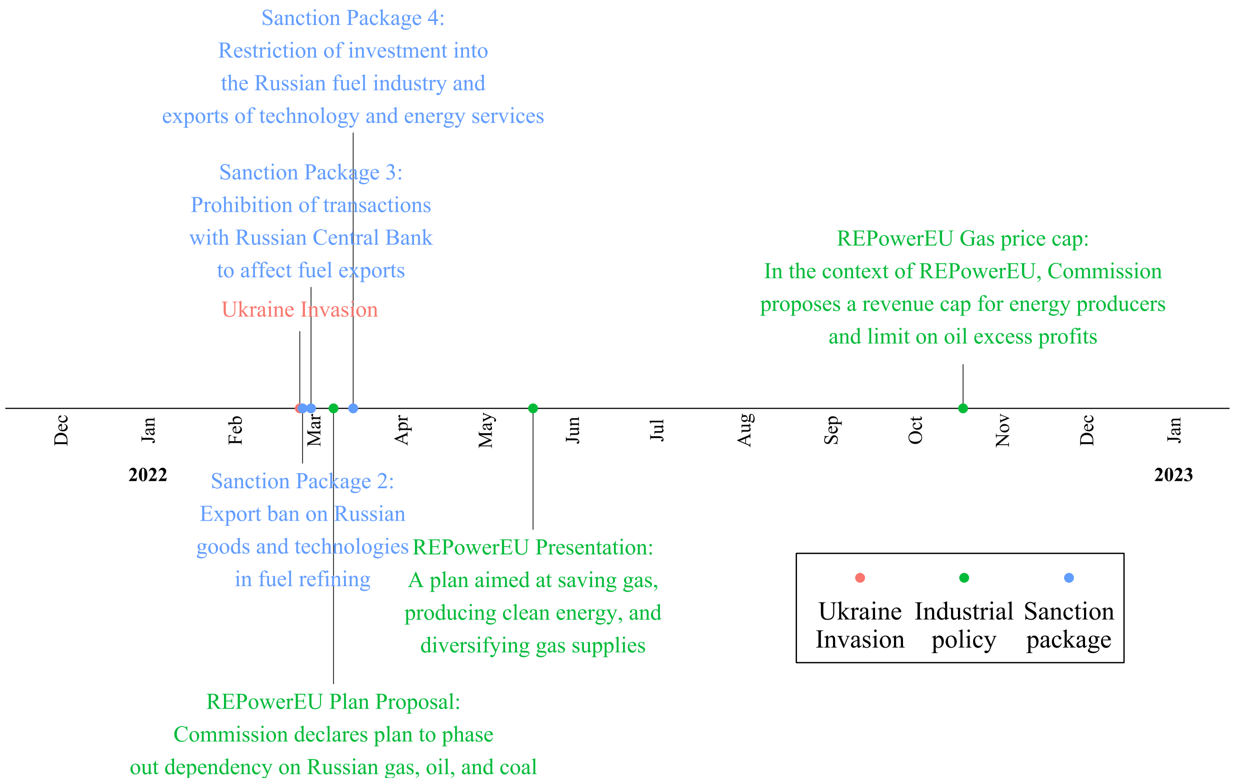

FIGURE 1: *Timeline of EU Commission announcements by type of event.* The figure marks announcement dates for sanction packages 2–4 in blue and REPowerEU policy measures in green. The red dot indicates the invasion of Ukraine on 24 February 2022.

These sanction announcements against Russia 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 vision was initially proposed on 8 March 2022 (European Commission, 2022*c*), before 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 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.

Our analysis leverages the timing of these events, which can reasonably be expected to shape investors' market outlook during moments of geopolitical and macroeconomic instability. Since uncertainty was highest in February 2022, right after the invasion, we assume that earlier announcements will have stronger market reactions than later ones.

Research Design

We use an event study design to test the expectations of our argument that European Commission announcements of distributionally relevant information will trigger different market responses as a function of both the type of announcement and the type of firm. Our empirical analysis examines stock market returns for EU energy firms *on the day* of each of the six announcements identified above.

Sample and Stock Market Returns Data

We collect data on stock market returns for EU publicly traded companies, which we group into different samples. Our first two samples include fossil fuel producers (32 firms) and renewable energy producers (38 firms) that are either headquartered or traded (or both) in a EU member state.[9] 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.[10]

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 their core activities are fossil fuel electric power generation; petroleum refining; natural gas or crude petroleum extraction; or underground, surface, bituminous coal, or lignite mining. Companies that operate as

[9] We also collect data for 376 fossil fuel and 153 renewable energy firms that are neither headquartered nor traded in a EU member state for an additional analysis to explore the geographic scope conditions of our argument.

[10] All data are retrieved from Eikon's API, and Appendix A details data selection.

electric power generators from biomass, geothermal, hydroelectric, solar, wind or other renewable sources are grouped into the renewable energy sample. Offering basic face validity to our assignment process, several of the largest publicly traded fossil fuel companies, such as Aramco, BP, Chevron, Eni, Equinor, ExxonMobil, Marathon Petroleum, Phillips 66, Shell PLC, TotalEnergies, and Valero, are selected into the fossil fuel firm category, while major renewables firms NextEra, Jinko, and Brookfield Renewable feature as renewable energy ones.[11]

Figure 2 provides a basic break-down of firms in our EU sample by NAICS industrial sector (see Figure A.2 in the Appendix for non-EU firms). Histograms show the number of companies in each sector, and crosses indicate companies' average share price over the month of December 2021. Across fossil fuel and renewable producers, companies are rather well balanced both in terms of the total number of firms in each category and the overall distribution of average share prices.

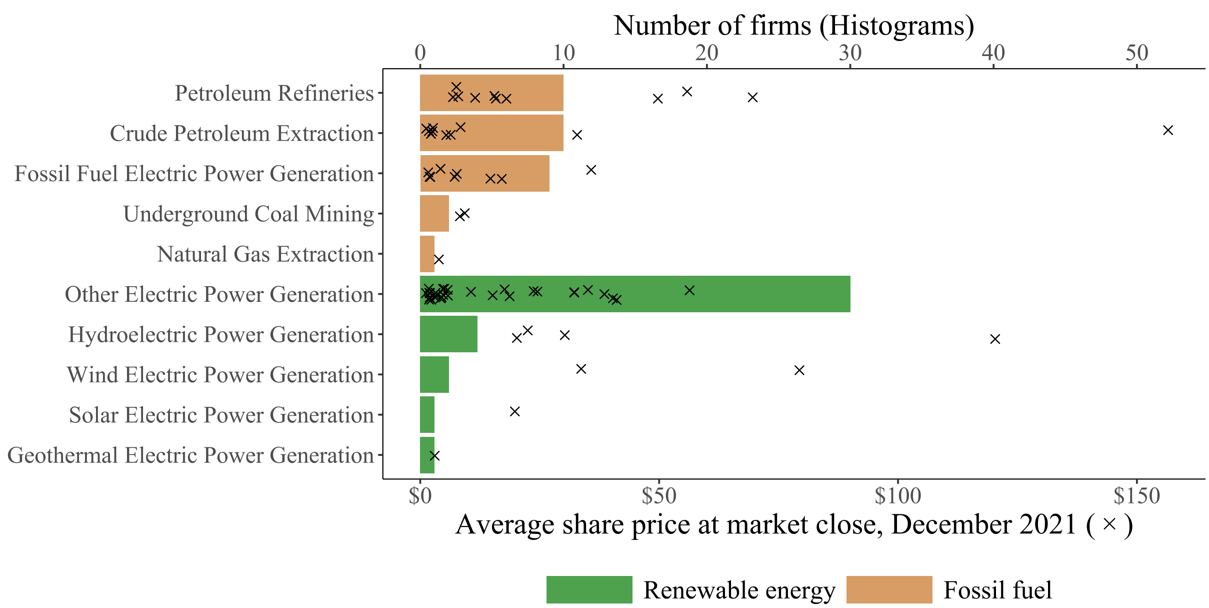

FIGURE 2: *Description of EU based or EU traded fossil fuel and renewable energy firms.* Histograms report the number of firms by NAICS industrial sector code (top x-axis) and crosses show the average firm market price in December 2021 (bottom x-axis).

[11] We exclude state-owned oil companies, such as Sinopec.

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 two trading days. Since, for any level of supply, increases in returns are driven by greater demand, positive returns correspond to higher profitability of holding these stocks, and *vice versa*. Changes in market valuation therefore nicely 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 investors' profit expectations for fossil fuel and renewable energy investments. 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 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 rather than the usual market indexes as predictive covariates in our estimation models (Wilf, 2016). Given that many firms in our fossil fuel and renewable energy samples 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.[12] 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).

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 dif-

[12] We exclude all 24 firms from the S&P 500 list that are also part of our 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.

ference in means for firms grouped into the fossil fuel sample compared to those in the renewables sample (Hypothesis 2).

Results

Figure 3 presents our main findings. For each event, plotted along the x-axis, we show the estimated average abnormal returns for EU energy companies, separately for fossil fuel producers (brown) and renewables firms (green). We distinguish between the type of policy announcement and show results from sanctions packages (top panel) and RePowerEU announcements (bottom panel).

In short, the early announcements by the European Commission—both in terms of sanctions packages and an economy-wide green renewal—moved market prices of EU-based energy firms sizably and to a similar degree across both brown and green producers. Consistent with our argument, the distributional nature of EU policy announcements is most visible for the RePowerEU package that clearly (and statistically significantly) separates green, "winning" companies from brown, "losing" companies based on the expectation that carbon-intensive business models are incompatible with ambitious climate action. Documented effects are, moreover, short-lived: announcements from the end of March 2022 produce substantively small or null effects, and the differential impacts for fossil fuel and renewable energy producers largely wash out.

Unpacking the empirical results announcement-by-announcement, the second and third sanctions packages that followed within a week of the Russian invasion triggered positive market responses of EU producers. Their abnormal returns were between 3.8%-4.1% above market expectations for fossil fuel producers and between 3.4%-4.0% for renewable energy producers.

Among all European Commission announcements, the RePowerEU plan proposal was the most consequential in terms of facilitating the green energy transition. It significantly boosted investors' profit expectations for European renewable energy producers, resulting in average abnormal returns

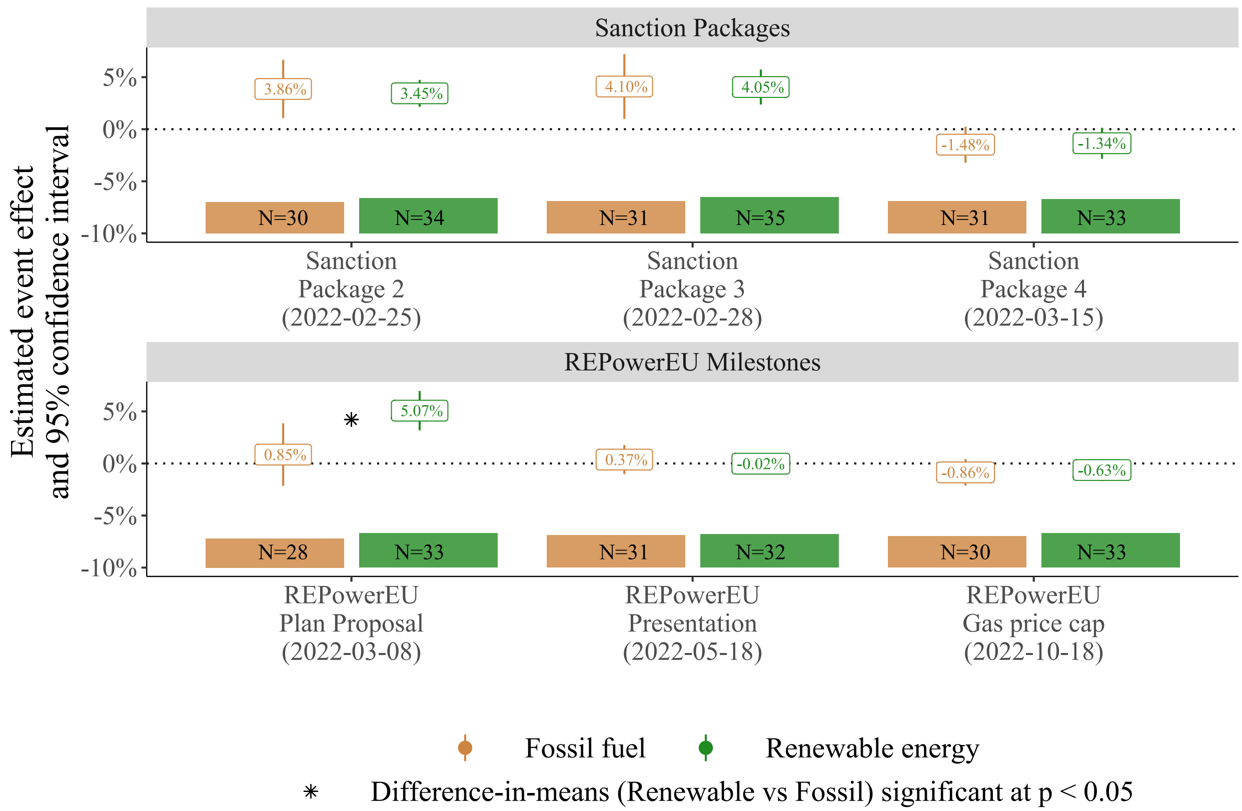

FIGURE 3: *Average abnormal returns for fossil fuel and renewable energy producers (EU firms).* The figure shows the estimated average abnormal returns for energy companies based or traded in the EU, distinguishing between sanction packages (top row) and RePowerEU announcements (bottom row), separately for fossil fuel producers (brown) and renewable energy producers (green). Vertical bars denote 95% confidence intervals. Histograms report sample sizes, and an asterisk indicates that group means of abnormal returns between brown and green energy companies are statistically significantly different at $p < 0.05$ in two-tailed t-tests.

of more than 5% above market expectations. European fossil fuel producers, on the other hand, saw market valuations only increase insignificantly above market expectations of less than one percent. We attribute this positive 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, we show in Figure 4 below that, despite strong effects for EU producers, the *same* announcement had little effects for companies outside the European Union. This offers compelling evidence that market participants can reliably separate between the material consequences of Commission announcements for EU and non-EU firms. Given RePowerEU's focus on infrastructure investment and green industrial policy in EU member states, most of the policy benefits will accrue to EU-based companies inside the bloc's Internal Energy Market.

Announcements that were made five to six weeks after the invasion had overall much weaker effects, no matter their type. Neither the fourth sanctions package nor the formal presentation of the RePowerEU policy or the gas price cap did move EU 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 communication 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. Among non-EU producers, RePowerEU announcements in May and October 2022 had substantively negligible, yet differential effects between brown and green producers.

Additional Results and Robustness

Results presented so far capture abnormal returns on the day of the announcement itself, and we show how abnormal returns accumulate over a symmetric time window of ten days before and after

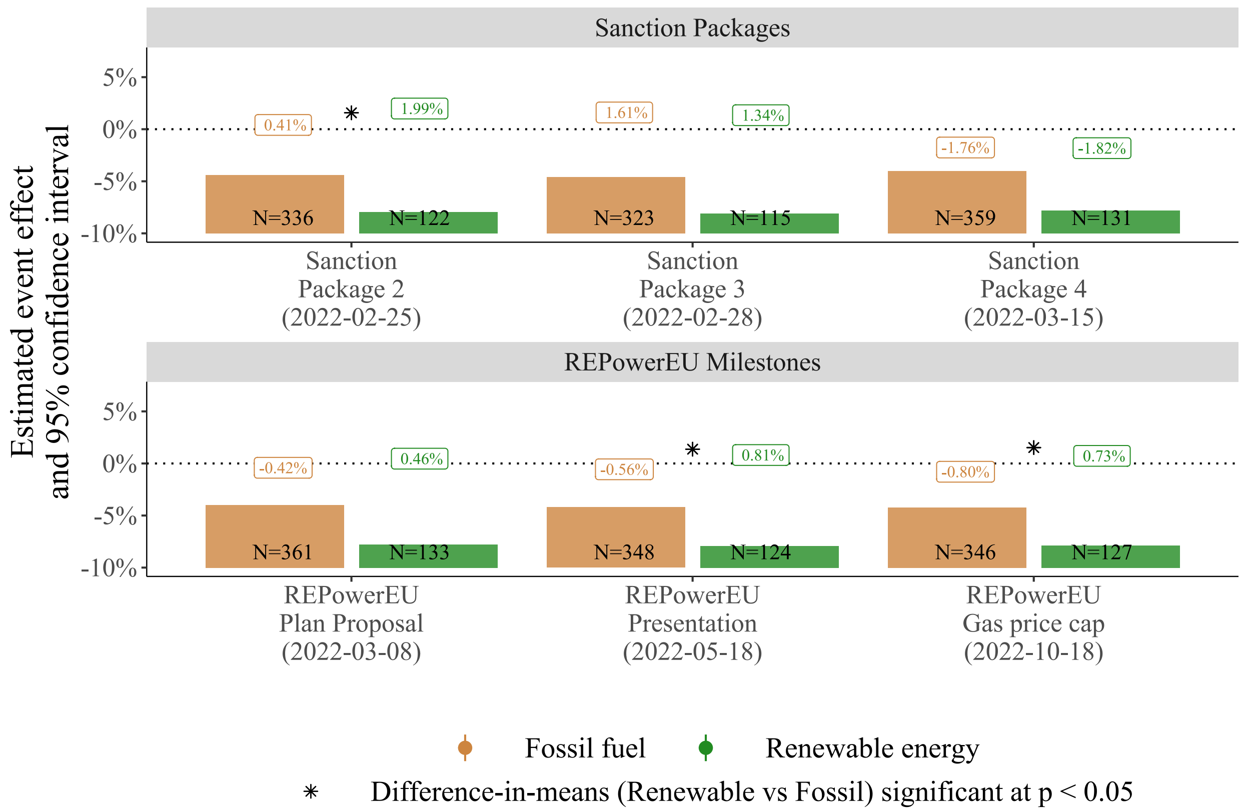

FIGURE 4: *Average abnormal returns for fossil fuel and renewable energy producers (non-EU firms).* The figure shows the estimated average abnormal returns for energy companies based or traded in the EU, distinguishing between sanction packages (top row) and RePowerEU announcements (bottom row), separately for fossil fuel producers (brown) and renewable energy producers (green). Vertical bars denote 95% confidence intervals. Histograms report sample sizes, and an asterisk indicates that group means of abnormal returns between brown and green energy companies are statistically significantly different at $p < 0.05$ in two-tailed t-tests.

each event for EU companies in the Appendix.[13] For sanctions 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. In summary, evidence from cumulative abnormal returns suggest that rather than an opportunity to fast-track the energy transition, investors seem to have understood sanction packages much more as opportunities for fossil fuel energy producers to cash in on massive windfall profits from making up the shortfall of Russian supply contraction. At the same time, 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.

Our appendix also presents several robustness checks. First, since our results depend on the accuracy with which we can estimate company-level counterfactuals, we discard firms for which counterfactuals come from LASSO market models with an R^2 statistic of less than 0.1, 0.3, and 0.5. For more precisely estimated counterfactuals, we find similar, and generally larger, distributional effects for policy announcements tied to the RePowerEU investment initiative. Second, we corroborate that using standard ordinary least squares (OLS) regressions with market indexes as predictors (instead of LASSO) produces similar findings, as does using raw returns measures. Third, we show that the results for the cumulative abnormal returns analysis are robust to dropping imprecisely estimated counterfactuals and using different event window sizes.

[13] 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.

Conclusion

This paper seeks to address a canonical political economy question: when and how do markets respond to policy announcements? We study this question in the context of the recent turn towards greater governmental interventionism into free financial markets in response to pressing geopolitical and environmental problems. At its core, we argue that, especially in times of crisis when markets seek stability, policy interventions can serve as credible signals to shape investment and capital (re)allocation decisions by investors. Under such conditions, policy announcements can trigger distributional effects from aligning investment and market incentives with the policy vision to address governance challenges, such as the energy transition. However, sustaining credible communication with markets is difficult in the long run as it requires consistent political effort and repeatedly reassuring institutions.

Focusing on EU interventionism in response to the Russian war in Ukraine as our case, 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 energy producers' market valuation, especially among European companies. Sanction packages, on the other hand, boosted market valuations across the board without any separation between fossil fuel and renewable energy sources. We take this as evidence that these announcements were perceived by markets as fuzzier signals that are only *indirectly* linked to the energy transition and, hence, undermined efforts for greater climate ambition and for weening Europe off its gas. In any case, the abnormal returns we identify dissipate quickly over time and mostly disappear by summer 2022. The preparedness in financial markets to align investments with a low-carbon future existed right at the start of the Russian invasion, but fizzled out over the course of the year.

For future work, these findings raise important questions for scholarship on the politics of the energy transition and broader 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 (Finnegan, 2022*b*). 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 investors' 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 (Colgan, Green, and Hale, 2021; Green et al., 2022). Our paper builds on this intuition and finds empirical evidence in support for 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. Developing this theoretical foundation in greater detail will be the next step.

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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.[14] 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.[15] 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.[16]

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.

[14] 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.

[15] 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)," and "Bituminous Coal Underground Mining (212112)."

[16] 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. 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.

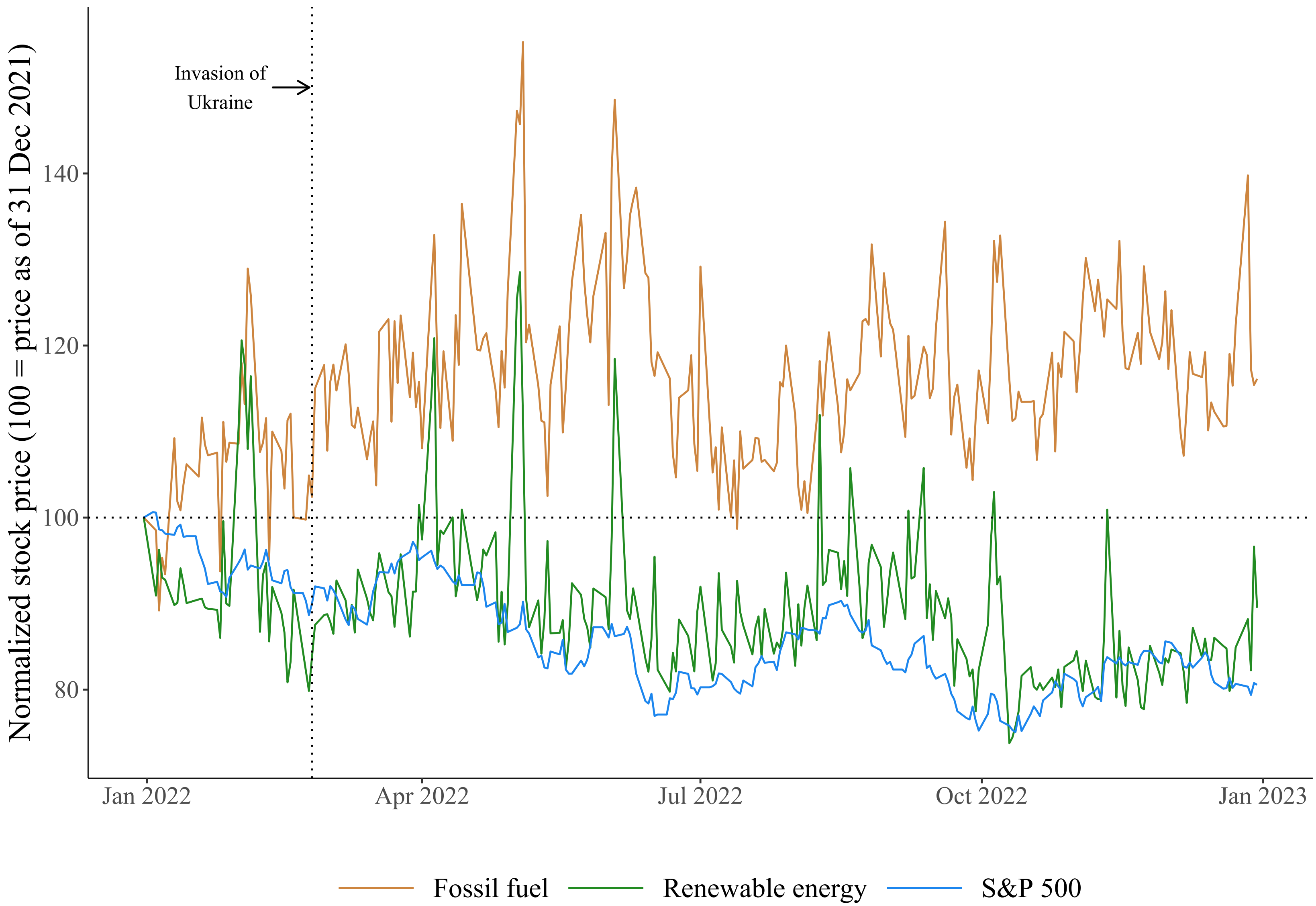

FIGURE A.1: Daily stock prices normalized as of December 2021, one year (YTD) trends

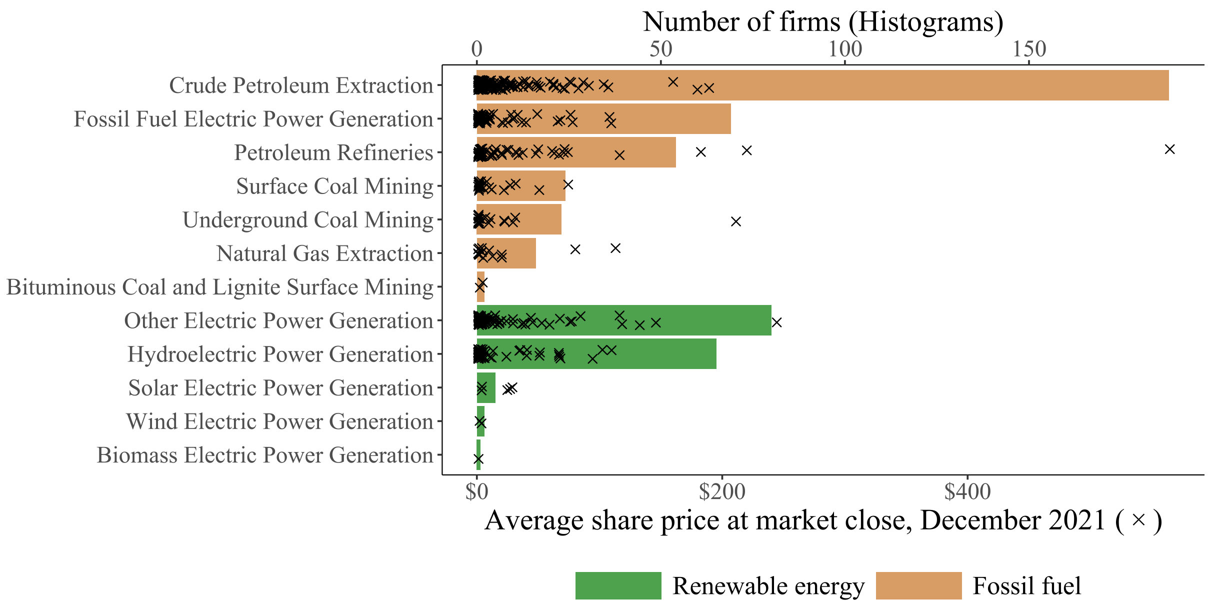

FIGURE A.2: *Description of non-EU based or non-EU traded fossil fuel and renewable energy firms.* Histograms report the number of firms by NAICS industrial sector code (top x-axis) and crosses show the average firm market price in December 2021 (bottom x-axis).

B Additional Results

B.1 Research Design: Calibration

Our research design allows us to estimate the effect of each event as the average difference between observed and counterfactual *Returns* on the event day. Figure B.3 exemplifies how the counterfactual values perform compared to the observed ones in the early days of the war.

B.2 Robustness: 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 B.4, B.5, and B.6 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.

B.3 Robustness: Results from Modelling Raw Returns

For transparency, we report our findings when studying average raw firm *Returns* on the event days in Figure B.7. 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.

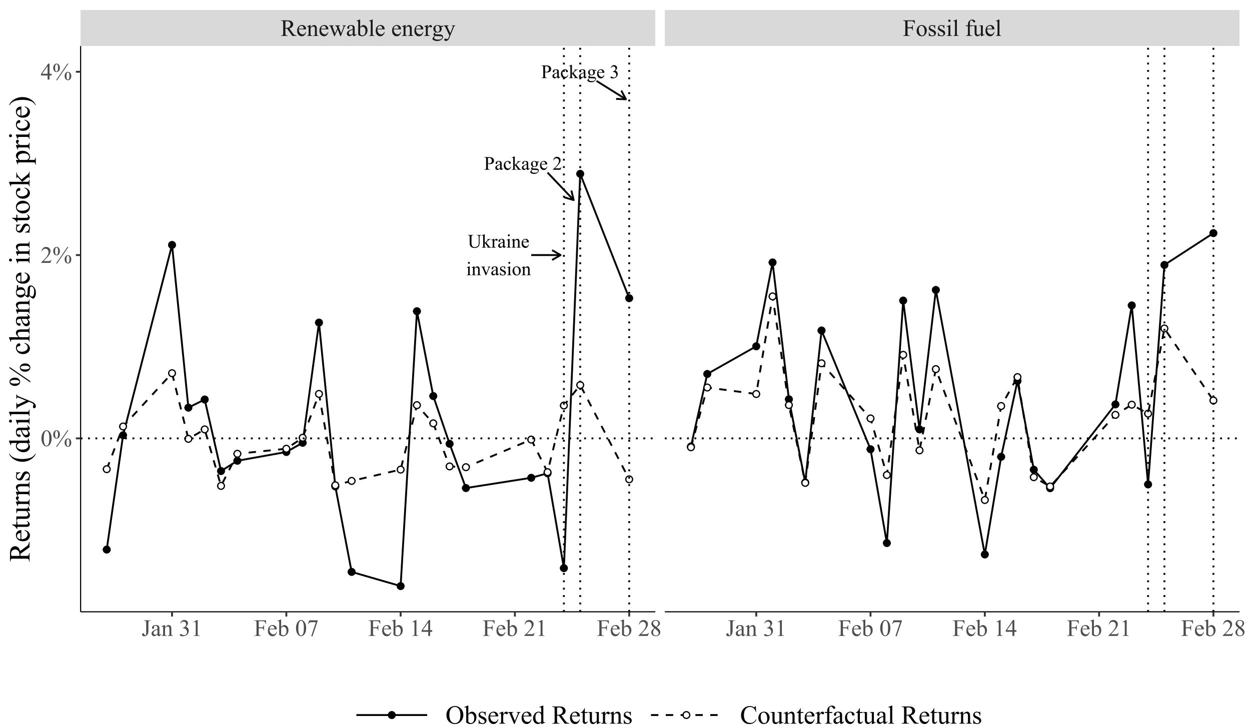

FIGURE B.3: Comparison of Observed and Counterfactual (predicted) Returns

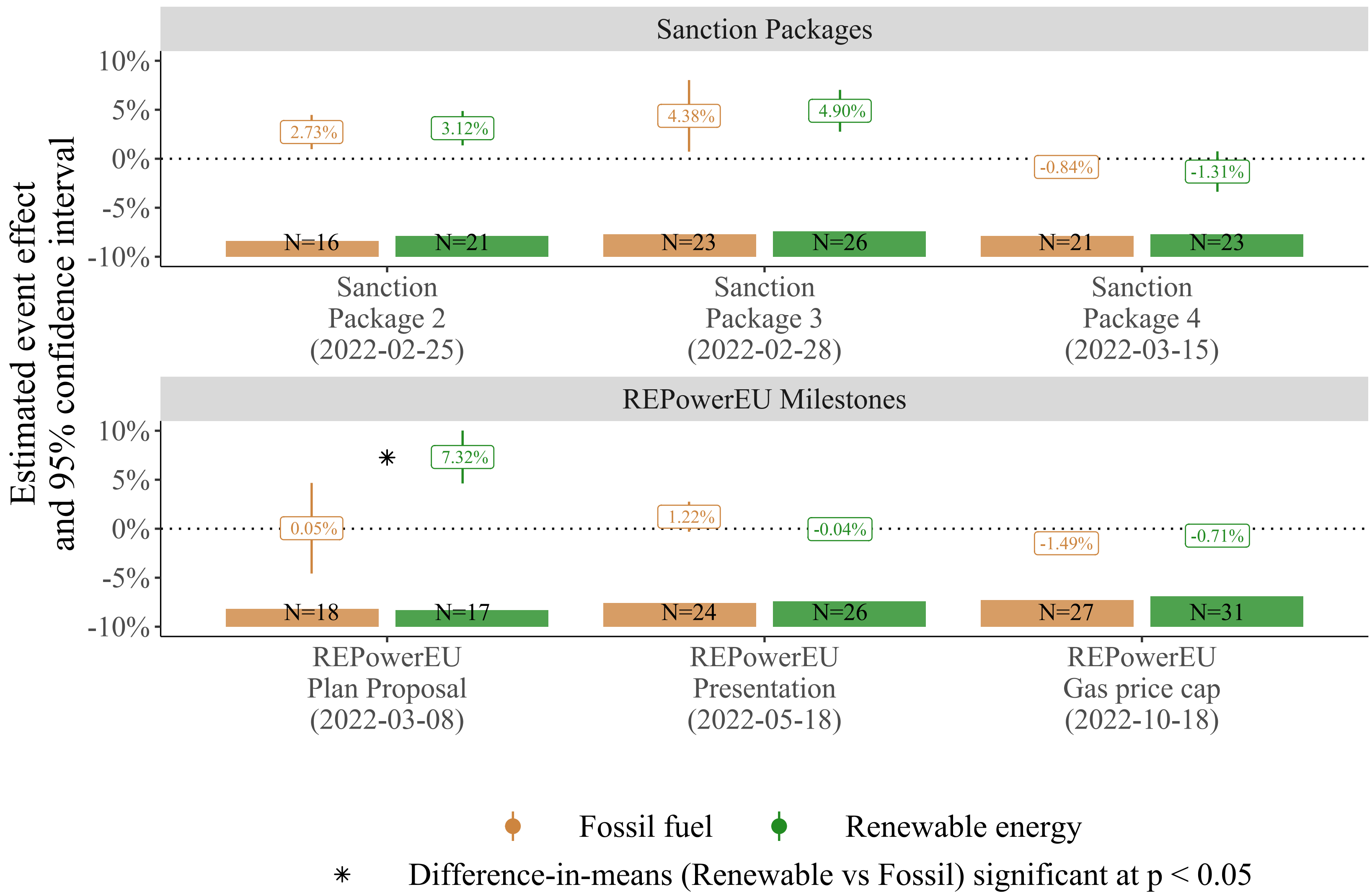

FIGURE B.4: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.10

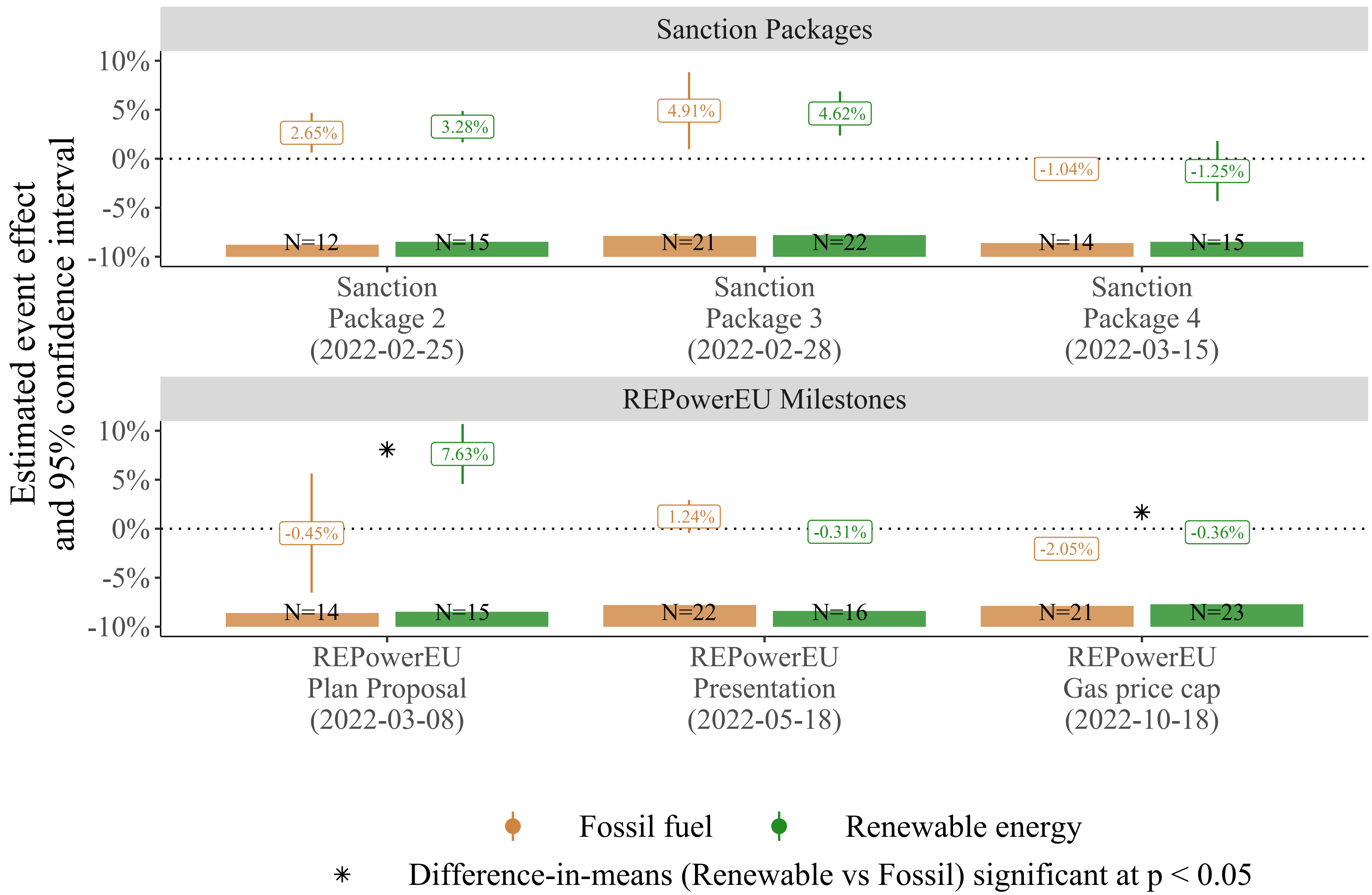

FIGURE B.5: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.30

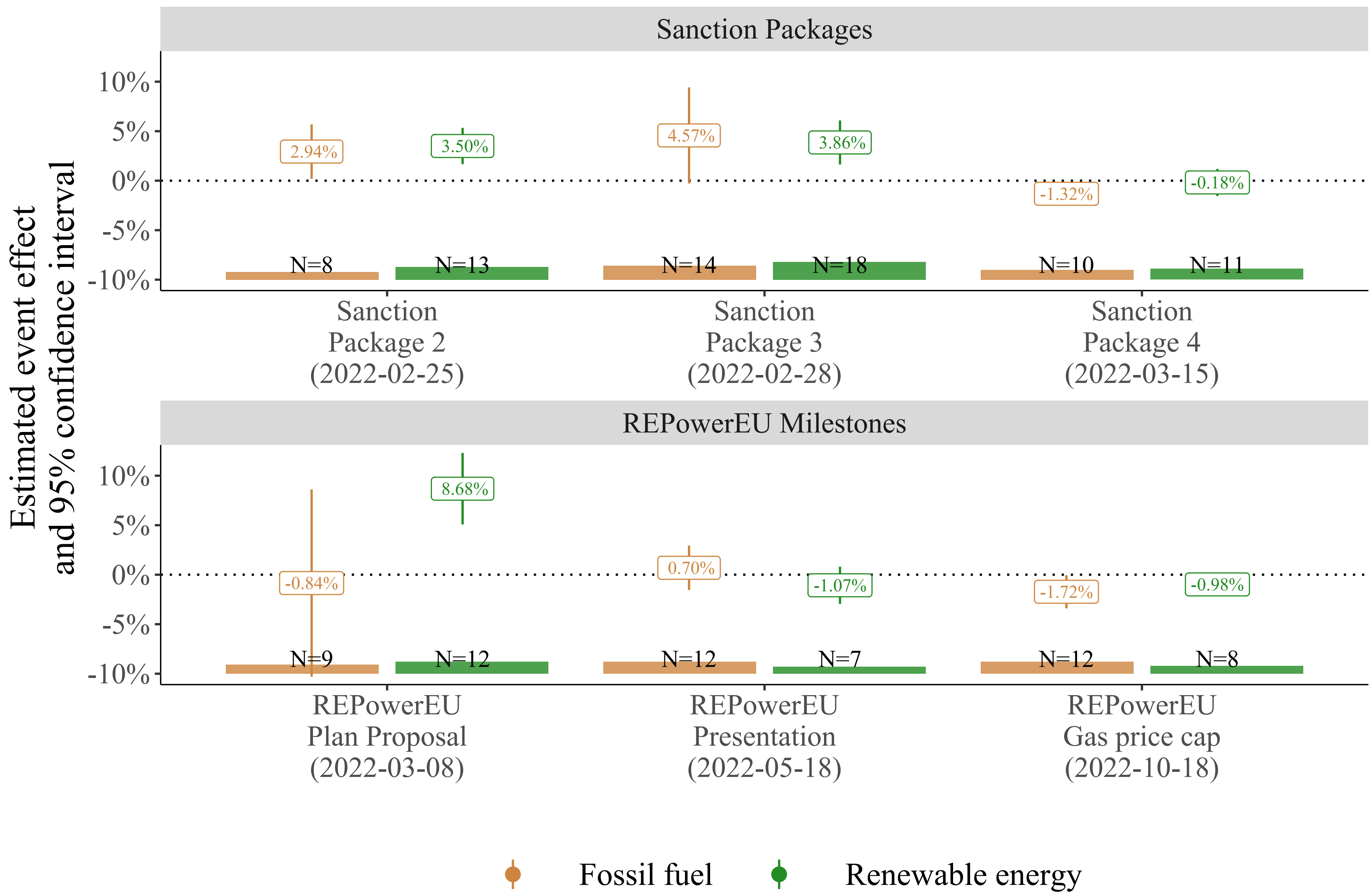

FIGURE B.6: Effects on *Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.50

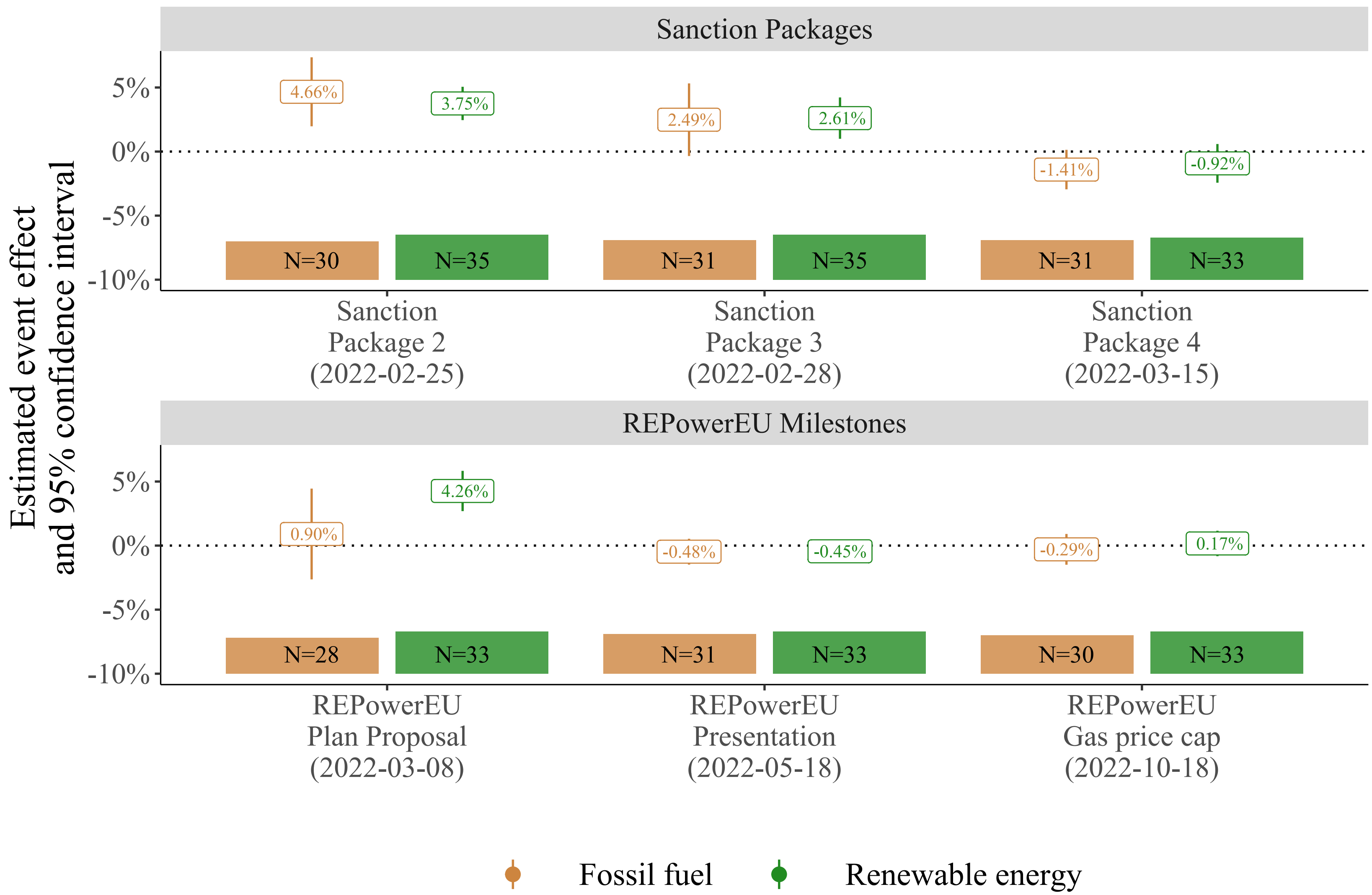

FIGURE B.7: Event effects on *Returns*. These estimates are obtained without discounting observed *Returns* from the market baseline.

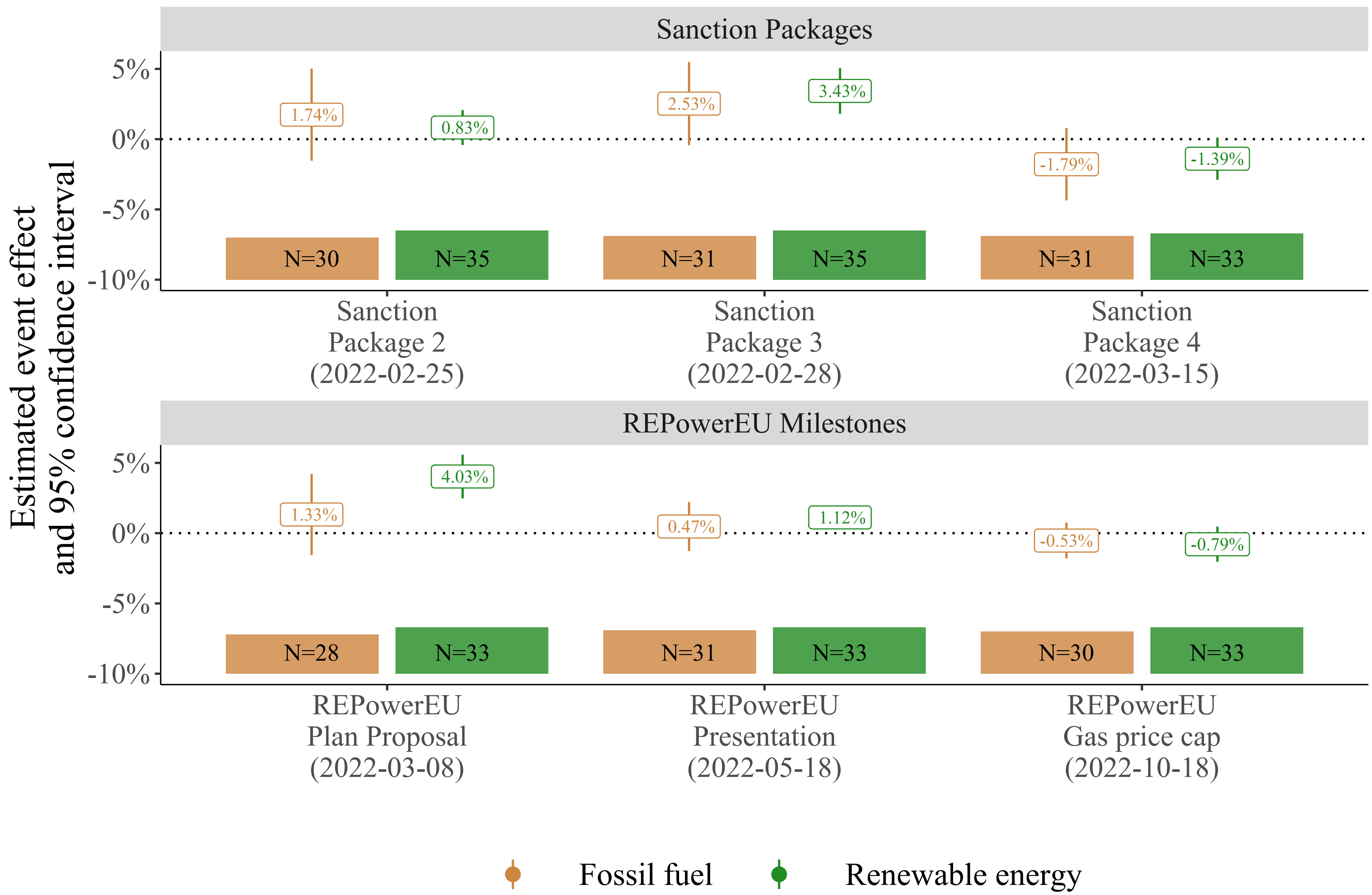

FIGURE B.8: Effects on *Abnormal Returns* obtained when using firm-level counterfactuals imputed using OLS models and market-wide indexes

B.4 Robustness: 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 B.8 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.

B.5 Cumulative Abnormal Returns

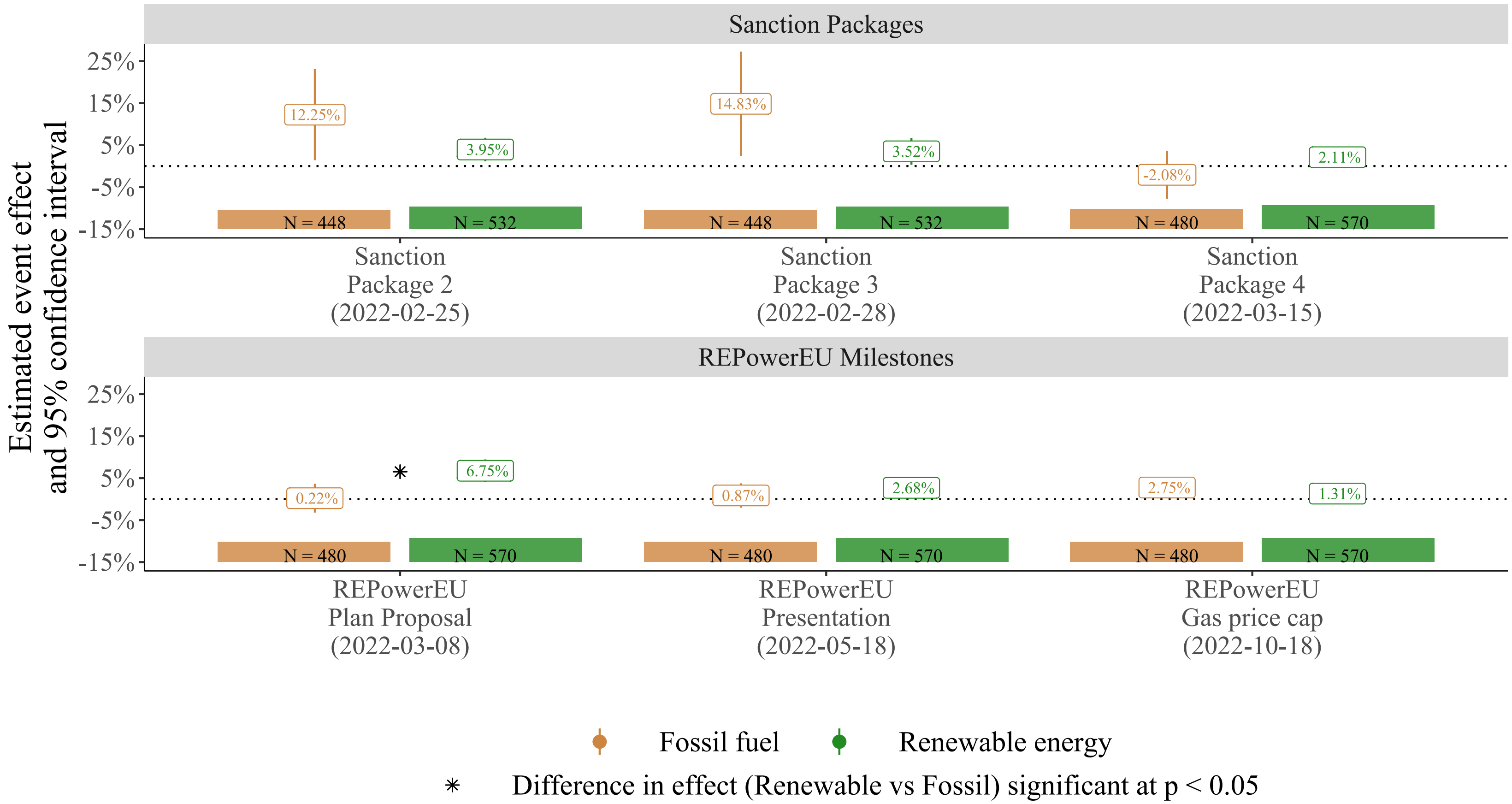

FIGURE B.9: *Cumulative average abnormal returns for fossil fuel and renewable energy producers (EU firms).* The figure shows the estimated average abnormal returns for energy companies based or traded in the EU, distinguishing between sanction packages (top row) and RePowerEU announcements (bottom row), separately for fossil fuel producers (brown) and renewable energy producers (green). Vertical bars denote 95% confidence intervals. Histograms report sample sizes, and an asterisk indicates that group means of abnormal returns between brown and green energy companies are statistically significantly different at $p < 0.05$ in two-tailed t-tests.

B.6 Robustness of CAR Analysis: Exclusion of Firms with Imprecise Estimation

Similarly to what we did above, in Figures B.10, B.11, and B.12 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. Other REPowerEU events have sizeable distributional effects among non-EU firms too.

B.7 Robustness of CAR Analysis: Different Time Window Sizes

In Figures B.13 and B.14, 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 and other REPowerEU events have significant distributional effects among non-EU firms too.

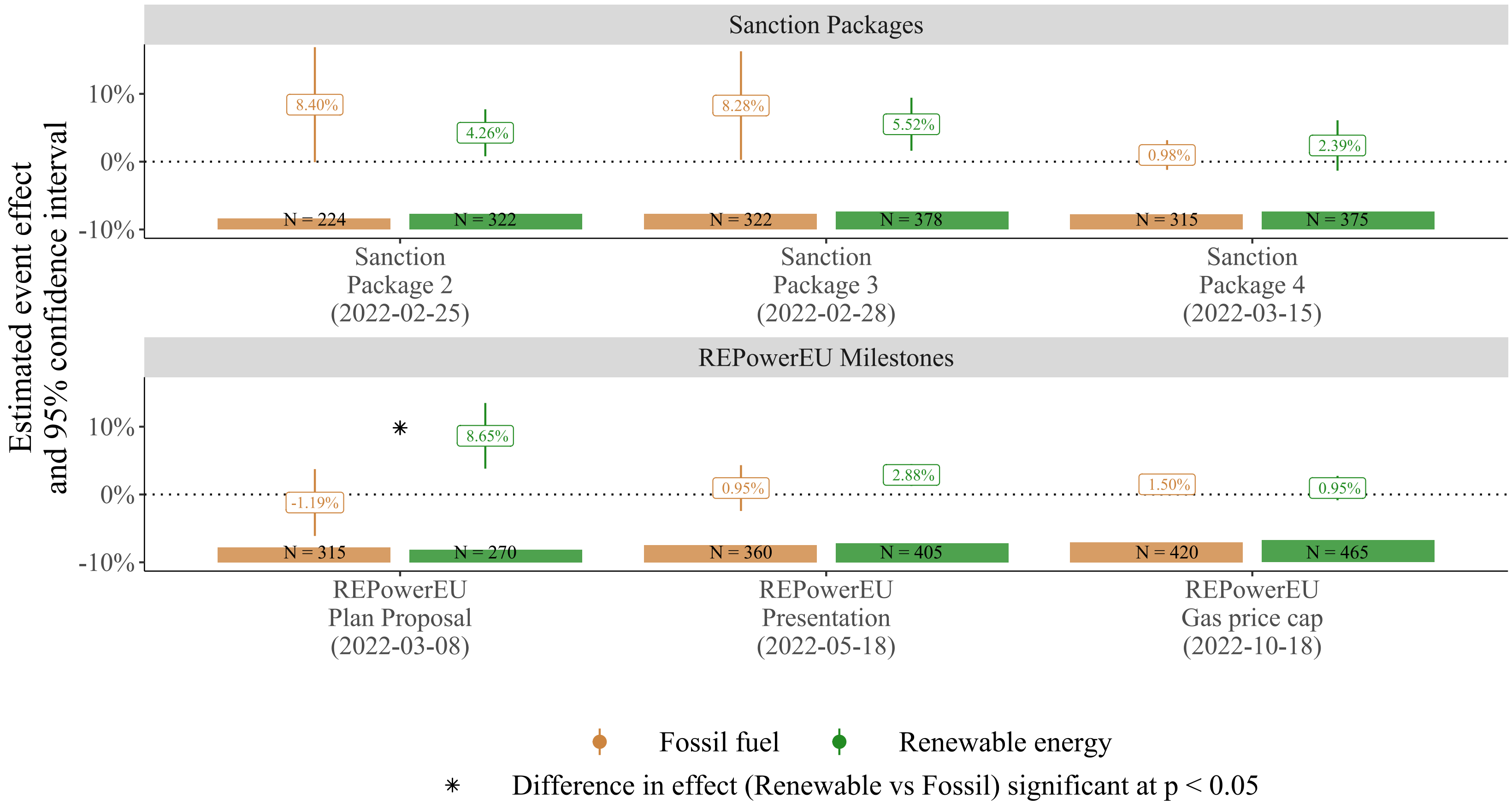

FIGURE B.10: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.10

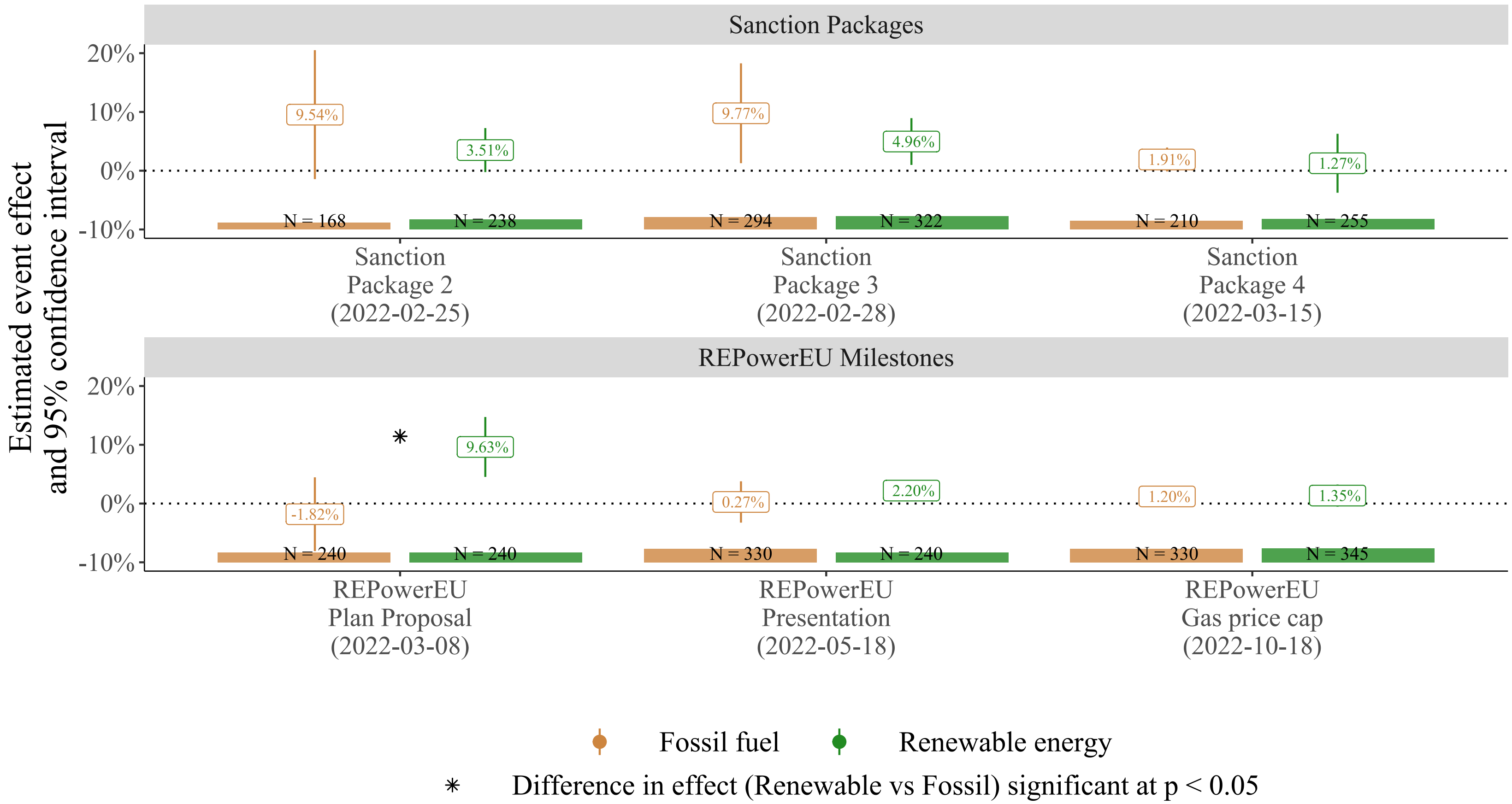

FIGURE B.11: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.30

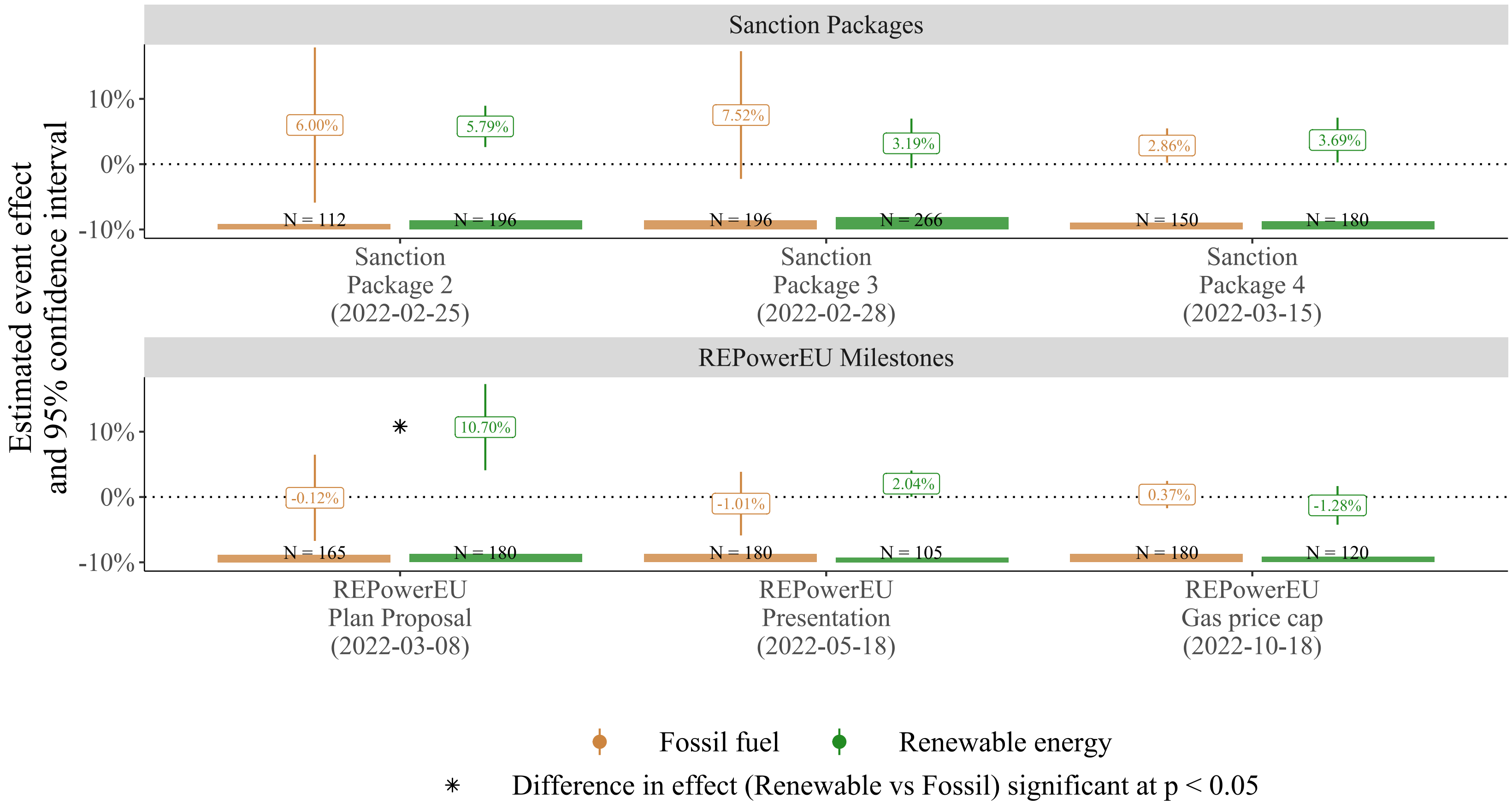

FIGURE B.12: Effects on *Cumulative Abnormal Returns* obtained when excluding firms whose counterfactual is based on market models with R2 smaller than 0.50

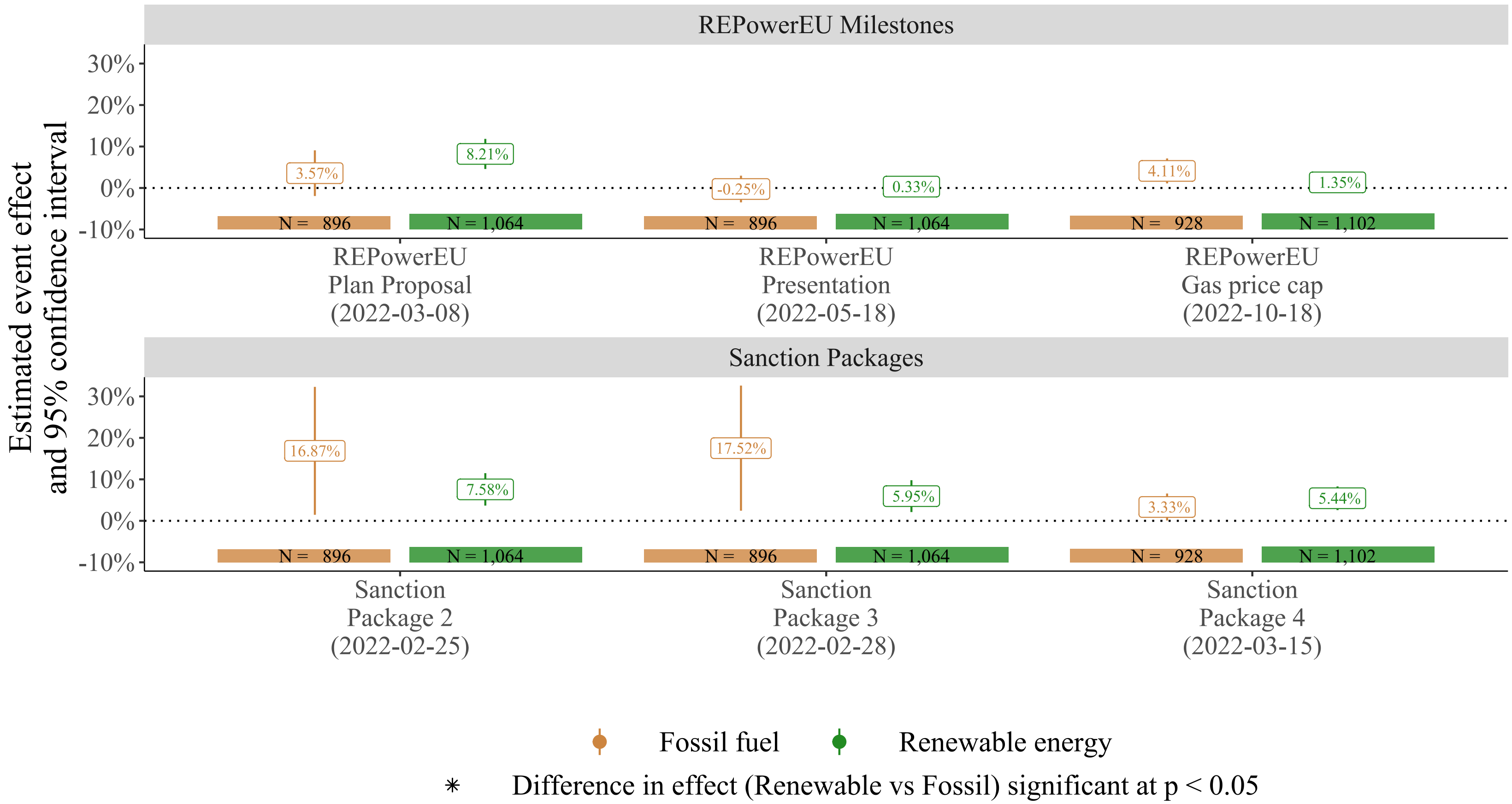

FIGURE B.13: Effects on *Cumulative Abnormal Returns* obtained when limiting time windows to 20 days to the left and right of each event

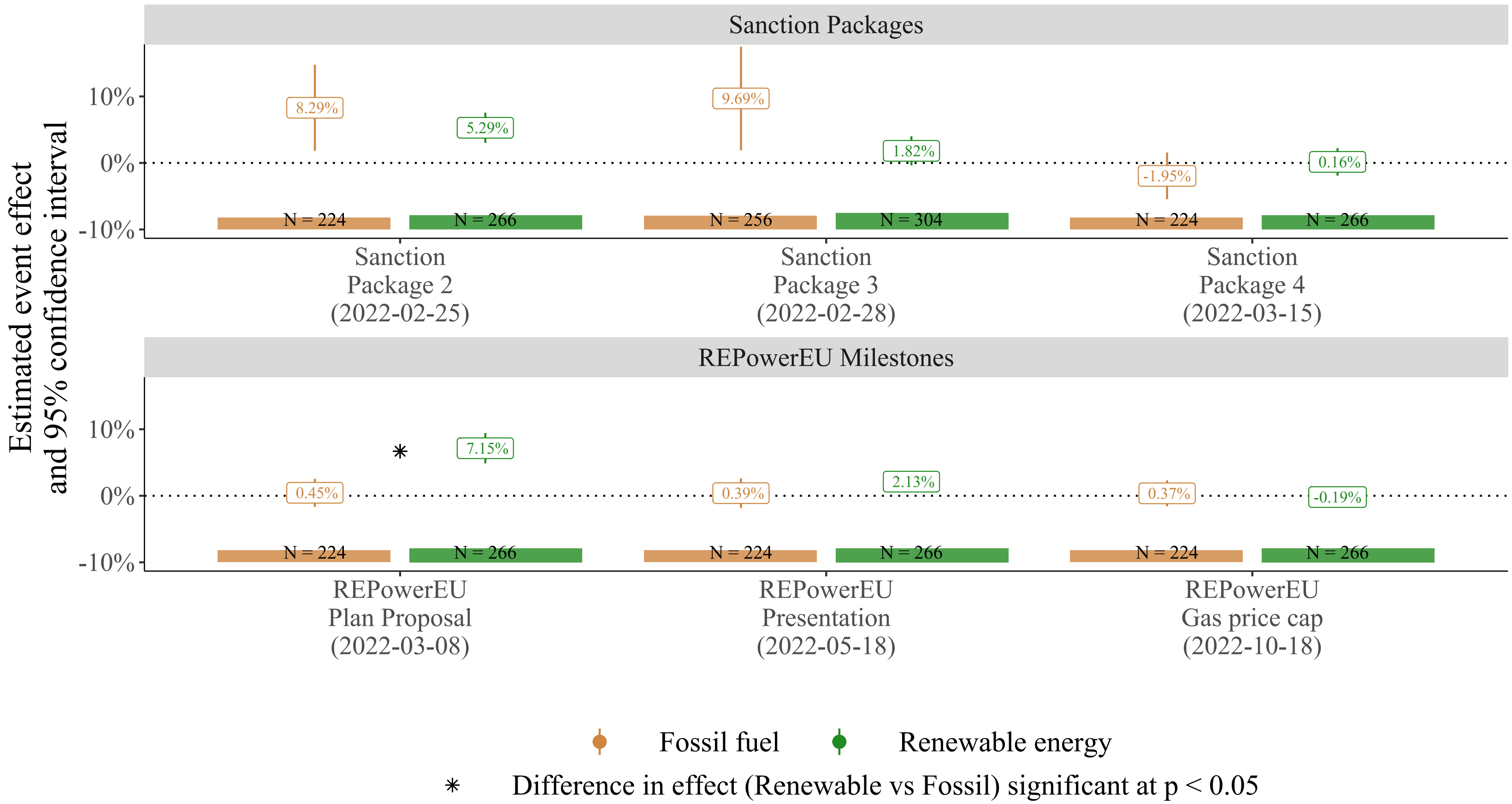

FIGURE B.14: Effects on *Cumulative Abnormal Returns* obtained when limiting time windows to 5 days to the left and right of each event