Papal Dividends: Popes' Political Communications and Financial Markets*

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Abstract

This paper investigates the market effects of communications by an understudied political leader: the Roman Catholic Pope. We analyze the market implications of a Pope's most authoritative communication, the encyclical, for relevant companies. We claim that investors are sensitive to encyclicals that take a political position on specific issues, because the Pope's vision can influence debates and decisions in these policy areas. However, the interpretation of the encyclical also depends on which ideology dominates the discourse around this document. A papal communication can thus result in political backlash that yields a material loss for exposed companies. We test this argument with a study of Francis's 2015 climate encyclical. We show that this communication, viewed as a climate policy manifesto, caused renewable energy companies to lose stock value, and that this loss was concentrated among American firms as a result of the conservative recoil at the Pope during the presidential campaign. We support the findings with evidence from media coverage and discuss the generalizability of the argument to other Popes.

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1 Introduction

Political authority is an important subject of investigation, because actions and communications of political leaders influence public opinions, behavior, and policy. A large political science literature has studied the effects of leadership and its traits. In parallel, a growing amount of political economy scholars investigate the economic consequences of leaders' positions, including how their partisanship, platforms, and communications move financial markets (Fowler, 2006; Bechtel, 2009; Sattler, 2013; Benton and Philips, 2020).

This research has mainly associated political leadership with elected politicians and institutional representatives. However, it is increasingly clear that this definition is limited: other public figures have significant political clout, and their impact is of growing political interest. Spiritual leaders, for example, can be critical political entrepreneurs. Many studies trace the historical political engagement of religious authorities and their policy impact in early modern states (Bueno De Mesquita, 2000; Stark, 2015). However, few systematic assessments exist on the *financial* implications of the political positions of religious authorities today. This gap is puzzling given that spiritual leaders have access to large audiences and public consideration for them can easily surpass attention to politicians (Grzymala-Busse, 2016; Tuñon, 2019). It is especially compelling from a political economy angle because, if religious institutions influence voters' political beliefs, they also presumably affect financial decisions.

In particular, there is a surprising lack of systematic research on the consequences of the most prominent spiritual figure in today's political landscape: *the Roman Catholic Pope*. Studies show that positions of the Vatican affect public framing of world issues (Genovese, 2015, 2019; Ziegler, 2020) and the deployment of papal resources to solve them (Warner, 2000; Juergensmeyer, 2008). Yet, virtually no political research explores the impact of Popes' social positions on global financial markets, despite common assumptions about the implications of papal statements (Hehir, 1990). This paper confronts precisely

this question. We focus on the ways in which a Pope affects stakeholders linked to the issues raised in his formal communications. We provide the first investigation of why modern papal politics matter for financial investors, and how papal communications may influence stock markets.

We build on the observation that, despite a nominal distance from politics, the Pope frequently releases messages that tackle global political problems (Ferrari, 2006; Chong and Troy, 2011).[1] We focus specifically on Popes' formal communications represented by *encyclicals*, the most authoritative written documents of the Holy See. Encyclicals are part of the repertoire of any pontiff, and all Popes are expected to write a number of them throughout their tenure. They tend to have specific themes, often related to individual behavior and spiritual affairs but also targeting collective issues, e.g. social inequality and economic integration. Each Pope chooses the themes of his encyclicals based on issue priorities and preferences. Almost inevitably, through these writings the pontiff places himself on either side of a major public debate. In fact, research has shown that encyclicals reveal a Pope's more or less traditional position on various social and economic issues (Genovese, 2015; Li et al., 2016).[2]

In this paper we study the effects of a new social encyclical on financial markets. We contend that a clear political message underlying the papal document can affect the value of assets associated with the issue of the encyclical. This is because the Pope's message can affect the policy debate within countries that pay attention – for example, Christian-majority countries, or countries with close linkages to the Vatican (Tuñon, 2019; Ziegler, 2020). We argue that the direction of the effect depends on the left-right ideology of the Pope in question and on the way his text is received in the political context where companies operate and where information related to the Pope is consumed.

More specifically, we claim that a Pope's encyclical can hurt or reward the most ex-

[1] As others have noted, the Pope is especially tuned in with issues affecting the vulnerables, given that global crises with few national solutions tend to impact them the most. These considerations motivate the Vatican to regularly step up for these communities (Chong and Troy, 2011; Genovese, 2019).

[2] Historians argue that since the early 20th century, Popes have sought a balance between the rejection of the communist economic model and the endorsement of a socially viable market model (the Vatican's so-called 'third way' of thinking about the role of the state in a free market economy, Himes, 2006). Accordingly, it is reasonable to perceive Popes as right- or left-leaning from an economic policy perspective.

posed market actors, depending on which public voice dominates the national discourse around the Pope's ideological message. Markets tend to favor right-leaning policies because they provide more predictable returns to investments (Brooks, Cunha and Mosley, 2021).[3] Thus, if a Pope's encyclical reflects a position of the ideological right, right-wing voices would likely back it up. This message would boost investors' confidence in status quo market actors, privileging traditional assets that benefit from conservative policy stands (Sattler, 2013).

By contrast, a left-wing Pope challenges traditional economic forces. His message could then generate price volatility and even hurt some traditional companies in favor of alternative markets. We contend this can happen if the most influential domestic political voices are on the Pope's side. In this case, the Pope's message would gain policy credibility, and would threaten consolidated market actors benefiting from traditional investments. However, a left-wing policy vision could also face backlash. The progressive message of a left Pope could generate opposition by those that sustain traditional markets and their stakeholders, for example right-wing media. If this occurs, backlash would hurt the credibility of the left-wing papal message and, consequently, the profitability prospects of companies that would benefit from its policy vision. Hence, we expect that the release of an encyclical affects companies in a direction consistent with the Pope's left-right position and the rallying political forces within relevant countries.

We test our argument with a case study of *Laudato Si*, the first encyclical written by Pope Francis and released in 2015. This encyclical is centered around climate change, an issue mostly associated with the political left. Francis approached the case for battling climate change with a strong political voice – emphasizing social justice, blaming materialism, bordering market skepticism.[4] Francis's message was depicted as a socialist agenda in several countries. Notably, the US right-wing outlet Fox News made strong associations between Francis's platform and the 'radicalism' of Bernie Sanders. Similar

[3]Furthermore, investors follow business outlets, which tend to be more conservative (Patterson and Donsbagh, 1996).

[4]In *Laudato Si*, the Pope takes a relatively negative position on carbon markets and pollution permits, saying that "in no way do [market mechanisms] allow for the radical change which present circumstances require" (171).

comparisons were made elsewhere between the Pope and, e.g., Raul Castro of Cuba.[5] Following our argument, one could expect that the encyclical had an effect on the stocks of the biggest energy companies exposed to climate policy, many of which are based in the most industrialized (and Christian) countries around the world. These companies include, on the one hand, fossil fuel firms and, on the other, green energy firms. Following our argument, a negative effect of the *Laudato Si* on fossil fuel stocks and/or a positive effect on green energy stocks would indicate a supportive reception of the Pope's climate message. By contrast, the opposite effects imply the Pope's failure to supply confidence to green markets, and a backlash by right-wing forces.

Our main empirical test is an event study that draws on daily stock values of the most traded global fossil fuel and renewable energy firms in the months around the release of the climate encyclical. Our analyses show that the publication of Francis's encyclical did not affect fossil fuel returns. Instead, it depressed the stock value of green energy companies: renewable companies cumulatively experienced about 3% abnormal losses in the month after the publication. In line with the theory, our empirical investigations suggest that American green energy companies experienced the main market losses due to the encyclical, because of the the politicization of the issues in the US domestic debate. We specifically trace this negative effect to the backlash of US right-wing media against Francis. This interpretation is supported by a text analysis of relevant ideological US media content. A separate analysis of Benedict XVI's *Caritas in Veritate* suggests that the market effects of papal communications go beyond Francis.

Our study sheds light on the important interactions between international leaders, national politics, and financial speculation. We enrich the scholarship on the political communications of international institutions and their credibility for stock markets by theoretically and empirically documenting that information from non-conventional authorities that lack direct policy relevance transposes to investors (Gray, 2009; Wilf, 2016). Furthermore, we indicate how media discourse can hijack the vision of such authoritative messages. Our research ultimately shows that markets seek out information about likely

[5]See BBC, 'Is the Pope a Communist?' June 7, 2015, and The Wall Street Journal, 'How Pope Francis Became the Leader of the Global Left'. September 24, 2015.

future policy directions from multiple indirect sources (Kucik and Pelc, 2016), and underscores the important role that non-elected actors play in forging political discussions with material consequences.

2 Popes and Stocks

2.1 Political Leaders' Communications and Financial Market Behavior

Political economy research on the financial effects of authorities moves from the assumption that asset prices reflect all publicly available information about leaders, and that new information affects investors' views on the future value of assets (Fama, 1970). New information comes in different forms. Strong market reactions occur with turns in ideological orientation of lesser-known, non-incumbent figures, political newcomers, election underdogs, and unexpected appointees (Bernhard and Leblang, 2006; Mosley and Singer, 2008; Bechtel, 2009) as long as they are credible and unconstrained (Fowler, 2006). A number of studies also point to the style and rhetorical positions of leaders, suggesting that not only actions, but also *communications* trigger stock price volatility. Accordingly, high amounts of resolve in newcomers' messages have significant market effects (Benton and Philips, 2020).

The majority of studies on the financial effects of political communications focus on politicians and representatives. However, political discourse is not only made by politicians: other personalities are also responsible for salient political events. Along these lines, a new set of studies investigate the effect of other politically salient institutions. Here, too, there is increasing agreement that these actors have important implications for global markets. For example, the appointment of technocrats outside of the realm of policy influences capital movement (Clark and Arel-Bundock, 2013). Similarly, information from meetings at international organizations updates investors' financial risk (Gray, 2009). Importantly, the content and public framing around international communications can cause significant market reactions (Wilf, 2016; Genovese, 2021).

In this paper we extend the logic about market implications of political communications to actors without any direct political association. Recent studies highlight the political clout of self-authorized representatives and moral entrepreneurs (Ferrari, 2006). We follow this research and maintain that, as long as an authoritative source expresses an identifiable ideological position, their communications can have a significant impact on financial markets. This is because their communications can stir the direction of public discourse, implant ideas, and inform policy positions across parties and agenda setters – paving a path to policy concerns which, in turn, affect the market value of certain assets.

We argue that a leader whose messages may move financial market is the Pope. The Pope is, of course, a special type of spiritual official: he has access to a jurisdiction and holds formal votes at international organizations, all characteristics that make papal actions particularly important for transnational political agendas (Gill, 2001; Minkenberg, 2002; Pelc, 2019). However, the *material short-term effects* of Popes' positions remain understudied. We contend that in most market-oriented countries – many of which have significant Christian populations – Popes' communications are market-relevant. We now outline how reactions to papal communications can reveal information to investors.

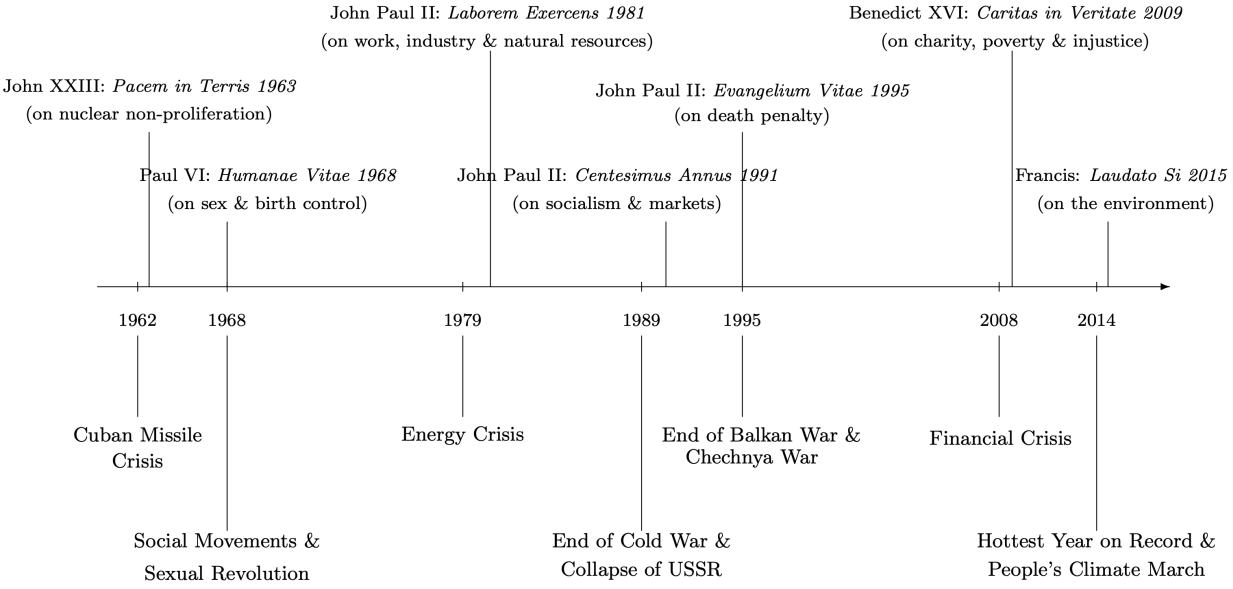
2.2 The Market Effects of The Pope's Political Vision

Besides developing spiritual advice and advancing theology, the Pope regularly releases formal communications focused on *social* teaching. Since the reforms of the 1962 Second Vatican Council, the Vatican has strongly committed to its social doctrine, represented by official communications about a range of global social issues. After 1962, the most comprehensive type of communication for these purposes has been the encyclical, "the most characteristic and ultimate purpose of [social] teaching" (Paul VI, 1969).

Social encyclicals concentrate on specific issues, often following crises as they emerge across the world (Genovese, 2015). Figure 1 illustrates the connection between the most important social encyclicals and major international events since the 1960s. Virtually all post-1962 encyclicals have reflected on fundamental social dilemmas against the backdrop

of globalization, e.g. poverty and war (Stark, 2015).[6] Despite a continuous focus on vulnerability and social tension, the tone and framing of papal issues is far from constant. Several experts have documented that different pontiffs have taken different positions on global problems (Himes, 2006). So, while social encyclicals may have similar patterns across papacies, the politics reflected in these texts vary substantially across time and Popes.

Figure 1: *Popes' social encyclicals and major international political events* (Source: adaptation of time line in Genovese, 2015).



As an example, consider the issue of economic markets and their role for peace and welfare in the aftermath of World War II. John XXIII (1958-1963) was skeptical of economic liberalism and chose a hard stand on markets. By contrast, John Paul II (1978-2005) favored a liberal view and had vast influence on the market ideology of leaders with conservative orientation (Brown, 2009). These positions spilled onto these Popes' social encyclicals. For example, in John Paul II's 1991 *Centesimus Annus*, which contains a hopeful message for states at the dawn of the post-Cold War era, the Pope defends the efficiency of free markets "for utilizing resources and effectively responding to needs" (34). Similarly, in the 2009 *Caritas in Veritate* Benedict XVI addresses the market economy

[6]Popes also release political communications in other forms. Similar patterns of political messaging are observed, for example, in the Pope's behavior on social media. While we focus on encyclical letters, we assume the Pope may complement these with other communications (Genovese, 2019).

in light of the Global Recession, championing the need for stronger banks.

These observations suggest that Popes have an inclination towards political issues that approximates right versus left positions, i.e. what political science calls the ideological position on the economy. Along these lines, an encyclical on a social issue would reveal *the Pope's economic policy vision*, portraying him as more or less supportive of free market operations for the purposes of solving said public issue (Li et al., 2016). Following this intuition, we assume that a communication from a Pope with a more conservative or liberal position may channel different policy visions that target real-world economic actors.

At the same time, it is unreasonable to expect that papal messages and their policy recommendations would reach investors directly. Rather, we contend that the effect of the Pope's position embedded in an encyclical depends on *the domestic context* where the Pope's message resonates. Evidently, the Pope's message requires a sound board to reach markets. Consider here the role of the media. If the media does not give space to the Pope's message, one may expect that the release of a new encyclical does not reach the salient public discourse and no policy-relevant discussion ignites. In this case, market investors do not feel pressed to react, as the papal message does not provide new information to them.

By contrast, if the encyclical becomes politicized, a policy-relevant debate with market implications emerges. Importantly, we claim that the nature of market reactions depends not only on the underlying ideological position of the Pope, but also *on which public voice dominates the national discourse around a Pope's communication*. Since markets tend to favor right-leaning policy, we expect that a right-leaning Pope's message generates support from right-wing media voices. The Pope's message would then boost market actors that gain from traditional financial investments. This materializes in positive returns for 'locked-in' firms and negative ones for new-coming ones.

What if a Pope's communication leans towards the left? We argue that such message could give credibility to alternative policies, which could then create an opportunity for economic newcomers to gain market share. That is, unless traditional public forces react.

Right-wing media might be hostile to the Pope's message and may mobilize against the Pope's stand and policy vision implications. The more powerful the backlash by conservative media, the less credible the political message embedded in the papal text (for a similar argument on how negative politicization undermines the authority of spiritual leaders, see Williamson et al., 2022). Consequently, assets that win from this left-wing policy agenda would be perceived as less certain by investors, who would lower expectations about their profitability and disinvest accordingly. Below, we explore the implications of this argument with a case in point: the market effects of Pope Francis's first social encyclical, called *Laudato Si*.

3 Francis' Climate Encyclical, Media Reception, and Energy Markets

The 184-page *Laudato Si* letter focuses on environmental degradation and climate change. It was first leaked by the Italian newspaper *L'Espresso* on June 15, 2015, and then officially released (unchanged) at noon on June 18, 2015. Francis thought of this encyclical as a meditation on the greater problems captured by environmental degradation: inequality and poverty. At the same time, the letter tackles the science and implications of climate change directly. It explicitly laments sources of pollution as well as the implications of lack of clean water and loss of biodiversity. It unambiguously reflects on the economic rules that influence environmental exploitation, and puts forward a political position on them. As the Pope noted on his Twitter account, ''there is a need to seek other ways of understanding the economy and progress #LaudatoSi'' (June 18, 2015).

The public received the encyclical in various ways. Environmentalists and climate activists registered it as a political manifesto and welcomed the punches directed to liberal economic forces.[7] Economists read it as an attack to capitalism broadly intended, a collection of ideas in support of progressive social policy, some even in tension with

[7]Carrington. *Will Pope Francis's encyclical become his 'miracle' that saved the planet?* The Guardian, June 18, 2015.

markets.[8] Importantly, the media played a major role in the political projection of the Pope's message. According to our theory, the public discussion and politicization of the Pope determine how investors react to an encyclical. Since public debates are built first and foremost around the news, media coverage is useful to learn about investors' mood at the time of the encyclical.

To probe the viability of this logic, we traced the reporting of this event in English-language print media. Figure 2 reports the percentage of newspaper articles featuring the word '*Pope*' out of all the news published in the four weeks before and after the publication of the *Laudato Si* (about 54,443 articles). We sampled four outlets: *The Guardian*, the *Financial Times*, *The New York Times*, and *Wall Street Journal*. Two of them (*The Guardian* and *The New York Times*) represent general audiences with social-liberal views. The other two (*Financial Times* and *Wall Street Journal*) are consumed particularly by businessmen and investors.

Figure 2 shows that all newspapers raised the attention on the Pope around the encyclical. The *New York Times* dedicated 4-5% of its articles to the Pope in the days around the publication (91 articles in the whole June, compared to 40 articles in the second half of May). Interestingly, business-focused news also gave significant volume to the Pope at the time of the release. Perhaps surprisingly, the *Wall Street Journal* – arguably the most conservative of the selected outlets – spent about 6% of coverage (6 articles) on the Pope the day of and after the release, more than any other of the sampled newspapers. Evidently, Pope-related news were substantively covered in conservative, business-savvy media.

[8] In an email to the NYT on June 20, 2015, Harvard economist Professor Stavins said "I respect what the pope says about the need for action, but this is out of step with the thinking and the work of informed policy analysts around the world, who recognize that we can do more, faster, and better with the use of market-based policy instruments".

Figure 2: *Newspaper coverage of the query "Pope" by representative sources.* Data from the Lexis Nexis database. Percentage over the daily number of articles in the outlets.

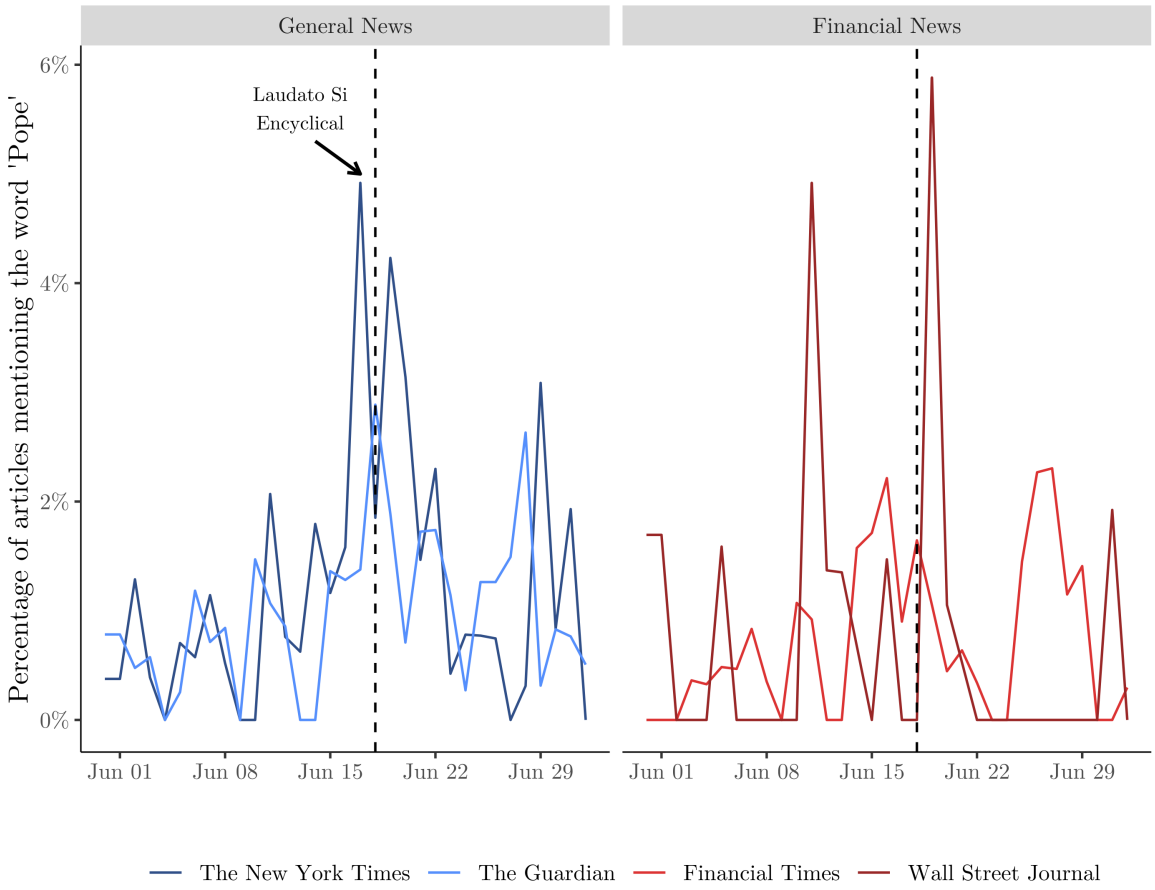
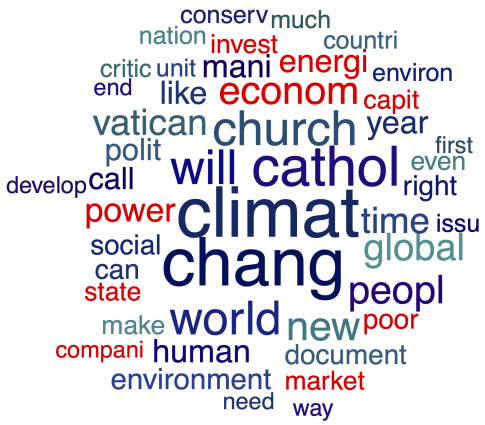


Figure 3: *Word cloud of most frequent words in relevant newspaper articles.* Higher word font size corresponds to higher word frequency. Words in red highlighted by the authors.



Top 50 words (>150 frequency) in sampled news articles (N=104).

The content of the news articles additionally suggests that influential media emphasized the economic policy dimension of the Pope's message. Figure 3 describes the word frequencies of 104 most relevant encyclical-related articles in the news sources.[9] As indicated by the size of words, newspaper articles mainly focused on the central topic of the encyclical – i.e. climate change. At the same time, a significant number of articles also refers to the economy and markets, as shown by words such as '*compani*', '*invest-*' and '*capit*[al]' (in red). Clearly, newspapers highlighted the divisive position of Francis on a predominantly left-wing issue. The Guardian noted that: "*One recurring motif throughout the encyclical is a general scepticism [...] to the role that big business should play in tackling climate change.*" Similarly, the Pope's hostility to business resonates on the Financial Times (June 18), according to which Francis made the case for a "*global economic structure that would make it more difficult for large oil companies, agricultural producers and industrial groups to harm the environment in their quest for profit.*"

For our purposes, a central question is which financial sectors would be receptive of this political discourse. Here we focus on the effects of Francis's message on energy companies. Energy markets are globally dominated by fossil fuel enterprises, i.e. oil and gas. These firms account for more than 50% of energy production in industrialized countries (more than 70% in some, e.g. the United States). They constitute the most 'locked-in' energy firms (Bayer and Urpelainen, 2016) and have profited from climate policy adverse leadership (Aklin, 2018; Ramelli et al., 2018). In contrast, renewable energy has steadily increased market share and relevance in the make-up of international energy portfolios, pushed by geopolitical risks in combination with technological innovation and experimental policies. As of 2015 (the year of the encyclical), renewables had become more successful, but backlash against renewable energy installation existed partly because of fossil fuel lobbying, partly because of the bottom-up public objection to energy developments (Meckling, 2011; Aklin and Urpelainen, 2018; Kennard, 2020).

We contend that Francis' left-wing encyclical introduced information that moved in-

[9]This search was based on the keyword 'encyclical' between spring 2014 (when it became known that the Pope was going to write a social encyclical) and summer 2016 (a year after the release of the *Laudato Si*) on *The Guardian*, *The Financial Times*, and *The New York Times*, including the international edition.

vestments of these markets as a function of the public discourse in support of or opposition against the Pope. On the one hand, Francis's message could have induced negative returns for fossil fuel companies and positive returns for renewable energy companies if progressive media had battled traditional right-wing views and rallied in favor of the Pope's policy vision. On the other hand, had the media mobilized *against* the Pope's message (as the patterns related to conservative media in Figure 2 suggest), the opposite effect can be expected. Accordingly, a right-wing media recoil would reduce confidence in the more vulnerable renewable energy sector, resulting in negative returns for green firms.

We set to test this argument empirically. However, we recognize that the effects we envision can vary across countries. Media coverage is specific to national political contexts and responds to domestic audiences. Therefore, the market effects of an authoritative papal message may also be specific to countries where the Pope is more salient and/or where the public engages with his messages in a more political way.

In the case of *Laudato Si*, we conjecture that the United States presents a political landscape where to expect particularly strong effects for a number of reasons. First, historical structural characteristics of the energy markets in this country suggest that some firms may be particularly vulnerable to external information. Fossil fuel investments in the US are larger than in Europe, where gas and oil are less predominant and largely imported. Furthermore, and differently from European counterparts, renewable firms in the US receive fewer economic incentives and less government protection (Bayer and Urpelainen, 2016). Liberal policy choices have left the renewable industry in the US vulnerable to information cycles and investors' power (Smith and Urpelainen, 2014; Aklin, 2018).

Also importantly, the national political discourse over Francis and the climate encyclical was particularly politicized in the US. In 2015, several American commentators compared the message of Francis's letter to the economic visions of Senator Bernie Sanders.[10]

[10]In 2016, during his Democratic primary candidacy, Sanders made several remarks in awe of Francis. In April 2016 the Senator went to meet Francis in Rome. Bade, Gavin. 2020. 'Power to the people: Bernie calls for federal takeover of electricity production'. *Politico*.

The Pope became a highly controversial figure at the backdrop of the presidential primary campaign.[11] So, if the Pope's message was seen as a preview of policies to come under a strong Democrats' presidency, markets could react similarly to the encyclical as they would to the announcement of a high chance of a radical left-wing president (Clark and Arel-Bundock, 2013; Sattler, 2013).

In particular, a strong media apparatus in the US supports right-wing policy views. A large body of research shows that Fox News channels have been influential at rallying Americans against left-leaning policies (DellaVigna and Kaplan, 2007; Clinton and Enamorado, 2014), including climate change (Feldman et al., 2012), at important times such as the onset of crises or during electoral campaigns. If the Fox News media slant can affect political views among public opinion and elites, then it may as well influence investors' concerns and investment behavior.

Data on the airtime coverage of the Pope by major US outlets indeed suggests that US renewable energy firms may have been particularly exposed to backlash-inducing concerns.[12] While a significant amount of US TV time in the summer 2015 was unsurprisingly focused on the Pope after the release of the encyclical (Figure 4), Fox News and Fox Business proposed most of the content covering the Pope compared to CNN and MSNBC (two general audience channels). Furthermore, their coverage referred consistently to the economic policy implications of the Pope's message (Figure 5). We claim that the ideological framing of the encyclical by the media is critical to understand its effects on investors' perceptions. Given the significant coverage of the Pope by conservative channels, the message might have generated sizeable uncertainty for climate policy investments in the US. We explore this possibility with the event study design below.

[11] Li et al. (2016) show that conservative Catholics in the US devalued the Pope's credibility on climate change in 2015, while left-wing Catholics found consistency between the Pontiff's views and those of their political allies.

[12] Data available at the Global Database of Events, Language and Tone (GDELT). Here we concentrate on all televised clips including the word "Pope" between May and July 2015.

Figure 4: *TV coverage of the query "Pope" by representative US broadcasting sources.* Data units correspond to GDELT 15-seconds clips mentioning the word "Pope" in the four selected networks.

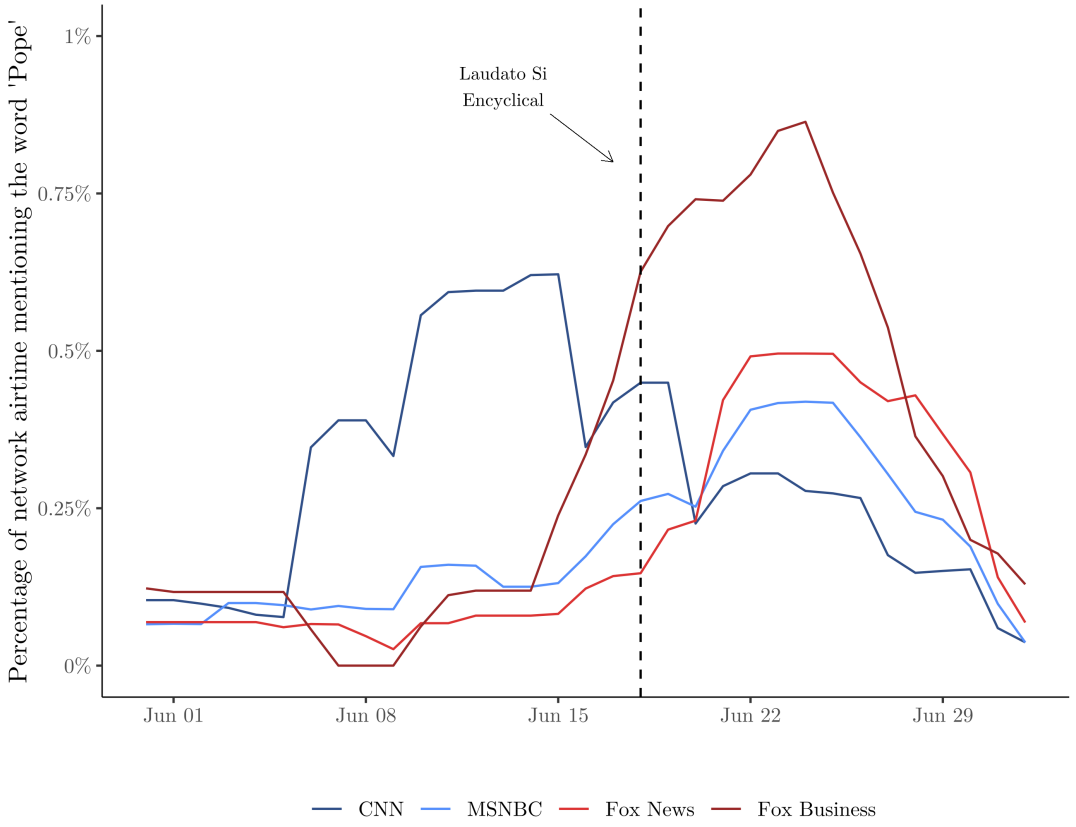
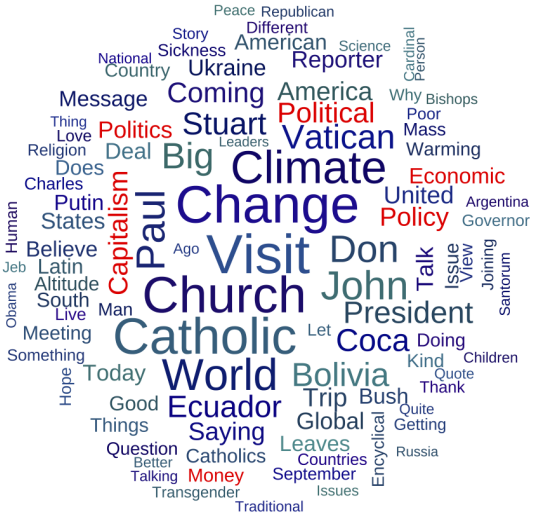


Figure 5: *Word cloud of the 100 most frequent words in relevant TV clips mentioning the word "Pope".* Higher word font size corresponds to higher word frequency. Words in red correspond to an economic policy theme and were highlighted by the authors.



4 Event Study

We empirically test our argument by studying stock prices of global energy firms. We first start by introducing the sample representing the most sizeable firms in industrialized countries; we later focus on differences across countries. We consider two sets of firms: companies in the non-renewable (fossil fuel) energy sector and renewable energy companies. We perform separate analyses for these two sets. We now describe the sample selection and the firms' stocks data around the time of Francis's encyclical. We then describe the event-study methodology employed to estimate market reactions to the *Laudato Si*.

4.1 Data

The sample of non-renewable energy companies is made of the most traded firms with primarily fossil-fuel based energy production. Specifically, we concentrate on the top listed companies in the 2010 Forbes Global 2000 dataset that belong to the energy-production business. Stock price data availability narrowed the sample down to 46 companies involved in coal and oil business.[13] More than 70% of these have headquarters in North America and Europe. This is in line with studies on influential companies involved in climate policy lobbying (Genovese, 2021; Green et al., 2021). It is also convenient for our purposes, as these countries have important Christian constituencies, hence reasons to care about words and deeds of Popes. The list of polluting firms and their headquarter countries are reported in the appendix (Table B.4).

Our sample of renewable energy companies is built following previous studies of clean energy markets (Aklin, 2018; Ramelli et al., 2018). We started from the top firms in the Bloomberg Industry Classification Standards list of Renewable Energy companies. Our sample draws on the Bloomberg list but we follow common practices and discard shell companies and penny stock firms. Additionally, we concentrate on firms whose primary activity is in wind, solar, hydro, biofuel, and other explicit clean energy operations,

[13]From the original list of most traded fossil fuel companies, we exclude two due to extremely volatile stock prices in the time frame of interest, however our substantive results do not hinge upon their exclusion.

thus sticking to identifiable renewables firms and removing those with ambiguous ties to the energy industry. The final sample is representative of a cross-national population of traded companies whose main activities are in the green energy sector, and whose value on stock markets is not trivial. Stock price data availability constrains our sample of renewable energy companies to 42 firms. The list of firms in this sample and their headquarter country is reported in the appendix (Table B.5).

From Thomson Reuters' Eikon database, we download percentage changes in price of each company's stocks at the end of a trading day, with respect to the closing price at the end of the previous day. We call this measure $Returns_{i,t}$ for each firm i on day t. We also download daily information on three market-wide indexes necessary to benchmark our analysis: the New York Stock Exchange (NYSE), the Frankfurt Stock Exchange (DAX) and the Financial Times Stock Exchange (FTSE) indexes. We choose them since the majority of energy firms in our sample are headquartered in either the US or Europe and those indexes measure performances of the most important financial hubs in these areas. All financial data span from November 1, 2014 until the July 23, 2015.

4.2 Event analysis

Our event of interest is the publication of the *Laudato Si* encyclical (June 18, 2015). We adopt an event-analysis design to study the effect of this publication on financial returns to energy-producing firms. This methodology imputes firms' daily returns under the synthetic counterfactual that the encyclical was not published. We can thus compare imputed counterfactual and factual returns and identify the effect of the document's publication, controlling for the confounding effect of any information, pre-existing trends, and shocks that hit the whole market. For the sake of brevity, we provide details on our research design in appendix and present here only its essential aspects.

Our design employs observations from a time window that pre-dates the event ("estimation window", 190 days long) to estimate one market model of each firms' $Returns_{i,t}$. Each firm-specific market model is estimated using the three market-wide indexes listed in the previous section as predictive covariates ($\mathbf{X_{i,t}}$). These market models are then

employed to predict what the expected $Returns_{i,t}$ to each firms would have been, in a time-window centered around the event ("event window", 61 days long), had the encyclical not been published.[14] We then compute *Abnormal* $Returns_{i,t}$, for each observation in the event window, as the difference between observed $Returns_{i,t}$ (factual) and expected $Returns_{i,t}$ (counterfactual, $E[Returns_{i,t}|\mathbf{X_{i,t}}]$). We also compute *Cumulative Abnormal* $Returns_{i,t}$ as the sum of all *Abnormal* $Returns_{i,t}$ to a firm i from the beginning of the event window until day t.

If the publication provided no more information to firms in our sample than that they received from market-wide events and trends – captured by market-indexes –, average *Abnormal Returns* before and after the event should not differ. We therefore use *Abnormal* and *Cumulative Abnormal* $Returns_{i,t}$ as dependent variables in a before-after design to assess the effect of the publication. We estimate linear models that include a binary indicator called *June 18 onward*, taking value 1 after the publication of the encyclical, 0 before. We also include *June 18*, a dummy taking the value 1 exclusively on the day of the publication. A lagged dependent variable further accounts for unobserved time dependence.[15] Finally, we include firm-level fixed effects to study within-firm variation before and after the event of interest.

Two assumptions support our identification strategy. First, the predictive performance of market models should not systematically change in conjunction with the publication of the encyclical. This assumption is untestable, but we minimize the distance in days between the two windows so as to make it plausible. Shorter and longer event windows also lend credibility to this assumption.[16] Second, no shock simultaneous to the event of interest affects solely energy firms (market-wide shocks are already accounted for in the counterfactual estimation). We reviewed public events that occurred around June-July 2015. We found no major transnational event in the weeks under analysis. In our results section we focus on one potential threat to this assumption that pertains

[14] In a series of robustness tests we shrink/extend the arbitrary length of our event window and confirm that our results hold (Figures D.1 and D.2 in appendix).

[15] We do not include lags in our *Cumulative Abnormal Returns* models because this variable at time $t-1$ is automatically correlated with its value at t.

[16] See Figures D.1 and D.2.

the US political domain: turmoil for the beginning of the presidential primaries. This concern can be empirically evaluated. As we illustrate below, it does not threaten the internal validity of our analysis nor the logic of our argument.[17] Our results are also robust to the inclusion of additional control variables that capture movements on energy markets around the days of June 2015 (Table D.7).

If these assumptions are met, the coefficients of our binary treatment variables quantify the effect of the encyclical on firms' returns, reporting the average amount by which firms' observed returns depart from expectation following the event. We estimate models distinctively for the sample of fossil fuel and renewable energy firms. Estimated effects should be negative for fossil fuel companies and positive for renewable energy companies if Francis's message resonated in the markets by virtue of its progressive vision, *without* conservative media backlash. Vice versa, coefficients should be of opposite sign if the message resonated as a preview of policy opposition, e.g. in case of backlash. Descriptive evidence in the appendix indicates that the Pope's message might have generated this sort of adverse effect especially in the US (Figure B.1, Table B.3). The next section systematically analyzes these patterns.

5 Results

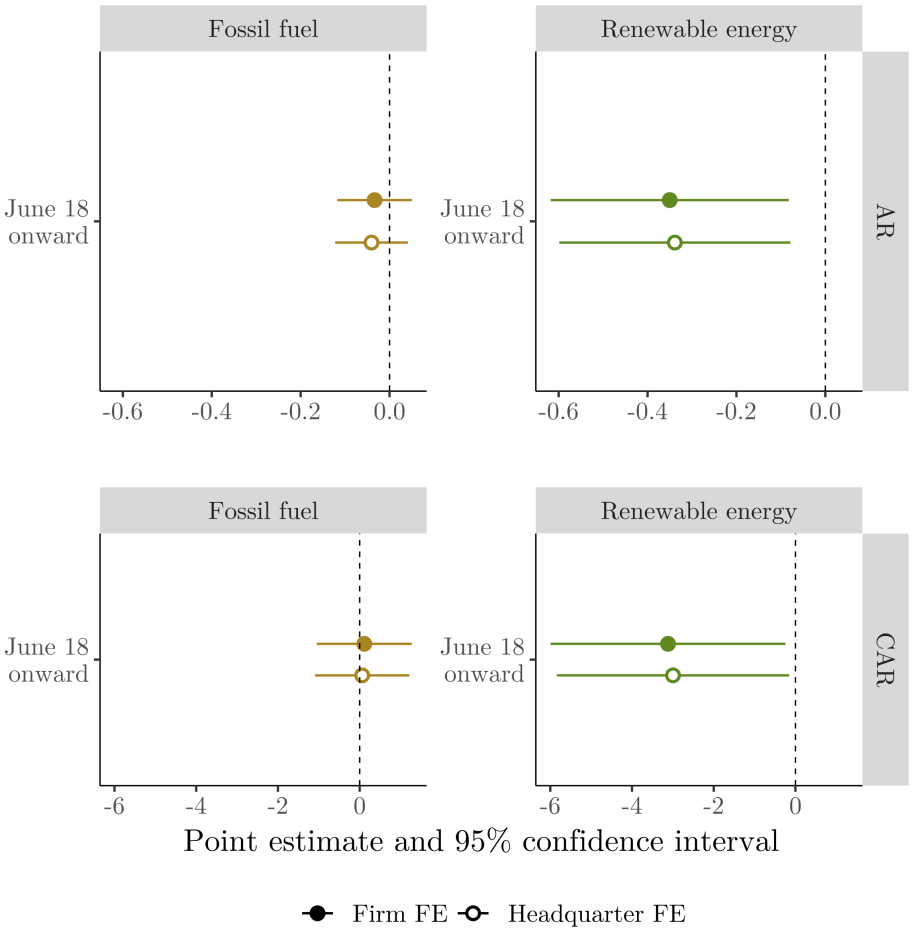
Figure 6 presents the first set of results.[18] First, we study within-firm variation in *Abnormal Returns* (AR) for the fossil fuel and renewable energy industries (top row). We find that fossil fuel companies did not experience significant abnormal returns after the publication of the encyclical. By contrast, renewable energy firms' daily observed returns after the *Laudato Si* were smaller than expected returns by around 0.35%, on average. This statistically significant result holds also when we substitute firm-fixed effect with headquarter-fixed effect.

How large is this daily average effect when cumulated over the entire event window?

[17] Other events that could affect financial markets in June 2015 were the EU bank reform talks and the Greek IMF bailout negotiations. We believe that the likely effect of these specific events on European firms' returns is captured by the market-wide indexes used to compute $E[Returns_{i,t}|\mathbf{X}_{i,t}]$, and is not be a reason of concern.

[18] Full results in Table C.1 in the appendix.

Figure 6: *Effect of the publication of the Laudato Si encyclical on Abnormal Returns and Cumulative Abnormal Returns of fossil fuel and renewable energy firms.*



Models are linear estimations of Abnormal Returns and Cumulative Abnormal Returns in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level. Full results in Table C.1 in the appendix.

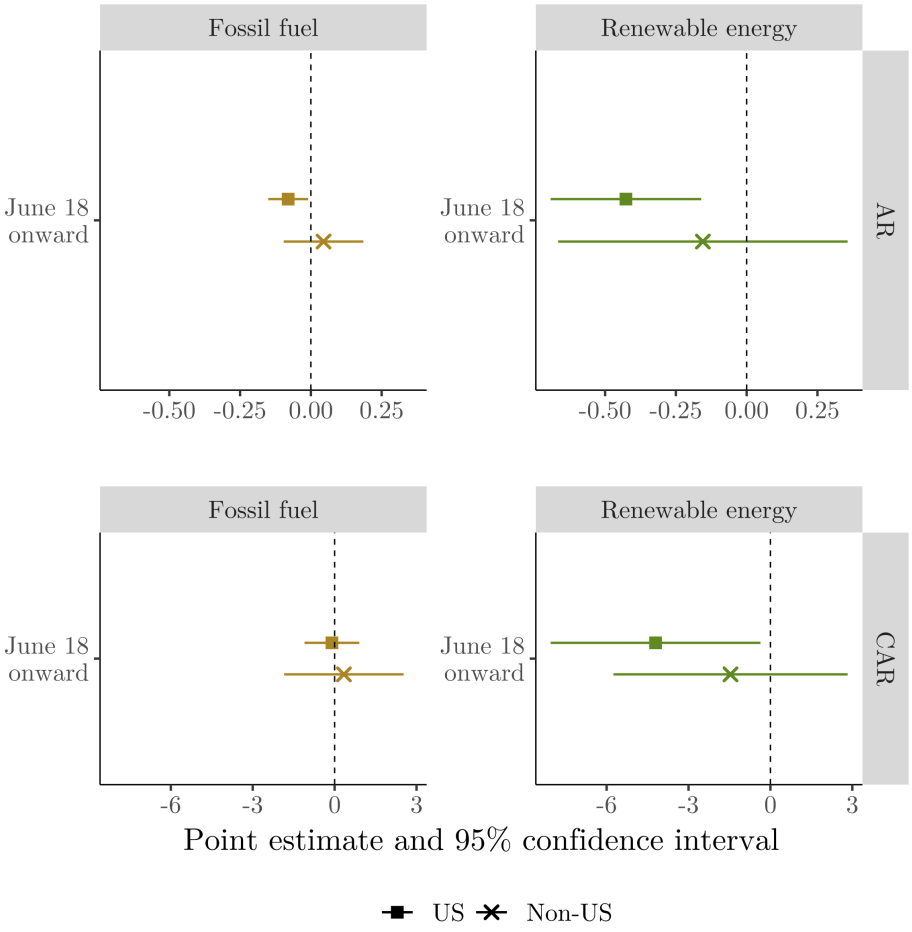
The bottom row of Figure 6 reports the effect of the encyclical on *Cumulative Abnormal Returns* (CAR) in the entire period after its publication. We find that fossil fuel firms did not experience significant variation in their *Cumulative Abnormal Returns*. Instead, renewable energy companies lost on average 3% in value of their stocks following the publication of the encyclical.

In sum, fossil fuel companies that would hurt more following a call for environmental policy action did not experience any significant market volatility after the climate encyclical. Rather, renewable energy firms, expected to gain from a progressive climate agenda, suffered from a lack of market confidence. These findings are counter-intuitive if one assumes that policy forces would be receptive of the message of Francis, as a boost of climate policy visions should favor green energy investments. They are rather explained by a context of negative politicization and backlash against the Pope that leads investors to lose confidence in green investments. It can be argued that this could be the case of the US (Li et al., 2016).

To further investigate these patterns in the data, we split the samples based on companies' headquarters and report the results in Figure 7 (full results in Table C.2 in the appendix). We find that fossil fuel US-based companies had slightly lower returns than expected by around -0.08% in the entire period following the publication of the encyclical. However, this very small coefficient does not result into any significant *Cumulative Abnormal Returns* effect. It is also not robust to alternative event window lengths (Figure D.2). We observe no significant effect in the non-US sample of fossil fuel companies.

By contrast, US-based renewable energy companies had significantly lower returns than expected by around 0.45% following the publication of the encyclical. Importantly, the US subsample also experienced a negative immediate shock: a reduction in stock value by around 0.66% on the very day the encyclical was published (see Tables C.2 and D.5). We also find that, over the entire event window, US companies in the clean energy sector lost an average 4.21% value in their *Cumulative Abnormal Returns* following the publication of Francis's encyclical. The non-US renewable energy companies, instead, experienced no significant effect.

Figure 7: *Effect of the publication of the Laudato Si encyclical on Abnormal Returns and Cumulative Abnormal Returns: Comparison of US and non-US firms.*



Models are linear estimations of Abnormal Returns and Cumulative Abnormal Returns in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level. Full results in Table C.2 in the appendix.

Overall, these additional results suggest that the political stand of Francis, resonating in a clear left message through his climate encyclical, did not generate confidence in renewable energy companies. These firms, which would be most cheerful of strong climate policy, were most exposed to policy debates and conservative backlash. As we argued, this effect is best understood in the context of a politicized debate like the one around the Pope in the US in 2015. At that time, American politics started grappling with the beginning of the presidential primaries, in view of the 2016 elections. American political events may have influenced the views of the Pope and therefore the effects identified in our empirical analysis.

Multiple robustness checks that confirm the interpretation of our results can be found

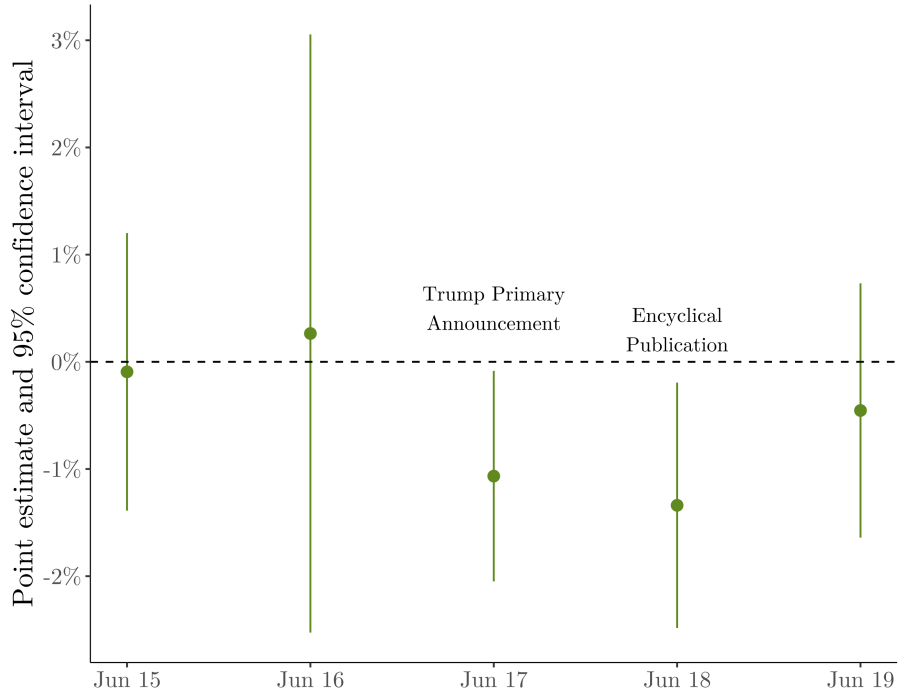
in the appendix.[19] One important note we make here is the potential threat to identification caused by the dynamics of the US presidential campaign in 2015. June 2015 was the month of Republican primaries candidatures, and Donald Trump made his own announcement of running on June 16. To be sure, our design removes the effect of this shock, to the extent that it affected the entire stock market. However, previous studies have shown the negative effect Trump's 2016 election had specifically on stocks of renewable energy companies, who stood to suffer from his vocal climate skepticism (Aklin, 2018). Accordingly, it is possible that our estimation picks up earlier concerns specific to renewable energy market actors about the policy prospects in case of a Trump presidency.

To tackle this concern, we narrow down our analysis to US-based clean energy companies, by studying in details the trading week that includes both Trump's primary announcement and the publication of the *Laudato Si* encyclical. Stock exchanges are usually closed for business on weekends, therefore we focus on the days from Monday, June 15 until Friday, June 19. We re-estimated a model of *Abnormal Returns* with firm-fixed effects, substituting our binary treatment variable with a categorical variable specific to each trading day. The reference point is Friday, June 12. We calculate day-by-day effects for the US-based companies in this time window.

The results are reported in Figure 8. *Abnormal Returns* for US renewable energy companies at the end of June 17 were about 1% lower than on June 12. Trump made his announcement on June 16. We do not observe any significant effect on that day, but it is possible that investors took a full day to respond to the information. However, even controlling for this effect, we observe an idiosyncratic shock on the day of June 18, at the release of the encyclical. On this day, US clean energy companies recorded negative *Abnormal Returns* about 1.34% lower than on June 12. While the negative effect could be partly compounded by Trump's announcement, *Returns* measure by how much stock prices differed at the end of a trading day with respect to the previous one. The

[19]We show our results do not hinge on the arbitrary length of the chosen event window. We also show that the leakage of the encyclical on June 15 had a similar effect on returns. We also propose alternative lag specifications for our models of *Abnormal Returns*. We extend our sample of renewable energy companies to include other minor firms. Furthermore, we propose analyses that include other time-varying control variables (e.g. cap-and-trade prices). Our findings hold across these alternative models.

Figure 8: *Day-by-day estimates of Abnormal Returns (AR) to US renewable energy companies in the trading week starting on June 15, 2015.*



Models are linear estimations based on US renewable energy companies' observations between June 12, 2015 and June 19, 2015. Coefficients refer to a variable for each individual trading day; the excluded reference category is Friday, June 12. Standard errors clustered at the firm-level. Full results in Table C.3 in the appendix.

consistent negative effect in *Abnormal Returns* on June 18 is thus evidence that, on this day, new information – presumably related to Francis's encyclical — was released that lead investors to update their renewable energy portfolios. Moreover, the effect on June 17 becomes insignificant in alternative specifications, whereas the June 18 effect is still detectable (see Table C.3 in the appendix).

Our event study results confirm the effect that politicized papal messages can have on financial markets. They also illustrate the important framing conditions dictated by the political context in which the papal communication is disseminated, as in the case of the US. To confirm the relevance of the US context, we collected a wide range of information that suggest the role of politicization in the domestic ground.[20] Back to the Pope's framing on US television, we can show not only that conservative US TV channels provided a significantly larger coverage of the encyclical, but also the message was in itself centered on backlash. As shown in Figure 9, the standardized word frequencies in the four main US broadcasting channels indicate that generalist US channels (CNN and MSNBC) associated the Pope with climate change generically, and mostly covered other geopolitical events. Arguably, CNN and MSNBC did not use the encyclical to discuss US climate policy directions nor economic implications.

The frequencies of Fox News and Fox Business provide a substantively different picture. Content related to economic policy (words in red) is more frequent here. '*Politics*' is much repeated; '*capitalism*' is one of the top five words associated with the Fox Business clips. In fact, this language was systematically used to challenge the Pope and criticize his left-wing agenda. In *Making Money with Charles Payne* (Fox Business) on July 11, Charles Payne notes that '*the Pope is socking it to capitalism.*' Similarly, on *Varney Company* (Fox News) on July 1, Stuart Vaney said: '*I don't think the Pope is socialist or communist, but it is very easy to jump to that conclusion.*'

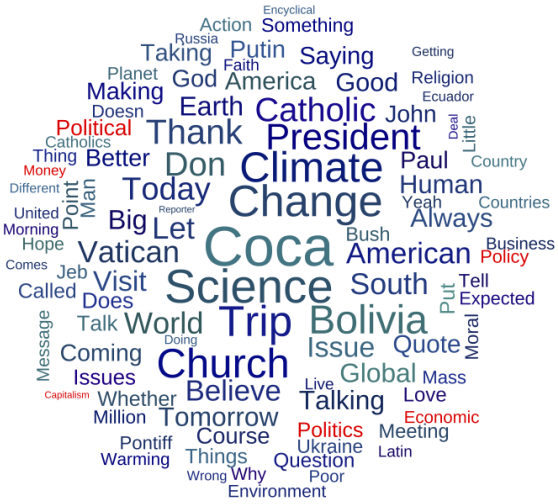
Two considerations follow. First, that Fox News Corporation took a different, more political, and to some extent more aggressive take on the Pope at the time of the encyclical, making explicit connections between capitalism, markets, and Francis's message

[20]In Appendix E we discuss trends in American public opinion polls and Congress debates related to the Pope's encyclical.

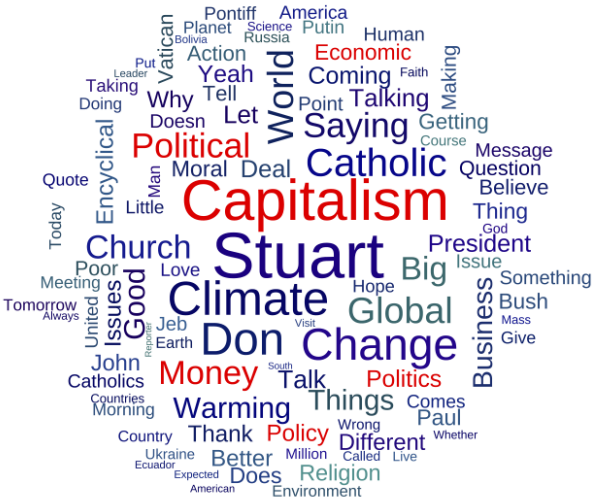
Figure 9: *Word cloud of most frequent words from TV clips mentioning the word "Pope" on CNN, Fox News, Fox Business, and MSNBC.* This figure shows the term frequency-inverse document frequency (TF-IDF) scores of the 100 most frequent words in video clips broadcast between June 18 and July 18, 2015.

(a) CNN

(b) MSNBC



(c) Fox Business



(d) Fox News

Source: GDELT Television Comparer API. The data query compares 15-seconds clips mentioning the word "Pope" in the broadcasts of the four selected networks.

for climate action. This in itself was information that could influence business-savvy consumers of TV news. Second, the stark difference between the skeptical, domestically oriented voice of Fox News and the other channels indicates that at minimum the encyclical contributed to a divided stream of news coverage, which could also push investors to doubt riskier investments (e.g. renewable energy portfolios).

6 Beyond Francis: Stock effects of other encyclicals

Before concluding, we ask: are our findings specific to Francis and his reception among the (US) public, or does our argument travel beyond this pontiff? We argued that ideological takes within social encyclicals can spark political reactions and generate relevant market signals for exposed actors, depending on whether the Pope leans towards the left or the right. Therefore, did the encyclical of another Pope transposed to relevant markets related to its topic?

To explore this question, we analyze the publication of a papal text with potential market policy implications by Francis' predecessor: Benedict XVI. We study *Caritas in Veritate*, Benedict XVI's first social encyclical released in 2009. The figure of Benedict XVI is in itself worth noting: Cardinal Joseph Ratzinger is considered a conservative voice of European theology and has often been associated with images of an elitist Vatican. His encyclical was born in reference to the 2007-2008 financial crisis and centered on problems of global development, with specific passages dedicated to business leaders, financiers, and aid agencies (Genovese, 2015). While the Pope's letter proposed help for the poor, it also lent a hand for banks' self-regulation in the wake of a major crisis. That Benedict XVI avoided taking strong critical stands on banking is also evidenced by the fact that the encyclical was released in the eve of the 2009 G8 Summit in Italy, and purposefully planned to be discussed among senior business leaders and bankers in London the same week.[21] Thus, we might expect the banking sector to be most exposed to the release of the encyclical. However, in the case of *Caritas in Veritate* our argument suggests that the market effect might have been positive, given the warming reception of

[21] Mychasuk, Emiliya. 24 October 2009. "Money and Morals". Financial Times.

Benedict XVI by conservative media and the rapprochement with financial leaders.

We test this empirically. First, we selected a sample of financial companies exposed by Benedict XVI's text. We drew on the US investment banks selected by Wilf (2016); we study 43 of these companies due to data availability. We complemented this list by selecting 25 publicly traded non-US incorporated banks, drawing from the top commercial banks by total assets as reported on Bureau van Dijk's Orbis corporate ownership database.[22] Next, we replicated the same procedure followed for the *Laudato Si* analysis. Our estimation window starts on November 23, 2008 and ends on June 1, 2009. We adopted the same market-wide indexes to explain returns to companies. The event window for this analysis starts on June 7, 2009 and ends on August 7, 2009. It is therefore centered around the event of interest (July 7, 2009).

Figure 10: Effect of the publication of Benedict XVI's *Caritas in Veritate* encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* of the sampled commercial banks.

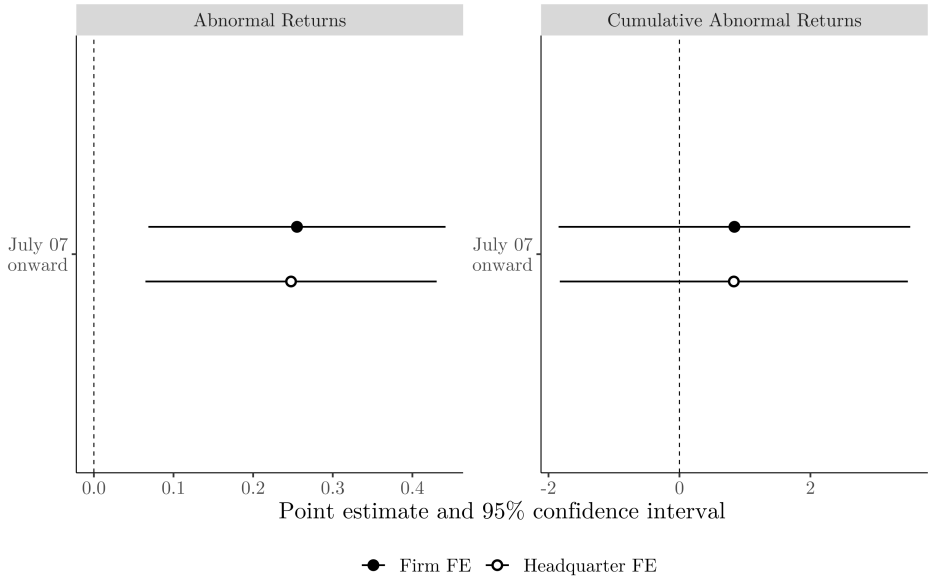


Figure 10 reports results obtained by estimating the models of *Abnormal* and *Cumulative Abnormal Returns*. Following the publication of *Caritas in Veritate*, commercial banks experienced average higher abnormal gains by about 0.25%. We also find that financial institutions experienced on average about 0.65% higher *Abnormal Returns* on the very day of the publication (see Table F.2). Both estimates are significant at the con-

[22]We considered only companies under the North American Industry Classification System (code 522110: Commercial Banking). The list of companies in this analysis is in Table F.1 in the appendix.

ventional 0.05 level. The findings suggest that investors were cheerful of Benedict XVI's message, possibly because it did not renegate commercial banks, although this boost in returns did not result into any significant *Cumulative Abnormal Returns*.

These results are only preliminary, and require a more in-depth investigation to tease out the mechanisms underlying the estimated effects. Nonetheless, this evidence underscores the material relevance of authoritative, politically oriented communications by Popes. It also further reinforces the utility of studying the impact of papal messaging in other contexts and periods, and their implications for trade and investments across time and space.

7 Conclusion

Studies on the impact of politics over markets have extensively concentrated on the effect of actions and communications of appointed political leaders (e.g. elected politicians or political institutions) on the returns to sensitive market actors. In this paper we note that this scholarship has surprisingly overlooked the impact of other authorities. Spiritual leaders, for example, have wide public audiences and frequently address social and political issues. However, little research has so far investigated their influence on the economy, and specifically on financial markets. We fill this gap focusing on a most understudied leader in the modern era: the Pope.

Our paper explores the financial implications of the most relevant papal writings – the encyclicals – for stakeholders invested in the political issues addressed by these forms of communications. Our argument draws on theories of political communication and political economy to explain why papal messages could alter financial outcomes. We conjecture that investors of exposed economic activities are sensitive to Popes' communications that signal a policy approach directed at them. Investors react to a papal communication if the Pope is particularly politicized. In these contexts, papal communications can divide the public and become market-relevant. We contend that the message of a Pope with conservative views may be received as good news by traditional stock markets. Vice versa, the encyclical of a left-wing Pope may generate more market volatility for traditional

investments and more opportunities for alternative stocks, unless conservative forces mobilize. Along these lines, a left-wing papal message could generate backlash which then hurts market actors that gain from a left policy vision.

We test our argument studying the market effects of Pope Francis's 2015 *Laudato Si* climate encyclical. An event study analysis shows that this document, which could have been received with cheer by green energy investors and concern by fossil fuel competitors, had the opposite effect. Our findings show that firms in the renewable energy sector lost on average 0.35% in their stock value each day for 30 days after the encyclical was published. Fossil fuel competitors saw no significant loss, instead. We also find that US renewable energy companies drive these results. The US-specific effects are insightful, because they suggest that a polarizing, authoritative left-wing figure like Pope Francis in combination with a polarized, populist-driven political environment can materially affect vulnerable companies.

Our research sheds new light on the material effects of the communications of unconventional political leaders, and suggests new lines of research. Whilst our findings indicate the crucial role that the domestic political context plays in absorbing the Pope's message, they also elevate the direct role of actors that international relations and comparative politics tend to discount, and gives new angles to the study of the rise of anti-establishment politics, which clearly also extend to public and media reactions to the Pope. Furthermore, our research gives credit to the political economy scholarship that believes in the power of words in international politics. Official communications, even if by political outsiders, seem to influence financial markets. This paper therefore encourages further studies on the effect of the timing and content of the message of political entrepreneurs and 'influencers.'

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Online Appendix

Papal Dividends: Popes' Political Communications and Financial Markets

Table of Contents

A Research design description

We define two time-windows of analysis. First, an "estimation window" corresponding to the pre-event timespan used to estimate synthetic counterfactuals. Second, an "event window", where the effect of the event under consideration is estimated. The first window spans over 190 days: from November 1, 2014 (t_0) to May 10, 2015 (t_1). The second time window spans from May 18, 2015 (t_2) until July 18, 2015 (t_3): it is 61 days long and is centered around the publication of the encyclical. Results are robust to shrinking and extending the arbitrary length of our event window (Figures D.1 and D.2).

Our empirical strategy proceeds in two steps. First, we focus on observations in the estimation window solely. The goal is to estimate, for each individual company, a linear market model – using ordinary least squares (OLS) – that predicts daily $Returns_{i,t}$ to that firm as a function of a vector of covariates $\mathbf{X}_{i,t}$ made of our three market-wide indicators (NYSE, DAX, and FTSE). These variables construct our vector of covariates $\mathbf{X}_{i,t}$ since the majority of energy firms in our sample are headquartered in either the US or Europe

and those indexes measure performances of the most important financial hubs in these areas. For each firm i in our dataset we estimate the following model in the estimation window using ordinary least squares (OLS):

$$Returns_{i,t} = \alpha_i + \beta_i \text{NYSE}_t + \gamma_i \text{DAX}_t + \theta_i \text{FTSE}_t + \varepsilon_{i,t} \mid t_0 < t < t_1 \tag{1}$$

An analysis of measures of fit confirms this procedure yielded satisfactorily predictive models. The average market model in the estimation window has an R^2 of 0.25. We do not observe significant differences in explanatory performance of our market models when distinguishing between clean energy and fossil fuel companies or US and non-US firms. The average R^2 value for US companies is 0.29 and that for non-US companies is 0.20. The average R^2 value for fossil fuel companies is 0.31 and that for renewable energy companies is 0.19. This gives us confidence that the models perform similarly across firms. Put differently, the indexes for the performance of US and European financial markets seem capable of explaining variation in returns to all our sampled firms.

Once market models are estimated, we use them to predict daily percentage changes in prices for each firm's stocks in the event window. Predicted $Returns_{i,t}$ represent our daily synthetic counterfactual observations around the publication of the encyclical:

$$E[Returns_{i,t}|\mathbf{X}_{i,t}] = \widehat{\alpha}_i + \widehat{\beta}_i \text{NYSE}_t + \widehat{\gamma}_i \text{DAX}_t + \widehat{\theta}_i \text{FTSE}_t \mid t_2 < t < t_3 \tag{2}$$

Next, we estimate two main outcomes of interest. We compute *Abnormal Returns*$_{i,t}$ for each observation in the event window, defined as the difference between the daily *observed* returns to a firm and those that are *expected* by our models (equation 3). We also compute *Cumulative Abnormal Returns*$_{i,t}$ as the sum of all *Abnormal Returns*$_{i,t}$ to a firm i from the beginning of the event window (t_2) until that moment t (equation 4). Table B.1 reports descriptive statistics of these outcome variables.

$$Abnormal\ Returns_{i,t} = Returns_{i,t} - E[Returns_{i,t}|\mathbf{X}_{i,t}] \mid t_2 < t < t_3 \tag{3}$$

$$Cumulative\ Abnormal\ Returns_{i,t} = \sum_{\tau=t_2}^{t} Abnormal\ Returns_{i\tau} \mid t_2 < t < t_3 \tag{4}$$

B Description of the sample for *Laudato Si* analysis

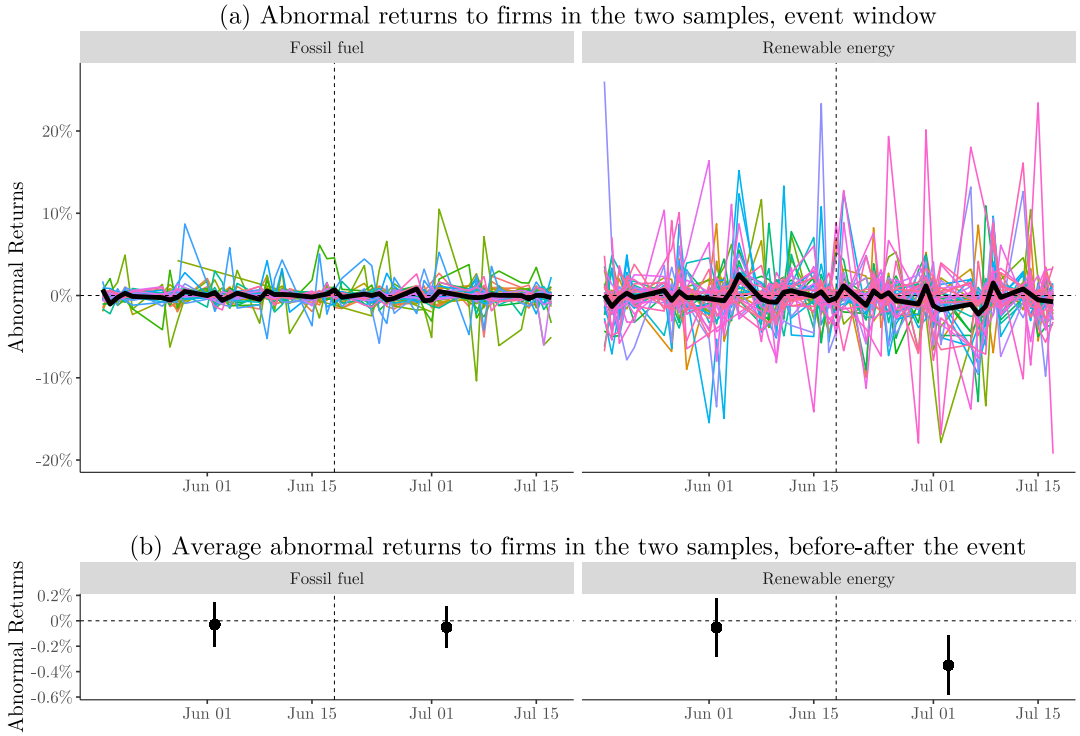
A descriptive analysis of *Abnormal Returns* provides some evidence of backlash against the Pope's green message. Figure B.1 shows estimated *Abnormal Returns* to fossil fuel and renewable energy companies in our sample and their averages in the event window.[23] Renewable energy companies show more volatility in the entire event window than fossil fuel ones, consistently with studies that point out clean energy firms are more vulnerable to political shocks than their fossil fuel counterparts (Aklin, 2018). Before the event,

[23]The plots exclude the companies Yingli Green Energy Holding Co Ltd (renewable energy sample) and BHP Group PLC (fossil fuel sample) due to high bound variation.

average *Abnormal Returns* are close to zero for both samples.[24] This indicates that, on average, there is no diversion from expected returns before the publication of the encyclical. After the event, instead, average *Abnormal Returns* are below the zero line, but *only* for the renewable energy sample. Fossil fuel companies have post-event abnormal returns that do not differ from zero.[25] Thus, clean energy firms' returns were on average *worse* following the publication of the encyclical, both compared to fossil fuel returns and against their pre-encyclical values.

Additionally, differences in mean of *Abnormal* and *Cumulative Abnormal Returns* in the renewable energy sector across different countries suggest that most action occurs in the US companies subsample (Table B.3) – something we come back to later in the empirics.

Figure B.1: *Abnormal returns before and after publication of the Laudato Si.* This figure shows the abnormal returns for all companies for the entire period of analysis (a) and the averages before-after the encyclical (b). The dashed vertical line represents the publication of the *Laudato Si* encyclical (June 18, 2015). The thick black line in panel (a) reports daily average *Abnormal Returns*.



The analysis for the estimates in panel (b) is reported in Table B.2.

[24]Mean value is -0.03 in the fossil fuel sample, indistinguishable from 0 at p-value = 0.74. Mean is -0.05 in the renewable energy sample, indistinguishable from 0 at p-value = 0.65.

[25]Mean value for the renewable energy companies is -0.35 after the event, distinguishable from zero at p-value = 0.003. For fossil fuel companies the value is -0.05, with p-value = 0.54.

Table B.1: Descriptive statistics of fossil fuel and renewable energy firms in our sample. Event window (May 18, 2015 - July 18, 2015)

	Mean	Median	Std. Dev.	Min	Max	N
Fossil fuel						
Abnormal Returns	−0.04	−0.001	2.68	−48.15	40.06	1,901
Cumulative Abnormal Returns	−1.39	−0.12	11.52	−96.78	31.33	1,937
Abnormal Returns (US)	−0.02	0.001	0.70	−6.02	4.26	993
Cumulative Abnormal Returns (US)	0.31	0.33	3.34	−12.85	15.60	993
Abnormal Returns (Non-US)	−0.07	−0.002	3.81	−48.15	40.06	908
Cumulative Abnormal Returns (Non-US)	−3.18	−0.57	15.95	−96.78	31.33	944
Renewable energy						
Abnormal Returns	−0.20	−0.20	3.51	−35.46	26.01	1,775
Cumulative Abnormal Returns	−2.06	−0.87	14.06	−62.02	39.60	1,783
Abnormal Returns (US)	−0.14	−0.14	2.70	−17.86	26.01	1,073
Cumulative Abnormal Returns (US)	0.41	0.23	14.61	−62.02	39.60	1,075
Abnormal Returns (Non-US)	−0.28	−0.26	4.48	−35.46	24.82	702
Cumulative Abnormal Returns (Non-US)	−5.80	−2.69	12.29	−48.03	29.18	708

Table B.2: Average *Abnormal Returns* to firms in the Fossil fuel and Renewable energy samples during the 30 days before and after publication of the *Laudato Si* encyclical with 95% confidence intervals.

	Before publication		After publication	
	Mean	95% Conf. Int.	Mean	95% Conf. Int.
Fossil fuel: Abnormal Returns	-0.03	[-0.21, 0.15]	-0.05	[-0.21, 0.11]
Renewable energy: Abnormal Returns	-0.05	[-0.28, 0.17]	-0.35	[-0.59, -0.12]

Table B.3: Difference-in-mean *Abnormal Returns* and *Cumulative Abnormal Returns* before-after publication of the encyclical (June 18, 2015). Fossil fuel and renewable energy firms, event window data.

	Before publication		After publication			
	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in Means	Std. Error
Fossil fuel						
Abnormal Returns	-0.03	2.82	-0.05	2.53	-0.02	0.12
Cumulative Abnormal Returns	-1.40	10.84	-1.38	12.21	0.01	0.53
Abnormal Returns (US)	0.02	0.59	-0.06	0.80	-0.09	0.04
Cumulative Abnormal Returns (US)	0.36	2.43	0.27	4.08	-0.09	0.21
Abnormal Returns (Non-US)	-0.09	4.00	-0.04	3.59	0.05	0.25
Cumulative Abnormal Returns (Non-US)	-3.20	15.04	-3.16	16.91	0.03	1.05
Renewable energy						
Abnormal Returns	-0.05	3.49	-0.35	3.53	-0.30	0.17
Cumulative Abnormal Returns	-0.54	11.02	-3.63	16.49	-3.09	0.67
Abnormal Returns (US)	0.07	2.68	-0.37	2.71	-0.44	0.16
Cumulative Abnormal Returns (US)	2.46	10.50	-1.75	17.68	-4.21	0.89
Abnormal Returns (Non-US)	-0.25	4.47	-0.32	4.50	-0.07	0.34
Cumulative Abnormal Returns (Non-US)	-5.18	10.17	-6.42	14.09	-1.24	0.92

Table B.4: Sample of fossil fuel firms and their headquarter country

Name	Nationality
Abb Ltd	Sweden
Abbott Laboratories	United States
Akzo Nobel NV	Netherlands
American Electric Power Company Inc	United States
Atco Ltd	Canada
Baltimore Gas and Electric Company	United States
Baxter International Inc	United States
BHP Group PLC	United Kingdom
Boeing Co	United States
BP PLC	United Kingdom
Celanese Corp	United States
Centrica PLC	United Kingdom
Chevron Corp	United States
China Shenhua Energy Co Ltd	China
China Yangtze Power Co Ltd	China
Clariant AG	Switzerland
Dow Chemical	United States
Duke Energy Corp	United States
Eli Lilly and Co	United States
Enel SpA	Italy
Eni SpA	Italy
Eramet SA	France
Exelon Corp	United States
Exxon Mobil Corp	United States
Fluor Corp	United States
Fortis Inc	Canada
Fortum Oyj	Finland
Freeport-McMoRan Inc	United States
General Motors Co	United States
Honeywell International Inc	United States
Huaneng Power International Inc	China
L'Air Liquide	France
Manila Electric Co	Philippines
Medtronic PLC	United States
Merck and Co Inc	United States
Monsanto	United States
PetroChina Co Ltd	China
Petroleo Brasileiro SA Petrobras	Brazil
Pfizer Inc	United States
Power Construction Corporation of China Ltd	China
PPG Industries Inc	United States
Praxair	United States
Public Service Enterprise Group Inc	United States
Royal Dutch Shell PLC	Netherlands
Sempra Energy	United States
Swire Pacific Ltd	China

Table B.5: Sample of renewable energy firms and their headquarter country

Name	Nationality
ABO Group Environment SA	Belgium
Adecoagro SA	Luxembourg
Advanced Energy Industries Inc	United States
American Superconductor Corp	United States
Andersons Inc	United States
Archer-Daniels-Midland Co	United States
Ballard Power Systems Inc	United States
Broadwind Inc	United States
Canadian Solar Inc	Canada
Cosan Ltd	Brazil
Daqo New Energy Corp	China
EnerSys	United States
Enertronica SpA	Italy
Enviva Partners LP	United States
First Solar Inc	United States
FutureFuel Corp	United States
General Electric Co	United States
Gladstone Land Corp	United States
Green Plains Inc	United States
Hanwha Q Cells	South Korea
JA Solar Holdings	China
JinkoSolar Holding Co Ltd	China
Ocean Power Technologies Inc	United States
ON Semiconductor Corp	United States
Ormat Technologies Inc	United States
Pacific Ethanol Inc	United States
ReneSola Ltd	China
Renewable Energy Group Inc	United States
REX American Resources Corp	United States
Siemens AG	Germany
Sky Solar Holdings Ltd	China
Solar Alliance Energy Inc	Canada
Solaredge Technologies Inc	Israel
SunPower Corp	United States
Sunworks Inc	United States
Teledyne Technologies Inc	United States
Tesla Inc	United States
Valero Energy Corp	United States
Vestas Wind Systems A/S	Denmark
Vivint Solar Inc	United States
Wacker Chemie AG	Germany
Yingli Green Energy Holding Co Ltd	China

C Event Analysis: Disclosure of Main Results

Table C.1: Effect of the publication of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* of fossil fuel and renewable energy firms. See Figure 6.

	Fossil fuel				Renewable energy			
	AR		CAR		AR		CAR	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 18 onward	−0.03	−0.04	0.11	0.06	−0.35**	−0.34**	−3.12**	−3.00**
	(0.04)	(0.04)	(0.59)	(0.59)	(0.14)	(0.13)	(1.47)	(1.45)
June 18	0.85	0.85			−0.03	−0.01		
	(0.64)	(0.64)			(0.47)	(0.46)		
Abnormal Returns (t-1)	−0.34***	−0.34***			−0.18**	−0.16**		
	(0.04)	(0.04)			(0.07)	(0.07)		
Constant	−0.10***	−0.01	−3.36***	−0.20	−0.12	−0.12	−4.20***	−4.27***
	(0.03)	(0.03)	(0.29)	(0.29)	(0.08)	(0.07)	(0.81)	(0.81)
Firm FE	Yes		Yes		Yes		Yes	
Headquarter FE		Yes		Yes		Yes		Yes
Number of firms	46	46	46	46	42	42	42	42
Observations	1,864	1,864	1,937	1,937	1,767	1,767	1,783	1,783
Adjusted R^2	0.11	0.11	0.87	0.32	0.02	0.02	0.71	0.11
F Statistic	5.63***	18.02***	284.62***	76.74***	1.90***	4.21***	103.36***	20.56***

Note: *p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table C.2: Effect of the publication of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns*: Comparison of US and non-US firms. See Figure 7.

	Fossil fuel				Renewable energy			
	US		Non-US		US		Non-US	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 18 onward	−0.08**	−0.10	0.04	0.34	−0.43***	−4.21**	−0.15	−1.46
	(0.04)	(0.51)	(0.07)	(1.12)	(0.14)	(1.96)	(0.26)	(2.19)
June 18	0.24**		1.44		−0.66*		0.94	
	(0.11)		(1.33)		(0.34)		(1.00)	
Abnormal Returns (t-1)	0.02		−0.36***		−0.06**		−0.24**	
	(0.04)		(0.03)		(0.03)		(0.10)	
Constant	0.06***	1.75***	−0.15**	−3.47***	0.003	−0.15	−0.26*	−5.12***
	(0.02)	(0.25)	(0.06)	(0.55)	(0.07)	(0.96)	(0.15)	(1.22)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	24	24	22	22	25	25	17	17
Observations	992	993	872	944	1,071	1,075	696	708
Adjusted R^2	0.02	0.70	0.11	0.88	0.01	0.75	0.04	0.58
F Statistic	1.62**	99.62***	5.69***	302.16***	1.38*	129.06***	2.53***	58.34***

Note: *p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table C.3: Event-analysis of *Abnormal Returns* to US-based renewable energy firms in the trading week beginning Monday, June 15 and ending Friday, June 19.

	Dependent variable:	
	AR	
	(1)	(2)
June 15	−0.09	0.11
	(0.65)	(0.54)
June 16	0.26	0.44
	(1.41)	(1.39)
June 17	−1.07**	−0.79
	(0.50)	(0.59)
June 18	−1.34**	−1.46**
	(0.58)	(0.58)
June 19	−0.45	−0.65
	(0.60)	(0.63)
Abnormal Returns (t-1)		−0.30***
		(0.03)
Constant	0.23	0.04
	(0.47)	(0.49)
Firm FE	Yes	Yes
Number of firms	25	25
Observations	150	150
Adjusted R^2	−0.11	−0.02
F Statistic	0.48	0.90
Note:	*p<0.1; **p<0.05; ***p<0.01	

All models in the table are estimated using observations spanning from Friday, June 12 and ending Friday, June 19. They are linear models estimated with ordinary least squares and manual inclusion of fixed effects. Standard errors are clustered at the firm-level. Estimated daily coefficients refer to a categorical variable with baseline level defined relative to *Abnormal Returns* on Friday, June 12.

D Event Analysis: Robustness Tests

We subject our results to an extensive series of robustness tests. First, we tested whether our findings depend on the arbitrary length of the event window we chose. We re-estimated models 1 and 5 from Table 6 on event windows of alternative lengths. We selected event windows of all possible durations, with an even number of days before and after the publication of the encyclical (June 18). The narrowest event window we considered included only 30 days around the event (15 before, 15 after). The longest event window considered included 70 days around the event (35 days before, 35 after). Panel (a) of Figure D.1 reports point estimates and 95% confidence intervals for the variable *June 18 onward* for each of these models. Results from models 1 and 5 of Table 6 are highlighted in red for comparison. We observe no significant effect for any time window length in the fossil fuel sample. Instead, we find a consistently negative and statistically significant effect of the publication on *Abnormal Returns* for event windows of at least 38 days around the event. Shorter event windows find no significant coefficient, confirming our interpretation that the negative effect of the encyclical took some time to kick in.

Next, we replicate the same procedure but modelling *Cumulative Abnormal Returns* (*i.e.* we study models 3 and 7). Panel (b) confirms the lack of a significant cumulative effect for fossil fuel companies is not dependent on the arbitrary lenght of the time window. We also find that a negative and statistically significant effect on *Cumulative Abnormal Results* is detected for event windows that include at least 54 days around the event, and remains consistently negative after that.

Figure D.2 replicates the same test by splitting the samples among US and non-US firms (presented in Table 7). Overall, it confirms our findings on heterogeneous effects when changing the length of the event window: American fossil fuel companies experienced a tiny negative effect on their *Abnormal Returns* following the publication of the encyclical, although the effect did not cumulate to any relevant loss. On the other hand, US renewable energy companies experienced larger and statistically significant losses on their *Abnormal Returns*, which amount to a significant cumulative negative effect. No effect is detected among non-US companies in either sample.

Next, we unpacked whether the leakage of the encyclical on June 15 had an effect on firms' returns. Table D.1 replicates the exercise proposed in Table 6, but studies the leakage instead of the publication. Overall, results are consistent with what we observe in Table 6. We find no significant effect for fossil fuel companies. Instead, we observe a negative and statistically significant effect of the leakage on *Abnormal Returns* and *Cumulative Abnormal Returns* of renewable energy companies, although the effect becomes smaller in size and noisier – but this loss of precision might be due to the fact that not all firms in our sample were equally exposed to the information leaked on June 15, hence warranting our choice of focusing on June 18.

We also substitute the publication of the encyclical with its leakage for the sub-sample analyses (Table D.2). In this case, the small significant effects for US fossil fuel companies disappear completely. We still observe no effect for non-US fossil fuel companies. Instead, the significant effect for US renewable energy firms holds and is comparable in size to what we documented in Table 7 (we still observe no significance for non-US renewable energy companies).

Introducing lags of the dependent variable with unit fixed effects can create problems for the estimation. We thus propose alternative lag specifications of models reported in Tables 6 and 7. Tables D.3, D.4, and D.5 report the results. They apply alternative lag choices to models relative to the publication of the encyclical on *Abnormal Returns*. They also unpack the effect on US and non-US firms. Specifications start from a firm-FE model with no lag and introduce all lags one-by-one until lag $t-4$. Results discussed in the main text are robust to all those alternative specifications.

Next, we test whether our significant results among renewable energy companies hold in a larger sample of clean energy-producing companies. We enlarge our sample of 42 companies by adding 11 more renewable energy firms that are reference din IG UK as top renewable energy companies. We then replicate the main analysis of *Abnormal* and *Cumulative Abnormal Returns* and subsample by headquarter (US vs non-US). Results are generally in line with our previous findings: we observe clean energy companies experiencing systematically lower average *Abnormal Returns* after the encyclical was published, by about 0.26%. This estimate is significant at the .05 conventional level. However, the effect on *Cumulative Abnormal Returns* is not distinguishable from zero. When we split our extended sample among American and non-American firms, we still find that US companies are driving the effect, with *Abnormal Returns* that are on average about 0.41% lower after the publication of the encyclical than before it. This effect is statistically significant at conventional levels and results in a significant reduction of *Cumulative Abnormal Returns* by about 4.33% when looking at the entire post-event period in the event window. No significant effect is detected for non-US companies.

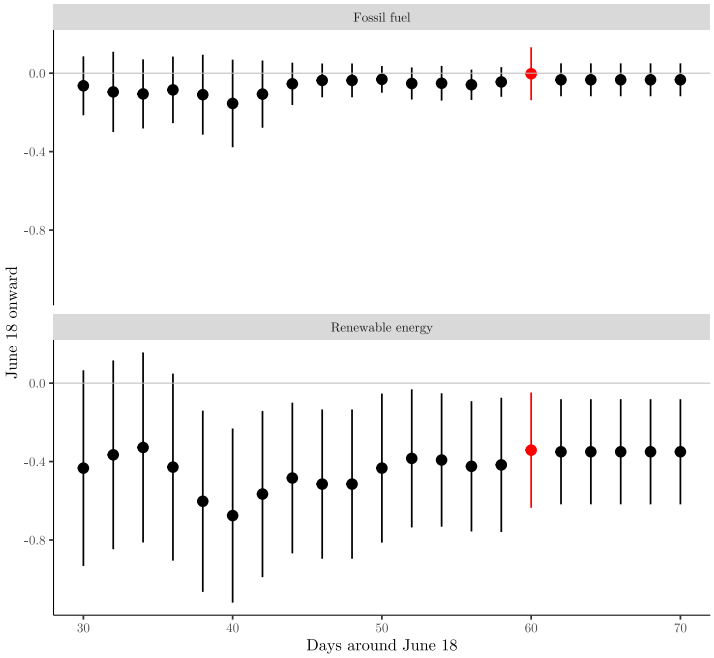
Finally, we test against two potential threats to identification of our results. First, we account for the possibility that growing electoral support for Donald Trump drives the effect we detect in the US sample of renewable energy companies. We obtained data on percentage of daily support for Trump as a Republican primary candidate from FiveThirtyEight in the time frame of our *event window*.[26] We include this variable as a control in our specifications. Second, we account for the possibility that changes in energy future prices in the EU could be contributing to unmeasured market volatility. We measure daily prices of emission allowances traded under the EU Emission Trading System (ETS). We include this variable as a control too. Results are reported in Table

[26]Data retrieved from https://projects.fivethirtyeight.com/election-2016/national-primary-polls/republican/.

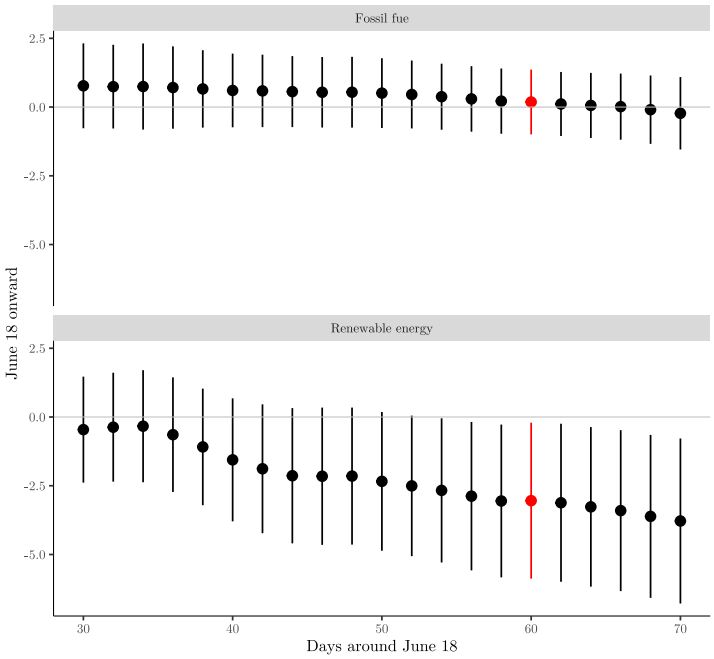
D.7. No significant effect is detected for the fossil fuel sample and for non-US based companies, consistently with previous results. The point estimate of the June 18 onward variable for the renewable energy US-based firms is negative and comparable in size to previous estimates. However, its standard error increases significantly, resulting into a non-significant estimate. We suspect our standard error increases significantly because the Trump support variable is highly collinear with June 18 onward (correlation: 0.91). Meaning, a lot of the variation that June 18 onward represents is captured by measures of Trump support. Notwithstanding that, a negative effect is still detected on the day the encyclical was published (June 18), for US-based renewable energy companies. This estimate is significant at a 0.10 level and comparable in size to that estimated earlier. Overall, we consider it as reassuring evidence supporting our main estimate of the effect of the encyclical.

Figure D.1: Point estimates and 95% confidence intervals for the effect of *June 18 onward* on *Abnormal Returns* (a) and *Cumulative Abnormal Returns* (b)

(a) Effect of *June 18 onward* on *Abnormal Returns*



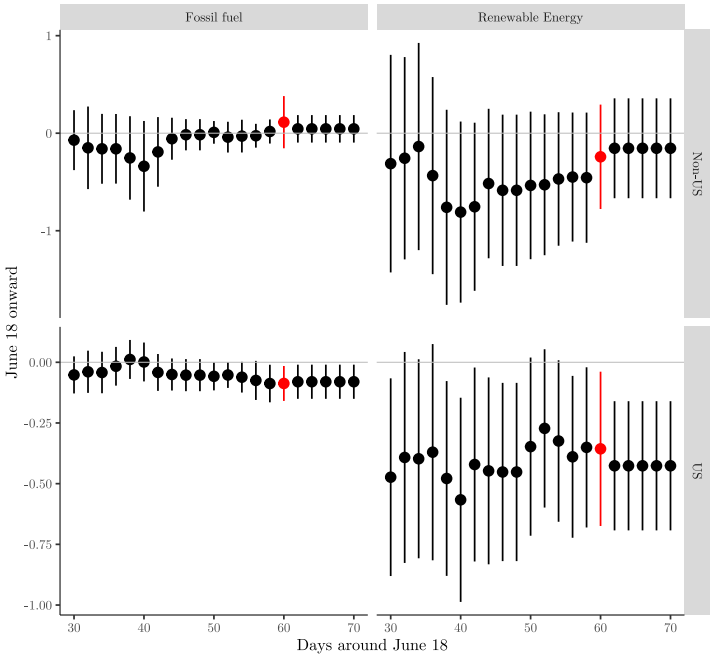
(b) Effect of *June 18 onward* on *Cumulative Abnormal Returns*



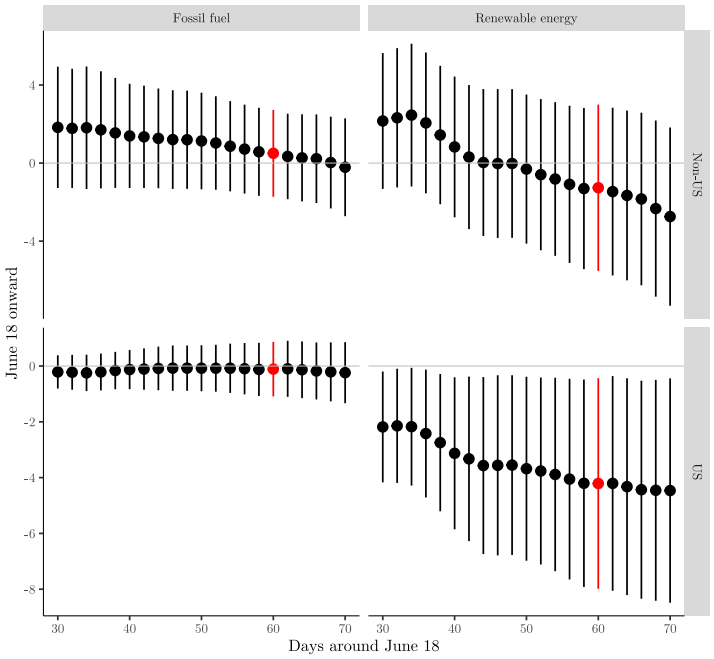
Horizontal axes report alternative choices for the length of the event window (expressed in days around the event). Red dots indicate estimates reported in the tables included in the main text. All estimated models include firm-fixed effect, a one-day lag of the dependent variable and the *June 18* binary variable. Standard errors are clustered at a firm level.

Figure D.2: Point estimates and 95% confidence intervals for the effect of *June 18 onward* on *Abnormal Returns* (a) and *Cumulative Abnormal Returns* (b) for US and non-US firms

(a) Effect of *June 18 onward* on *Abnormal Returns*. US and non-US firms



(b) Effect of *June 18 onward* on *Cumulative Abnormal Returns*. US and non-US firms



Horizontal axes report alternative choices for the length of the event window (expressed in days around the event). Red dots indicate estimates reported in the tables included in the main text. All estimated models include firm-fixed effect, a one-day lag of the dependent variable and the *June 18* binary variable. Standard errors are clustered at a firm level.

Table D.1: Effect of the leakage of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* for fossil fuel and renewable energy firms

	Fossil fuel				Renewable energy			
	AR		CAR		AR		CAR	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 15 onward	0.03	0.02	0.09	0.03	−0.32**	−0.31**	−2.63*	−2.53*
	(0.07)	(0.07)	(0.58)	(0.58)	(0.15)	(0.15)	(1.48)	(1.47)
June 15	−0.08	−0.08			0.36	0.35		
	(0.12)	(0.12)			(0.55)	(0.55)		
Abnormal Returns (t-1)	−0.34***	−0.34***			−0.18**	−0.16**		
	(0.04)	(0.04)			(0.07)	(0.07)		
Constant	−0.11***	−0.02	−3.35***	−0.19	−0.12	−0.12	−4.25***	−4.31***
	(0.04)	(0.04)	(0.33)	(0.32)	(0.08)	(0.08)	(0.95)	(0.94)
Firm FE	Yes		Yes		Yes		Yes	
Headquarter FE		Yes		Yes		Yes		Yes
Number of firms	46	46	46	46	42	42	42	42
Observations	1,864	1,864	1,937	1,937	1,767	1,767	1,783	1,783
Adjusted R^2	0.10	0.11	0.87	0.32	0.02	0.02	0.70	0.10
F Statistic	5.52***	17.64***	284.60***	76.74***	1.88***	4.16***	101.52***	19.88***
Note:								*p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.2: Effect of the leakage of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* for fossil fuel and renewable energy firms. Comparison of US and non-US firms

	Fossil fuel				Renewable energy			
	US		Non-US		US		Non-US	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 15 onward	−0.05	−0.05	0.14	0.25	−0.42**	−3.63*	−0.10	−1.10
	(0.04)	(0.53)	(0.13)	(1.08)	(0.18)	(1.93)	(0.24)	(2.32)
June 15	−0.02		−0.12		0.65		−0.13	
	(0.09)		(0.25)		(0.50)		(1.15)	
Abnormal Returns (t-1)	0.02		−0.36***		−0.06**		−0.24**	
	(0.04)		(0.03)		(0.02)		(0.10)	
Constant	0.05**	1.73***	−0.17**	−3.44***	−0.001	−0.18	−0.25**	−5.23***
	(0.02)	(0.29)	(0.07)	(0.60)	(0.10)	(1.08)	(0.13)	(1.48)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	24	24	22	22	25	25	17	17
Observations	992	993	872	944	1,071	1,075	696	708
Adjusted R^2	0.01	0.70	0.11	0.88	0.01	0.74	0.04	0.58
F Statistic	1.46*	99.54***	5.55***	302.02***	1.30	125.31***	2.49***	57.96***
Note:								*p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.3: Effect of publication of the encyclical on *Abnormal Returns* to firms in the fossil fuel and clean energy industries. Alternative lag specifications.

	Abnormal Returns									
	Fossil fuel					Renewable energy				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
June 18 onward	−0.06*	−0.03	0.03	−0.01	−0.03	−0.30***	−0.35**	−0.35**	−0.45**	−0.47**
	(0.03)	(0.04)	(0.09)	(0.06)	(0.05)	(0.12)	(0.14)	(0.16)	(0.19)	(0.19)
June 18	0.79	0.85	0.84	0.81	0.82	0.04	−0.03	0.01	−0.002	0.05
	(0.67)	(0.64)	(0.61)	(0.62)	(0.60)	(0.45)	(0.47)	(0.46)	(0.46)	(0.44)
June 15 onward		−0.34***	−0.39***	−0.24***	−0.31***		−0.18**	−0.19**	−0.23***	−0.21**
		(0.04)	(0.05)	(0.04)	(0.06)		(0.07)	(0.07)	(0.08)	(0.08)
June 15			−0.23***	−0.20***	−0.16***			−0.06**	−0.08***	−0.06**
			(0.04)	(0.03)	(0.02)			(0.03)	(0.03)	(0.03)
Abnormal Returns (t-1)				0.11***	0.11***				−0.04	−0.05*
				(0.02)	(0.02)				(0.03)	(0.03)
Abnormal Returns (t-2)					0.06**					−0.07**
					(0.03)					(0.03)
Abnormal Returns (t-3)	−0.07***	−0.10***	−0.17**	−0.002	0.01	−0.11	−0.12	−0.41***	−0.48***	−0.06
	(0.02)	(0.03)	(0.07)	(0.05)	(0.04)	(0.07)	(0.08)	(0.08)	(0.10)	(0.11)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,901	1,864	1,782	1,700	1,618	1,775	1,767	1,717	1,667	1,617

Note: *p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.4: Effect of the publication of the encyclical on *Abnormal Returns* to fossil fuel firms. Alternative lag specifications, comparison of US and non-US firms

	Abnormal Returns									
	US					Non-US				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
June 18 onward	−0.10**	−0.08**	−0.09**	−0.09**	−0.09**	−0.01	0.04	0.21	0.13	0.08
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.07)	(0.20)	(0.12)	(0.11)
June 18	0.25**	0.24**	0.24**	0.24**	0.22*	1.38	1.44	1.39	1.34	1.34
	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(1.41)	(1.33)	(1.25)	(1.27)	(1.22)
Abnormal Returns (t-1)		0.02	0.03	0.04	0.04		−0.36***	−0.41***	−0.26***	−0.33***
		(0.04)	(0.03)	(0.03)	(0.03)		(0.03)	(0.04)	(0.03)	(0.05)
Abnormal Returns (t-2)			−0.02	−0.04	−0.05			−0.24***	−0.21***	−0.17***
			(0.04)	(0.04)	(0.04)			(0.03)	(0.02)	(0.02)
Abnormal Returns (t-3)				0.002	0.01				0.10***	0.11***
				(0.06)	(0.06)				(0.02)	(0.02)
Abnormal Returns (t-4)					−0.15**					0.07***
					(0.06)					(0.02)
Constant	0.07***	0.06***	0.06***	0.06**	0.06**	−0.11***	−0.15**	−0.27**	−0.08	−0.06
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.06)	(0.13)	(0.09)	(0.07)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	993	992	968	944	920	908	872	814	756	698

Note: *p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.5: Effect of the publication of the encyclical on *Abnormal Returns* to renewable energy firms. Alternative lag specifications, comparison of US and non-US firms

	Abnormal Returns									
	US					Non-US				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
June 18 onward	−0.41***	−0.43***	−0.35**	−0.36**	−0.42**	−0.14	−0.15	−0.25	−0.51	−0.53
	(0.14)	(0.14)	(0.16)	(0.17)	(0.18)	(0.20)	(0.26)	(0.30)	(0.38)	(0.38)
June 18	−0.63*	−0.66*	−0.66**	−0.63*	−0.58*	1.02	0.94	0.99	0.97	1.00
	(0.33)	(0.34)	(0.32)	(0.33)	(0.35)	(0.97)	(1.00)	(0.99)	(0.99)	(0.96)
Abnormal Returns (t-1)		−0.06**	−0.07**	−0.10*	−0.11*		−0.24**	−0.26**	−0.31***	−0.27**
		(0.03)	(0.03)	(0.05)	(0.06)		(0.10)	(0.11)	(0.11)	(0.12)
Abnormal Returns (t-2)			−0.01	−0.03	−0.02			−0.10***	−0.11***	−0.09**
			(0.03)	(0.03)	(0.04)			(0.03)	(0.04)	(0.05)
Abnormal Returns (t-3)				−0.10***	−0.11***				−0.01	−0.01
				(0.03)	(0.03)				(0.04)	(0.03)
Abnormal Returns (t-4)					−0.10***					−0.04
					(0.03)					(0.04)
Constant	0.01	0.003	−0.04	−0.06	−0.05	−0.23*	−0.26*	−0.52***	−0.51***	−0.09
	(0.07)	(0.07)	(0.08)	(0.10)	(0.11)	(0.13)	(0.15)	(0.17)	(0.20)	(0.20)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,073	1,071	1,044	1,017	990	702	696	673	650	627
Note:										*p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.6: Effect of the publication of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* of renewable energy firms, extended sample.

	AR		CAR		US		Non-US	
					AR	CAR	AR	CAR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 18 onward	−0.26**	−0.25**	−2.18	−2.09	−0.41***	−4.33**	−0.003	0.50
	(0.13)	(0.12)	(1.41)	(1.40)	(0.13)	(1.83)	(0.22)	(2.11)
June 18	0.19	0.19			−0.49		1.05	
	(0.39)	(0.38)			(0.31)		(0.73)	
Abnormal Returns (t-1)	−0.16**	−0.14**			−0.05*		−0.22**	
	(0.07)	(0.07)			(0.03)		(0.09)	
Constant	1.03***	−0.01	−0.85	−5.78***	−0.01	−0.09	0.92***	−2.10**
	(0.08)	(0.06)	(0.66)	(0.72)	(0.06)	(0.89)	(0.13)	(0.98)
Firm FE	Yes		Yes		Yes	Yes	Yes	Yes
Headquarter FE		Yes		Yes				
Number of firms	51	51	51	51	28	28	23	23
Observations	2,139	2,139	2,175	2,175	1,200	1,204	939	971
Adjusted R^2	0.02	0.02	0.69	0.11	0.01	0.74	0.04	0.63
Note:								*p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

Table D.7: Effect of the publication of the encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* of fossil fuel and renewable energy firms, additional controls.

	Fossil fuel				Renewable energy			
	US		Non-US		US		Non-US	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
June 18 onward	−0.002	−0.08	0.03	1.86	−0.51	0.90	0.78	6.05**
	(0.12)	(0.50)	(0.40)	(1.33)	(0.36)	(1.29)	(0.54)	(2.45)
June 18	0.20		1.48		−0.63*		0.60	
	(0.14)		(1.39)		(0.34)		(1.05)	
Abnormal Returns (t-1)	0.02		−0.36***		−0.06**		−0.25***	
	(0.04)		(0.03)		(0.03)		(0.09)	
Trump support (%)	−0.01	−0.003	−0.002	−0.14	0.01	−0.46***	−0.09*	−0.69***
	(0.01)	(0.05)	(0.04)	(0.12)	(0.03)	(0.18)	(0.05)	(0.23)
ETS	−0.03	0.03	0.14	−0.19	−0.01	−0.13	0.24*	−0.25*
	(0.03)	(0.03)	(0.14)	(0.17)	(0.07)	(0.14)	(0.14)	(0.15)
Constant	0.08	1.77***	−0.13	−3.00***	−0.02	1.48	0.07	−2.65
	(0.06)	(0.37)	(0.16)	(0.81)	(0.14)	(1.50)	(0.26)	(1.75)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of firms	24	24	22	22	25	25	17	17
Observations	992	993	872	944	1,071	1,075	696	708
Adjusted R^2	0.02	0.70	0.11	0.88	0.01	0.75	0.04	0.60
Note:								*p<0.1; **p<0.05; ***p<0.01

All models in the table are linear estimations of returns using observations in the event window (May 18, 2015 - July 18, 2015). Standard errors clustered at the firm-level.

E Mechanism and Additional Evidence from the US

Congress debates In addition to the media discourse and the backlash from far-right news channels, we also explore whether the debates within the main American deliberative institution - the Congress - covered the Pope's encyclical and if this generated further partisan division that could preoccupy investors. For this purposes, we retrieved the relevant congressional speeches based on key word searches on the Congressional Record Database between June and September 2015.[27] We find 17 relevant speeches, of which all are led by Democrats (and one Independent, Senator Sanders) in support of the Pope's views. Of these 17 speeches directly address the Pope's views in this time frame, 12 were made by unique speakers; 9 of them are senators, 2 are representatives, and one governor (Jared Polis, Colorado) gave a speech at the Congress on September 17. See Table C.1 for details.

The content of these speeches suggests a clear tendency by Democrats to use the Pope's encyclical in order to push for an ambitious climate agenda. On June 23 Paul Tonko said '*I thank Pope Francis, and I hope the words he shared last week will ring true with all of us, including those who continue to deny climate change, both in this body and around the world*'. Additionally, the Democratic speakers seemed particularly interested in leveraging the Pope's message to confront the Republican candidates for presidency, and especially the leading one at that point – Jeb Bush. For instance, on July 21 Senator Sheldon Whitehouse said: '*The question is why Republican Presidential candidates refuse to engage on climate change. [...] The Republican candidates from Florida are running against the facts and they are running against the opinions of experts and leaders [...].*' Evidently, the Democrats in Congress associated their policy vision to the message of the Pope. This net division between supportive Democrats and silent Republicans further indicates that the vision of Francis had policy credibility among the left, and was generally polarizing. With left elites in support but the right (e.g. Fox News) against the climate policies implied by the encyclical, it is reasonable to expect stockholders to worry about the returns on the more fragile climate investments. As we know ex-post, the right political apparatus eventually prevailed in 2016 with the presidential victory of Donald Trump. But what about about the voting attitudes of public opinion at the time of the encyclical?

Public Polls It it also possible that US investors in June 2015 bet on the backlash against the Pope and his climate policy vision given the success of the right in public polls. To illustrate the trends of public polling at the time of the encyclical, we retrieved the polling percentages by individual primary candidates computed by independent pollsters

[27] Extending the search to later in the year does not change the inference.

and then gathered by FiveThirtyEight.[28] Figure E.1 shows these data and the two-week moving averages for four candidates: Bush and Trump (on the top panel) and Clinton and Sanders (in the bottom panel). The grey bar indicates the two-month window centered around the encyclical of June 18.

The figure suggests some observations. First, it is evident that in the time window under consideration the new comers of the primary races, i.e. Trump and Sanders, increased their respective polling compared to their previous levels and also compared to Bush and Clinton, respectively. After June 18, Trump and Sanders were about 15 and 10 percentage points above their May 18 polling, respectively. Whether this increase is at least partly attributable to the Pope is hard to gauge (other events were occurring at that time, for example - as we already mentioned- Trump officially announced his candidacy to the primaries in June 2015, although he paid little attention to Francis at that point). However, it is noteworthy that the Pope contributed to some political action and manoevering. For example, Senator Sanders repeatedly expressed support to the Pope's encyclical, and even met him in Rome that summer. Clearly, these trends indicate that at the time of the encyclical US politics was receptive to a message that could have shed voters towards the extremes, like the one of the *Laudato Si*.

So, in light of the polling data in addition to the politicization of Francis fueled by Fox News and elicited in Congress, it is well possible that the encyclical ignited volatility in the markets. Evidently, the papal communication hit a US context that was building up for a right-wing populist shift at the expense of left policy and their winners, e.g. the renewable energy sector.

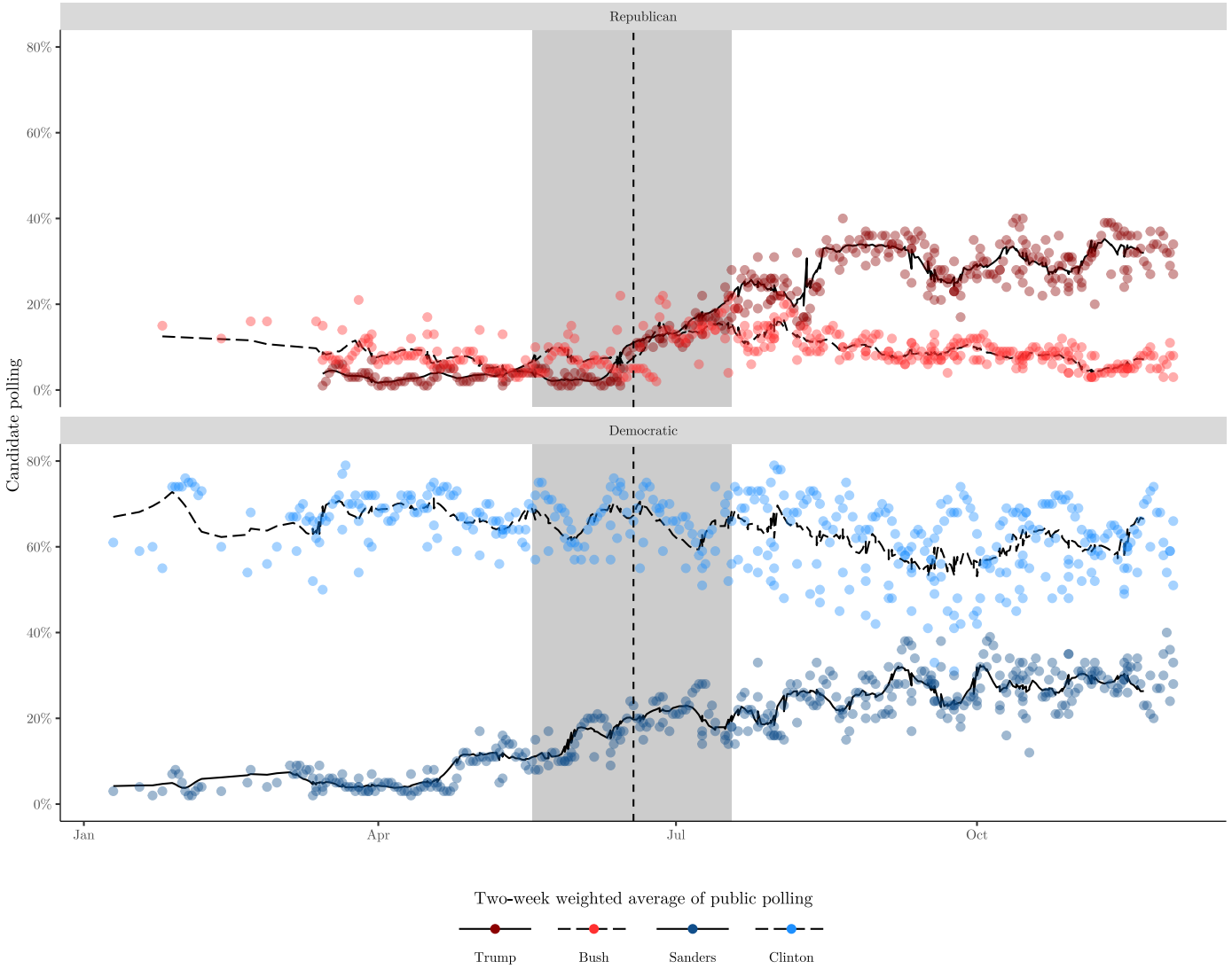
[28] Data retrieved from https://projects.fivethirtyeight.com/election-2016/national-primary-polls/republican/.

Table E.1: US congressional speeches mentioning either 'Pope', ' Francis's, 'climate change', and 'environment' between June 2015 and September 2015.

Date	Speaker	Body	State	Party	Position on Pope
June 16, 2015	Edward Markey	Senate	Massachussets	Democrat	Support
June 18, 2015	Edward Markey	Senate	Massachussets	Democrat	Support
June 23, 2015	Paul Tonko	House	New York	Democrat	Support
July 21, 2015	Sheldon Whitehouse	Senate	Rhode Island	Democrat	Support
August 08, 2015	Al Franken	Senate	Minnesota	Democrat	Support
August 08, 2015	Tom Udall	Senate	New Mexico	Democrat	Support
August 08, 2015	Patrick Leahy	Senate	Vermont	Democrat	Support
August 08, 2015	Tammy Baldwin	Senate	Wisconsin	Democrat	Support
August 08, 2015	Jeffrey Merkley	Senate	Oregon	Democrat	Support
August 08, 2015	Bernie Sanders	Senate	Vermont	Independent	Support
September 09, 2015	Paul Tonko	House	New York	Democrat	Support
September 17, 2015	Jared Polis	Governor	Colorado	Democrat	Support
September 17, 2015	Edward Markey	Senate	Massachussets	Democrat	Support
September 18, 2015	Bill Francis	House	Illinois	Democrat	Support
September 22, 2015	Amy Klobuchar	Senate	Minnesota	Democrat	Support
September 22, 2015	Jeffrey Merkley	Senate	Oregon	Democrat	Support
September 29, 2015	Sheldon Whitehouse	Senate	Rhode Island	Democrat	Support

The table reports the number of US Congressional speeches identified based on the key word searches on the US Congress' Congressional Record database: https://www.congress.gov/congressional-record. A research assistant manually coded the party membership of the speaker and whether the speech was in support of the Pope's view or opposing it.

Figure E.1: *Support for Republican and Democratic primary candidates around the time of the 2015 encyclical*



Data points report raw polling percentages by individual primary candidates computed by independent pollsters and gathered by FiveThirtyEight. Two-week moving average (weighted according to original scoring) is overlayed to adjust for pollster quality and sample size.

Figure E.2: Word cloud of most frequent words related to the Laudato Si in *The Guardian* (top) and *The Financial Times* (bottom). Higher word font size corresponds to higher word frequency. Words in red intuitively correspond to an 'economic' theme and were highlighted by the authors.

Top words (>50 frequency) in The Guardian articles (N=29), 2014−2016.

Top words (>25 frequency) in Financial Times articles (N=16), 2014−2016.

F *Caritas in Veritate* analysis

Table F.1: Sample of commercial banks and their headquarter country

Name	Nationality
Associated Banc-Corp	United States
Australia and New Zealand Banking Group Ltd	Australia
Banco Bilbao Vizcaya Argentaria SA	Spain
Banco do Brasil SA	Brasil
Banco Santander SA	Spain
BancorpSouth Bank	United States
Bank of America Corp	United States
Bank of Hawaii Corp	United States
Bank of Montreal	Canada
Bank of New York Mellon Corp	United States
Bank of Nova Scotia	Canada
Barclays PLC	United Kingdom
BNP Paribas SA	France
BOK Financial Corp	United States
Canadian Imperial Bank of Commerce	Canada
Cathay General Bancorp	United States
Citigroup Inc	United States
Citizens Republic Bancorp Ord Shs	United States
Comerica Inc	United States
Commerce Bancshares Inc	United States
Commonwealth Bank of Australia	Australia
Credit Suisse Group AG	Switzerland
Cullen/Frost Bankers Inc	United States
Deutsche Bank AG	Germany
East West Bancorp Inc	United States
Fifth Third Bancorp	United States
First Citizens BancShares Inc (Delaware)	United States
First Horizon Corp (Tennessee)	United States
FirstMerit Ord Shs	United States
Fulton Financial Corp	United States
HSBC Holdings PLC	United Kingdom
Huntington Bancshares Inc	United States
ING Groep NV	Netherlands
International Bancshares Corp	United States
Intesa Sanpaolo SpA	Italy
JPMorgan Chase and Co	United States
KeyCorp	United States
Lloyds Banking Group PLC	United Kingdom
M and T Bank Corp	United States
Natwest Group PLC	United Kingdom
New York Community Bancorp Inc	United States
Northern Trust Corp	United States
PNC Financial Services Group Inc	United States
Popular Inc	United States
PrivateBancorp Ord Shs	United States
Regions Financial Corp	United States
Royal Bank of Canada	Canada
Sberbank Rossii PAO	Russian Federation
Societe Generale SA	France
Standard Chartered PLC	United Kingdom
State Bank of India	India
State Street Corp	United States
Sterling Financial Ord Shs	United States
Susquehanna Community Financial Inc	United States
SVB Financial Group	United States
Synovus Financial Corp	United States
TCF Financial Corp	United States
Toronto-Dominion Bank	Canada
Truist Financial Corp	United States
U.S. Bancorp	United States
UBS Group AG	Switzerland
UMB Financial Corp	United States
UniCredit SpA	Italy
Valley National Bancorp	United States
Webster Financial Corp	United States
Wells Fargo and Co	United States
Wintrust Financial Corp	United States
Zions Bancorporation NA	United States

Table F.2: Effect of the publication of Benedict XVI's *Caritas in Veritate* encyclical on *Abnormal Returns* and *Cumulative Abnormal Returns* of sampled banks. See Figure 10.

	AR		CAR	
	(1)	(2)	(3)	(4)
July 7 onward	0.26***	0.25***	0.84	0.83
	(0.10)	(0.09)	(1.37)	(1.36)
July 7	0.66**	0.65**		
	(0.30)	(0.30)		
Abnormal Returns (t-1)	0.10***	0.12***		
	(0.02)	(0.02)		
Constant	0.02	0.04	−1.14	0.83
	(0.06)	(0.06)	(0.75)	(1.58)
Firm FE	Yes		Yes	
Headquarter FE		Yes		Yes
Number of firms	68	68	68	68
Observations	2,784	2,784	2,967	2,967
Adjusted R^2	0.01	0.02	0.62	0.21
Note:				*p<0.1; **p<0.05; ***p<0.01

All models are linear estimations of returns using observations in the event window (June 07, 2009 - August 07, 2009). Standard errors clustered at the firm-level.

Table F.3: Effect of the publication of the *Caritas in Veritate* encyclical on *Abnormal Returns* to commercial banks. Comparison of US and non-US firms.

	US		Non-US	
	AR	CAR	AR	CAR
	(1)	(2)	(3)	(4)
July 07 onward	0.30**	2.37	0.21*	−1.71
	(0.13)	(1.93)	(0.13)	(1.65)
July 07	0.96**		0.20	
	(0.40)		(0.45)	
Abnormal Returns (t-1)	0.13***		−0.01	
	(0.03)		(0.03)	
Constant	−0.24***	−9.55***	0.08	0.25
	(0.07)	(1.05)	(0.07)	(0.90)
Firm FE	Yes	Yes	Yes	Yes
Number of firms	43	43	25	25
Observations	1,771	1,856	1,013	1,111
Adjusted R^2	0.01	0.55	0.01	0.73
Note:				*p<0.1; **p<0.05; ***p<0.01

All models are linear estimations of returns using observations in the event window (June 07, 2009 - August 07, 2009). Standard errors clustered at the firm-level.

Table F.4: Effect of the publication of the *Caritas in Veritate* encyclical on *Abnormal Returns* to commercial banks. Alternative lag specifications.

	AR				
	(1)	(2)	(3)	(4)	(5)
July 07 onward	0.34***	0.26***	0.28***	0.32***	0.37***
	(0.11)	(0.10)	(0.10)	(0.11)	(0.12)
July 07	0.60*	0.66**	1.00**	0.79**	0.85**
	(0.31)	(0.30)	(0.40)	(0.38)	(0.38)
Abnormal Returns (t-1)		0.10***	0.11***	0.11***	0.12***
		(0.02)	(0.03)	(0.03)	(0.03)
Abnormal Returns (t-2)			−0.03	−0.03	−0.04
			(0.03)	(0.03)	(0.03)
Abnormal Returns (t-3)				−0.08***	−0.07***
				(0.02)	(0.02)
Abnormal Returns (t-4)					−0.01
					(0.03)
Constant	0.01	0.02	0.05	−0.01	−0.06
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)
Firm FE	Yes	Yes	Yes	Yes	Yes
Number of firms	68	68	68	68	68
Observations	2,876	2,784	2,692	2,600	2,508
Adjusted R^2	0.002	0.01	0.01	0.02	0.02
Note:					*p<0.1; **p<0.05; ***p<0.01

All models are linear estimations of returns using observations in the event window (June 07, 2009 - August 07, 2009). Standard errors clustered at the firm-level.