

Mandatory Disclosure of Institutional Investors' Fossil Fuel Investments

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Abstract

Regulators around the world have begun to require investment companies to provide information regarding fossil fuel investments to non-capital market participants. In this paper we examine whether such disclosures impact the investment portfolios and/or investment policies of the disclosing firms. Using a 2016 law change that required some U.S. insurance companies to disclose fossil fuel investments on a public website, we find the disclosing insurers reduced their fossil fuel investments by approximately 20% relative to the non-disclosers and changed their formal investment policies. Additionally, the discloser firms became more likely to adopt risk and investment management policies that relate to climate change. We further find the divestment and new policies remain after the mandatory disclosure policy is rescinded.

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1. Introduction

Recently regulators have begun to require investment companies to provide information regarding fossil fuel investments to non-capital market participants. Despite the growing popularity of these mandatory disclosure policies, little is known regarding how such policies impact the investment portfolios and/or investing policies of the disclosing firms. In this paper, we examine a 2016 law change that required insurance companies licensed in California to publicly report their fossil fuel investments on the California Department of Insurance (CDI) website. Prior to the regulation interested parties would have had to identify and purchase data on the holdings of the insurer in order to be able to calculate a similar metric. By putting the insurers' fossil fuel investments on the website it became easily accessible and free to all stakeholders (Jones, 2016a). We find this change in policy resulted in the disclosing insurers divesting their fossil fuel investments and adjusting their formal investment policies.

The rule (hereafter the “California Rule”) was novel at the time but subsequently policymakers in several countries including New Zealand, Hong Kong, the U.K., Japan and Switzerland have prescribed similar disclosure regulation (Duran, 2021; Teu, 2021; Treacy, Sako and Yeu, 2022). In Europe, asset managers are required under the Sustainable Finance Disclosure Regulation (SFDR) to provide sustainability-related disclosures (Halper, Bussiere and Shriver, 2022); however, a lack of clear disclosure and concerns about “greenwashing” has further led regulators to advocate for more explicit fossil fuel reporting (ESMA, 2022).¹ The intent of these policies is similar to the

¹ In the U.S., the SEC's proposed “Enhanced Disclosures by Certain Investment Advisers and Investment Companies about Environmental, Social, and Governance Investment Practices” requires environment-focused funds to disclose the greenhouse gas emissions of the firms they invest in (SEC, 2022).

California Rule. As one regulator explained, “[the disclosure regulation] is to ensure transparency on climate action by investors, to enable the public authorities, NGOs, think tanks and, more generally, civil society to use this reporting process to put pressure on investors” (Evain, Cardona and Nicol, 2018).

Despite the growing interest in California Rule-type policies there is a lack of large-sample evidence on the disclosing firms’ responses to such policies. It’s often empirically challenging to estimate the effect of these types of policies because of i) nonrandom selection of firms subject to the disclosure, ii) lack of a counterfactual, iii) presence of concurrent regulation, and iv) lack of data on the outcomes of interest.

Our setting has several unique research design features that allow us to mitigate these challenges and to provide evidence regarding the policy’s efficacy. First, the disclosure only applies to some insurance companies and not others. Because the insurance industry is so heavily regulated the disclosing and non-disclosing firms have similar investment portfolios, mandates and strategies prior to the disclosure (Rabinowitz, 2019). Second, there is security-level data prior to and after the disclosure which allows us to track portfolio changes for treated and nontreated firms.² Third, a concurrent insurance industry climate change survey allows us to track changes in insurers’ stated investing policies, providing an additional measure of the impact of treatment. Fourth, the California Rule was effective from 2016 to 2019 which provides a post-period to observe any sustained change in firm behavior after the policy treatment is removed. Fifth, the setting avoids many of the contemporaneous event issues of policy

² Access to that data is based on a proprietary data base. While it may be available to sophisticated investors, the costs to obtain and to process the data would likely be prohibitive for consumers or individual investors.

changes. The rule was not bundled with other rule changes, there were no new climate-related disclosure regulations passed in the U.S. during the time period of our analyses nor was there any climate-related information about the portfolios released by a third party such as Morningstar. Lastly, the rule was not subject to a prolonged legislative process where lobbying efforts could have altered the outcome because the CDI has the sole authority to regulate insurance companies licensed in California.

To test the effect of the mandatory disclosure, we adopt a difference-in-differences (DiD) approach surrounding the enactment of the California Rule in 2016. As insurers are heavily invested in bonds, we focus our analysis on bonds to avoid combining securities with vastly different characteristics. This choice also allows us to use par values, thus avoiding the impact of market values in causing perceived changes in portfolios. We compare the difference between pre- and post-period fossil fuel investments of disclosing firms (those licensed in California) with the fossil fuel investments of non-disclosing firms (those licensed elsewhere) and find the disclosure results in significant divestment. The average California-licensed insurer divests approximately 20% of their fossil fuel holdings with the onset of the rule. With the average disclosing insurer holding \$44M in fossil fuels investments in the pre-period, the disclosure results in approximately \$9M of divestments on average. The results are robust to matching, various fixed effects structures and are not influenced by fluctuations in insurer characteristics or fossil fuel commodity prices.

Along with changes to their portfolio, the insurers change their risk and investment policies as they relate to climate change. Starting in 2010, several states have required insurance companies licensed in the state to respond to a nine-question

climate risk survey. The questions cover topics like the insurer's use of climate change modeling and analytics, whether or not they consider the impact of climate change on their investment portfolio, and whether they attempt to reduce greenhouse gas emissions in their operations or organization (NAIC, 2023). Using the survey responses, we find the disclosing insurers are i) more likely to adopt a risk and investment management policy, ii) more likely to consider the impact of climate change on their portfolio, and iii) more likely to alter their investment strategy with the onset of the mandatory disclosure.

We find there is a strong relationship between the insurers' investment policies and fossil fuel divestment. Those that adopt a risk and investment management policy are likely to divest, while those with no change in policy have no change in their fossil fuel holdings. Another feature of our setting is that the policy ended in 2019 allowing us to observe whether the policy changes were temporary or permanent. Looking in the post-period, we find the insurers who have made changes when the policy was in effect maintain their investment policies and do not revert to their pre-policy holdings of fossil fuel investments, suggesting a permanent effect for this subsample.

One concern is the results may be due to window dressing or insurers simply selling their fossil fuel securities to insurers owned by the same parent company that are not subject to the disclosure. For example, the regulation is based on the insurers' end of the year holdings. Insurers could divest just prior to the end of the year and buyback the securities at the beginning of the following year. However, our analyses of trades shows no evidence of "window dressing" behavior. Similarly, we find no evidence of sales or transfers to non-treated subsidiaries of the same parent company.

To gain deeper insight into the divesting actions of disclosing insurers, we find the retained fossil fuel holdings for disclosing insurers have higher credit ratings and are more liquid than holdings prior to the regulation. We also find the insurers bear a cost for their divestment and repositioning. Specifically, our evidence shows that disclosing insurers experience lower investment returns than non-disclosers. These results taken together give insight into the costs of divesting that disclosing firms bare when divesting and repositioning their portfolio.

This paper makes three main contributions. First, the paper’s findings provide a unique insight to the literature on mandatory nonfinancial disclosure and more specifically to the growing literature on environmental disclosure of which climate risks are one of the most significant components. While prior research has focused on the effects of mandatory disclosure on firms (Downar et al., 2021; Jouvenot and Krueger, 2021; Tomar, 2022), this is one of the first papers to examine the effects of mandatory environmental disclosure on institutional investors.³ Our findings specifically highlight the role risk and investment management policies play in divestment. We find without policy changes there is little change in investors’ portfolio choices.

³ Our paper relates most closely to the work of Messonier and Nguyen (2021) who examine the passage of Article 173 in France in 2016 which asked certain financial institutions on a “comply or explain” basis to disclose the climate risks in their investments. Similar to this study, they find the disclosure leads to a reduction in carbon-intensive securities. With that said, there are several key differences between the studies. While disclosure is mandatory under the California Rule, Article 173 allows for a high degree of discretion in disclosure, resulting in poor compliance, missing data, and inconsistent calculations and methodologies (Evain, Cardona and Nicol, 2018; Ilhan et al., 2021). The authors rely on holdings data aggregated at the country-level, while we have access to securities data at the firm level. This allows us to examine benchmarking and other economic mechanisms though which disclosure may affect manager’s portfolio choices. Lastly, while no concurrent disclosure regulation impacted investors in my setting, Article 173 was passed at the same time as the Paris Climate Accord. This makes it difficult to disentangle the effect of the specific disclosure regulation from various climate policies enacted in France during that time.

Second, this paper provides new insights into the burgeoning literature on climate finance which is the study of local and global financing of public and private investment that seeks to support mitigation of and adaptation to climate change (UNFCCC, 2022; see Hong, Karolyi and Scheinkman (2020) for a review). The paper contributes across the strand of literature examining how institutional investors account for climate risk in their investment decision making. Previous studies on institutional investors have examined the carbon-intensity of portfolios among asset managers (Choi et al., 2021), pensions funds (Boermans and Galema, 2019), the effect of divestment on stock prices (Rohleder, Wilkens and Zink, 2022), the effect of joining investor coalitions (Humphrey and Li, 2021; Ceccarelli, Ramelli and Wagner, 2022), and the effect of carbon risk classifications (Ceccarelli et al., 2021). Prior papers have also examined institutional investors' preferences for climate risk disclosures (Ilhan et al., 2021), their impact on portfolio firm's CSR activities (Chen, Dong & Lin, 2020) and their climate risk perceptions (Krueger, Sautner and Starks, 2019). This paper diverges from those by concentrating on the effect of mandatory disclosure. Additionally, the paper's focus on fossil fuel securities, in particular, answers the call by Hong, Karolyi and Scheinkman (2020) for more research on divestments and stranded assets.

Lastly, this paper provides empirical evidence relevant to an ongoing policy debate. Regulators in several countries have proposed or implemented climate-risk disclosure for institutional investors (Duran, 2021; Halper, Bussiere and Shriver, 2022; Teu, 2021; Treacy, Sako and Yeu, 2022). Some argue that stricter regulations like mandatory divestments are preferable (Carlin, 2021; Reitmeyer, 2022). This paper provides evidence that mandatory disclosure regulations may also impact investors' fossil

fuel holdings and investment policies while also showing there is a cost in the form of reduced returns to such changes.

The paper is organized as follows: Section 2 describes the background, motivation and sample selection process. Section 3 summarizes the main results. Section 4 describes the results of additional tests and section 5 concludes.

2. Background, Conceptual Framework and Sample

2.1 INSTITUTIONAL BACKGROUND

California has the largest insurance market in the U.S. and the 4th largest insurance market in the world (Insurance Journal, 2018; CDI, 2022). The state's insurance market stands out not only for its scale, but for the authority granted to its commissioner. In the late 1980s, Californian voters changed the position of insurance commissioner to include regulation of rate increases while also switching the role from government-appointed to elected. Subsequent commissioners have often used their power to achieve specific policy aims. For example, in 2010 then-commissioner Steve Poizner floated a plan to force all insurers who operate in California to divest investments in any multinational companies that do business in Iran, due to his view that they are a sponsor of terrorism.

In January 2016, then-commissioner Dave Jones ordered insurance companies licensed in the state to disclose their fossil fuel securities. The rule defined a fossil fuel security as any security issued by a company that extracts oil, gas and coal or an electric utility that uses fossil fuels to generate electricity (Jones, 2016a).⁴ In addition to the

⁴ Responding to questions from insurers, Jones clarified the definition as securities issued by companies who i) generate 50% or more of their revenues from oil and gas, ii) generate 30% or more

mandatory disclosure, the commissioner argued that holdings in fossil fuel companies represent a risk to policy holders as he felt those assets are likely to decline in value. Accordingly, he asked insurance companies to voluntarily divest from any investments in thermal coal.⁵ Specifically, he asked that they stop making new investments, refrain from renewing existing investments and sell or withdraw from existing investments in any company that generates 30% or more of its revenue from the mining or use of thermal coal. This further request leads to a logical conclusion that his intention was to spur divestment, not just to provide information to the firm's stakeholders. At the time of the rule's announcement, California-licensed insurers collectively held close to \$500M in fossil fuel securities.

Jones made the disclosure public with the goal of making all stakeholders aware of the insurers' fossil fuel investments. As he said, "we will make this new information public so that investors, policyholders, regulators and the general public can know the extent to which insurance companies are invested in the carbon economy" (Jones, 2016a).

Pundits were quick to argue the rule was politically motivated (Greenhut, 2016; Lehman, 2016) as the initial announcement came just a few days before the commissioner's speech at a UN climate event (Dentons 2016). The rule was met with vocal opposition from insurers, fossil fuel companies and other insurance commissioners. Commissioners from six oil-producing states sent a public letter to the California commissioner asking for him to cease the ruling (Doak, Ridling, Roberston, Atkins,

of their revenue from thermal coal or iii) utilities that generate 30% or more of their electricity from thermal coal or that generate 50% or more of their electricity from the combustion of oil or natural gas (Jones, 2016b).

⁵ Thermal or steam coal is a term used for non-meteorological coal. It is the coal used to generate power.

Rosendale Jr. and Godfread, 2016). However, the commissioner did not relent and the disclosure regulation remained in effect till the end of Jones' term with 2019 as the last year the holdings were reported.

The rule required insurance companies to disclose their fossil fuel investments at the security-level and to explain whether they plan on i) divesting, ii) have already divested, iii) do not plan on divesting or iv) have no investments to divest and the justification for not divesting. The results were made public through the CDI website⁶ and reported on by several local and national media outlets (Reuters, 2016; Bloomberg, 2016). The website allowed users to easily sort insurers by their total fossil fuel holdings or their holdings as a percentage of the portfolio.⁷

2.2 MOTIVATION

While the new regulation did not require divestment or other changes in investing choices, it's requirement for disclosure likely caused insurers to attempt to forecast the response of stakeholders and likely caused them to monitor responses after the disclosures were made. The actual or anticipated responses by the users could have fed back into the insurers' decisions, resulting in changes in investment or other real actions (sometimes called an "action cycle") (Tomar, 2022; Hombach and Sellhorn, 2019; Weil et al., 2006).

There are several reasons why an "action-cycle" leading to divestment is possible in this setting. First, there are potential reputation costs for both the investment company and its managers. The insurance industry relies heavily on trust and

⁶ Holdings data can be viewed here: https://interactive.web.insurance.ca.gov/apex_extprd/f?p=260:1.

⁷ The CDI website receives a moderate amount of page views. The main website receives approximately 1.8M views each year (Hyperstat, 2023).

reputation. Fossil fuel investments have faced growing criticism due to their contribution to climate change and associated environmental and social risks (Vetter, 2020). As Hong, Karolyi and Scheinkman (2021) summarize, “energy companies have become the new ‘sin’ stocks facing divestment campaigns and lawsuits from shareholders... The divestment and legal campaigns are similar to what tobacco companies faced a generation ago...” Further, the disclosure reached a wide audience (Reuters, 2016; Bloomberg, 2016). Insurers may anticipate the negative publicity and divest as a result.

Along with the company’s reputation, managers also consider their personal and professional reputations (Dewatripont et al., 1999). In support of this incentive in our setting, a recent survey of institutional investors, finds the strongest motive for investors to not invest in fossil fuel companies is the protection of the investor’s reputation (Krueger, Sautner and Starks, 2019).

Political costs may also motivate insurers to divest (Cahan, 1992). As mentioned earlier, the California-licensed insurers have rate increases approved by the commissioner. The insurers may fear the commissioner would hold back rate increases, or make the process more difficult, unless they showed some progress in reducing their fossil fuel holdings. As Greenhut (2016) explained at the time of the rule’s announcement,

“Insurers are in something of a bind when it comes to rebutting any insurance commissioner. The commissioner has so much authority over insurers that they rightly fear retribution when it comes to, for example, rate hike requests. So while the commissioner and his supporters say the divestment request is voluntary, it’s easy to see why insurance companies might believe there is some duress involved.”

Finally, benchmarking may motivate insurers to change their holdings and investment policies. The disclosure makes it easier for insurers to compare their fossil

fuel holdings to their peers. If certain insurers “stand out” by holding a relatively high amount of fossil fuel holdings, they would have an extra motivation to divest. Prior papers have shown benchmarking in similar settings. For example, Tomar (2022) found the disclosure of greenhouse gas emissions (GHG) allowed the U.S. manufacturing facilities to assess their relative GHG emissions. Those with relatively higher emissions reduced their emissions.

On the other hand, there are several reasons why the California Rule may not result in any change to the investment company’s holdings or investment policies. First, divestment may hurt the fund’s performance. Divestment would limit diversification and could force the investors to sell securities at less than their carrying values (Shleifer and Vishny, 2011). If this compromises the insurers’ financial health or results in poor investment returns, the investors could face lawsuits from shareholders or insurance policyholders. Similarly, the managers are compensated based on the portfolio’s returns and any poor performance due to divestment would be directly felt by them.

Also, it seems unlikely the California Rule would get the investment companies to think more critically about their climate-risk and change their behavior as a result. Insurers are already at the forefront of insuring against weather-related events (Bank of England, 2015) and are likely taking this into account with their investment strategies which are known for being highly conservative (Grundl, Dong and Gal, 2016).

Divestment also seems unlikely because it’s a rarely used by investors. In a survey of institutional investors by Krueger, Sautner and Starks (2019), it was found of 12 possible approaches in dealing with climate risk, the least frequently used tool by investors is to divest problematic portfolio firms. This is shown by Ansar et al. (2013) as

well who found during a three-decade divestment campaign against tobacco companies only about 80 organizations and funds ever sold stock to support the campaign.

2.3 SAMPLE AND DATA

2.3.1 Sample Selection

We construct the sample using security-level holdings from the National Association of Insurance Commissioners (NAIC), the insurance industry's national regulator and standard setter. Insurers are required to annually file their investment portfolio with the NAIC. We gather the end of year portfolio holdings (i.e. EOY portfolio) from Schedule D – Part 1 and information about annual purchases and sales from Schedule D – Parts 3 and 4 (i.e. transaction data) for all property and casualty insurers from 2014 to 2021⁸. The EOY portfolio reports all credit obligations owned by the insurers as of December 31st for each year including corporate bonds, municipal securities, bank loans and treasury notes and bonds along with mortgages and various asset-backed securities. The transaction data covers all the insurer's buys and sales of stocks and bonds for each year. This paper focuses on bond holdings specifically because i) they make up the majority of insurers' investment portfolios⁹, ii) we avoid combining securities with vastly different characteristics, and iii) bonds allow us to use par values, thus avoiding the impact of market values in causing perceived changes in portfolios.

The EOY portfolio includes such information as the CUSIP, name of the issuing entity, when the security was acquired and at what cost to the insurer, the effective

⁸ The sample starts in 2014 because that's the first year the NAIC has compiled the Schedule D – Part 1 data.

⁹ Data from the NAIC on the \$2.3T investments held by U.S. property & casualty insurers at year-end 2020 shows that over half are held in bonds (NAIC, 2021).

interest rate, the unrealized gains or losses and the interest paid and due for that year. It also includes the par and fair value of the security at the end of the fiscal year. The transaction data includes identifying information about the security along with the date the security was acquired or sold and the third party that facilitated the transaction. We combine the EOY portfolio with the transaction data to create quarterly-level portfolio holdings. We identify financial information about each insurer from the Bureau van Dijk Orbis dataset which includes the gross, net and earned premiums, total assets and net investment income for each insurer. We add summary information from the NAIC including the name of the insurer's parent company and the state the insurer is domiciled.

We classify an insurer as licensed in California if it's listed on the CDI's website.¹⁰ We restrict the sample to only insurers with a complete set of information. This results in a primary sample of over 43,000 quarterly observations. See Table 1 which details the sample selection process.

[TABLE 1]

2.3.2 Measuring Fossil Fuel Investments

A main variable used in our analyses is the fossil fuel investments held by each insurer. We measure *Fossil Fuel Securities / Tot Bonds* as the total fossil fuel investments held by the insurer scaled by the value of the insurer's bond portfolio. For our main measure we use the par value of each security to mitigate concerns that changes in the fossil fuel investments are due to fluctuations in the market value of the securities.

¹⁰ An insurer is licensed to do business in the state when the insurer has met the legal requirements and obtained the necessary authorization from the state's insurance regulatory authority to conduct business within the state. There are financial and solvency requirement, compliance issues and product approvals just to name a few of the requirements.

In untabulated results, we use the security's fair value instead of par value and find statistically and economically similar results.

The CDI did not provide a list of fossil fuel companies or fossil fuel industry classifications. Instead, they defined fossil fuel securities as publicly traded securities where the company generates a significant portion of their revenues from oil and gas, coal or utilities that generate a significant percentage of their electricity from fossil fuels (Jones, 2016b). For our main analyses, we use the classifications made by the firms in their reporting to identify fossil fuel securities. Specifically, we use the list of fossil fuel securities for each insurer per the CDI website, identify the issuing companies and then label a company as a fossil fuel company if five or more insurers identify the company as a fossil fuel company. This ensures we are identifying generally agreed upon fossil fuel companies. We then label all the securities issued by those companies as fossil fuel securities and aggregate the fossil fuel securities owned by each insurer on a quarterly basis to arrive at the total fossil fuel investments. We scale by the par value of the insurer's bond portfolio to create the main outcome variable.

2.3.3 Descriptive Statistics

Table 2 presents the descriptive statistics of the key variables used in our analyses. Panel A presents the variables for the main sample. The average insurer has a total bond portfolio of just under \$500M. On average, fossil fuel investments make up approximately 6.8% of the insurer's bond portfolio. Utilities account for 3.7% of the portfolio, coal accounts for 0.1%, oil and gas accounts for 2.5% and other fossil fuel securities account for the remaining 0.5%. *Treat* denotes California-licensed insurers. A little less than 1/5th of the insurers in the sample are California-licensed insurers. The

average bond has a yield of just over 3% and an S&P numerical rating of 7 which translates into a BBB- credit rating.

[TABLE 2]

3. Main Results

3.1 EFFECT OF THE CALIFORNIA RULE ON MANAGER'S PORFOLIO CHOICES

3.1.1 Main specification

We begin our empirical analyses by estimating the effect the mandatory disclosure has on the investment company's holdings of fossil fuel investments. We use a difference-in-differences research design where insurers licensed in California are considered treated while all other insurers are in the control group. The sample period starts in 2014 and ends in 2019 when the commissioner left office. Because the policy became effective for insurers on December 31, 2016, we use that quarter end date as the start of the post-period and all prior quarters as the pre-period. Eq. (1) represents our model for testing the effects of the mandatory disclosure (firm and time subscripts are omitted):

$$Fossil\ Fuel\ Securities / Tot\ Bonds = a + \beta Treat \times Post + Treat + Post + Controls + \lambda + \theta + \varepsilon \quad (1)$$

We estimate Eq. (1) using OLS regression and heteroscedasticity-robust standard errors clustered at the state level because treatment is based on the state where the insurer is licensed. The dependent variable *Fossil Fuel Securities / Tot Bonds* is the par value of the insurer's fossil fuel investments divided by the par value of the total bond portfolio (see the section "Measuring Fossil Fuel Investments" for more details on this measure). The indicator variable *Treat* distinguishes between insurers licensed in California and all other U.S. insurers.

In our main analyses we restrict the California-licensed insurers to only those with fossil fuel securities immediately prior to the onset of the regulation. However, our results are robust if we remove this restriction. *Post* is a binary variable equal to one for the period after the announcement of the California Rule (from 12/31/2016 onwards) and zero for the prior period. *Controls* is a vector of control variables to account for observable differences that may be correlated with the investor’s decision to invest in fossil fuel securities. For example, size may be correlated with the decision to divest as larger firms have a wider range of investment options (Grundl, Dong and Gal, 2016) and are more likely to face pressure from various stakeholders (Darnall, Henriques and Sadorsky, 2010). We follow prior papers and use both *Log Gross Premiums* and *Log Total Assets* as proxies for size (Anantharaman, 2017). We further use the percentage of income earned by investment income (*Investment Income*) as greater dependence on investment income likely affects the investment managers’ investment risk. Certain insurers may be less willing to divest if they fear divestment will hurt their returns. To control for both time-invariant unobservable differences in firm characteristics and time-varying unobservable factors, we employ firm- (λ) and quarter-year (θ) fixed effects, respectively. Appendix A provides variable descriptions for all variables used.

[TABLE 3]

Table 3 shows estimates for the effect of mandatory disclosure on insurers’ fossil fuel investments. We find disclosing firms reduce their holdings in fossil fuel securities. Column (1) includes only firm and quarter-year fixed effects as control variables to mitigate the concern that including covariates affected by the treatment can cause problems when trying to establish causality (Gormley and Matsa, 2014). The main

coefficient of interest is on the interaction term which is negative and significant (coef. = -0.013, t-stat = -5.64). We also run the regression with no firm or quarter-year fixed effects and the results are consistent (see Table 11). Column (2) controls for firm characteristics with similar results. In both columns, *Fossil Fuel Securities / Tot Bonds* decreases by approximately 1.3% which corresponds to a decrease of approximately 20% (0.013/0.068) of the average scaled fossil fuel investments. With the average fossil fuel investments of \$44M, the effect is equivalent to a divestment of approximately \$9M on average. The specification in Column (2) is the main specification used throughout this paper. The results are similar when we further control for *state* \times *year* in column (3) which suggests the findings are not driven by unobservable time-varying factors pertaining to the state. In column (4), we control for changes in the annual prices of certain fossil fuel commodities including coal, natural gas and oil and find similar results with no significant changes to the prior specifications.

To address potential selection concerns, we also provide results based on entropy-balanced matching. The entropy-balanced matching approach ensures there are equal covariate balances based on observable characteristics (Hainmueller, 2012). We match on gross premiums, total assets, the value of the bond portfolio and the value of the fossil fuel investments held by the insurer in the pre-period. Column (5) presents the results for the main specification. Columns (6) and (7) further control for *state* \times *year* and fluctuations in commodity prices. Across all three columns the coefficient on the interaction term is negative and significant suggesting the mandatory disclosure is associated with fossil fuel divestment.

3.1.2 Parallel Trends Assumption

One of the major assumptions of a difference-in-differences research design is the treated and control groups are on the same trend prior to treatment (i.e., parallel trends assumption). For that assumption to be valid fossil fuel ownership should be on the same trend prior to the onset of the regulation for both California-licensed and all other insurers. We test for this by substituting *Post* in the main specification with quarter-year indicator variables with the base quarter set on September 30, 2016, which is the quarter just prior to the enactment of the California Rule. The results are presented in Table 4. $Q = 1$ refers to observations at 12/31/2016, $Q = 2$ are observations at 3/31/2017 and so on. The coefficient on the interaction term of *Treat* with the quarter-year dummy shows there is no statistical difference between the two groups prior to the California Rule. At $Q = 1$, the coefficient is negative (coef. = -0.006, t-stat = -1.22) and starting at $Q = 2$ the negative significant is statistically significant (coef. = -0.008, t-stat = -1.66). The negative and significant coefficient remains for the remainder of the sample period.

[TABLE 4]

Figure 1 plots the coefficient on the interaction term over the sample period. The disclosing and non-disclosing insurers are on similar trends prior to the California Rule at which point they diverge. The disclosing insurers show a greater reduction in their fossil fuel investments in the post-period. Overall, the results provide evidence in support of the parallel trends assumption in this setting.

[FIGURE 1]

3.2 EFFECT OF THE CALIFORNIA RULE ON FIRM'S INVESTMENT POLICIES

3.2.1 *Climate Risk Survey*

Beginning in 2010, several states have required insurance companies licensed in the state to respond to a nine-question climate risk survey called the NAIC Climate Risk survey.¹¹ The responses span before and after the California Rule and allow us to examine what, if any, changes the disclosing insurers make to their investment strategies and risk management. We focus on their responses to three questions: (i) has the company considered the impact of climate change on its investment portfolio, (ii) has [the insurer] altered its investment strategy in response to these considerations, and (iii) does the company have a climate change policy with respect to risk management and investment management. The insurers are asked to provide a “yes” or “no” answer and to explain their response.

Table 5 presents the effect of mandatory disclosure on insurers’ investment policies. We find the California Rule is associated with firms adopting climate change risk and investment management policies. For these tests we follow the main specification. The dependent variable is equal to one if the insurer answers “yes” to the question and zero if they answer “no.” $Treat \times Post$ is a binary variable that equals one for California licensed insurers after the announcement of the California Rule (i.e., 12/31/2016 onwards). Column (1) presents the results from the question: has the company considered the impact of climate change on its investment portfolio? Column (2) presents the results from the follow-up question, has [the insurer] altered its investment strategy in response to these considerations? Across both, the coefficient on the interaction term is positive and significant indicating the disclosing firms are more

¹¹ As of 2020, 14 states require the disclosure from over 1,400 insurance companies. Those responding account for over 80% of the premium volume in the U.S. (NAIC, 2023). The states include California, Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington.

likely to consider the effect of climate change on their investment portfolio and more likely to alter their investment strategy in response. The third question we examine asks, does the company have a climate change policy with respect to risk management and investment management? Column (3) presents the results. The coefficient on the interaction term is positive and significant (coef. = 0.0815, t-stat = 3.00) suggesting the onset of the California Rule encourages insurers to have a climate change policy.

[TABLE 5]

Collectively, the results provide evidence the California Rule motivated firms to consider climate change in their investment portfolio, alter the investment strategy as a result and adopt a climate change risk and investment management policy. Together with the results in the previous section, this suggests the California Rule not only resulted in portfolio changes but policy changes as well.

3.2.2 Cross-Sectional Tests

We next examine the relation between divestment and changes in policies. For these tests, we restrict the sample to only California-licensed insurers. The results are presented in Table 6. The dependent variable is *Fossil Fuel Securities / Tot Bonds*. *Policy Change* is an indicator variable equal to one if the insurer adopts a risk and investment management policy after the onset of the California Rule. *Post* is a binary variable equal to one for the period after the announcement of the California Rule (from 12/31/2016 onwards) and zero for observations in the prior period. We follow the main specification of Eq. (1) and include firm and quarter-year fixed effects and cluster standard errors at the state-year level. Column (1) presents the results with only firm and quarter-year fixed effects. Column (2) includes additional firm-specific control

variables and column (3) includes changes in commodity prices. Across all three columns, the coefficient on the interaction term is negative and significant. The results show those insurers that adopt a risk and investment management policy with respect to climate change are more likely to divest from fossil fuel securities.

[TABLE 6]

Taking the analyses one step further, we further categorize insurers based on their change, or lack thereof, in formal investment policies that relate to climate change from the pre- to the post-period. We group the California-licensed insurers into four groups: i) those insurers who always have a risk and investment management policy (i.e. “Always Yes”), ii) those insurers that go from not having a policy to having a policy with the onset of the California Rule (i.e. “No to Yes”), iii) those insurers that go from having a policy to not having one (i.e. “Yes to No”), and iv) those insurers that never adopt a policy (i.e. “Always No”). We follow the main specification from Eq. (1). $Treat \times Post$ is a binary variable that equals one for California-licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 onwards). We compare each group to the non-disclosing insurers. The results are presented in Table 7. Column (1) presents the results for the “Always Yes” group. The coefficient on the interaction term is negative and significant (coef. = -0.00657, t-stat = -3.83) indicating those California-licensed insurers that always have a risk and investment management policy reduce their fossil fuel investments with the onset of the disclosure regulation. Column (2) presents the results for the “No to Yes” group. The coefficient is negative and significant (coef. = -0.0392, t-stat = -5.04) suggesting those insurers divest their fossil fuel investments. Columns (3)

and (4) present the results for the “Yes to No” and “Always No” groups. Both groups show no change in their fossil fuel investments in the post-period.

[TABLE 7]

Together these cross-sectional results show an association between policies and fossil fuel divestment. Those insurers that adopt a risk and investment management policy have greater divestment, while those with no investment policy in place in the post-period show no change in their fossil fuel holdings.

3.3 FOSSIL FUEL HOLDINGS ONCE THE DISCLOSURE STOPS – POST 2019

The California Rule was enacted by then-commissioner Dave Jones and ended when he left office in 2019. This creates a unique feature allowing us to observe how the firms’ behaviors change after the mandatory disclosure ceases.

We find the insurers do not revert to their pre-policy holdings of fossil fuel investments. The results are presented in Table 8. We follow the main specification from 2018 to 2021. $Treat \times Post (= 2020)$ is an indicator variable equal to one for California-licensed insurers in the post-period after the disclosure regulation ends (i.e., 2020-2021). Columns (1) and (2) present the results for changes in the risk and investment management policy and columns (3) and (4) present the results for changes in the fossil fuel holdings. Columns (1) and (3) present the results with firm and quarter-year fixed effects, while columns (2) and (4) present the results with state-year fixed effects. In all four columns, the coefficient on the interaction term is insignificant indicating there is no statistically significant change in policies or fossil fuel investments among the disclosing insurers once the California Rule ends. This suggests the effect of the mandatory disclosure was not fleeting.

[TABLE 8]

4. *Additional Results*

4.1 IS THE DIVESTMENT *REAL* DIVESTMENT?

While our tests indicate changes in investment, it is possible that firms are window dressing or simply moving investments between subsidiaries. Window dressing has been shown among banks (Allen and Saunders, 1992) and mutual funds (Agarwal, Gay and Ling, 2014). Consolidation for strategic, diversification and economics of scale reasons have led to many U.S. insurance companies being owned by parent companies (Insurance Information Institute, 2021). One insurer subject to the disclosure regulation could sell their fossil fuel investments to another not subject to the disclosure regulation but owned by the same parent. At the consolidated level the parent company would still have the same holdings and would have avoided any costs that come from an abrupt sale. We test for both the presence of window dressing and selling to related insurers in Panels A and B of Table 9.

Panel A presents the results of the window dressing test. Using the end of year portfolio and the transactions data, we reconstruct the holdings information for each insurer at the monthly level. We restrict the sample to observations three months before and three months after the end of 2016, 2017 and 2018, respectively. We follow the main specification with the difference that *Post* is equal to one for observations in the first quarter of each year and zero for observations in the 4th quarter of the previous year. If window dressing occurred, we would observe a positive and significant coefficient on the interaction term indicating disclosing insurers increase their fossil fuel holdings immediately at the start of the next year. $Treat \times Post$ is a binary variable that equals

one for California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 onwards). Columns (1), (2) and (3) restrict the sample to monthly holdings at the end of 2016, 2017 and 2018 respectively while column (4) combines all three years. If insurers engage in window dressing, we expect to see the coefficient be lower in the last quarter of each year and higher immediately after; however, there is no evidence of this.

[TABLE 9]

Panel B presents the results of the related party transactions test. The dependent variable is equal to one if the insurer sells a fossil fuel investment to an insurer with the same parent company and zero otherwise. *Treat* is equal to one for California-licensed insurers and zero otherwise. *Post* is equal to one for observations on 12/31/2016 or thereafter and zero otherwise. Column (1) presents the results with only firm and quarter-year fixed effects. Column (2) adds seller insurer control variables and column (3) adds buyer insurer control variables. The coefficient on the interaction term across all three columns is insignificant suggesting the insurers do not sell their fossil fuel securities to related insurers. Collectively, these results show insurers do divest their fossil fuel securities. They don't just engage in activities that make it appear they have divested fossil fuel securities when they have not.

4.2 WHAT ARE THE COSTS TO DIVESTMENT?

At the time of the California Rule's announcement many feared the mandatory disclosure and divestment would hurt the insurers' returns and weaken their financial position as the insurers would sell bonds at unfavorable prices and forego higher returns in the future (Greenhut, 2016). Others argued any price impact would be negligible as

the fossil fuel securities represented such a relatively small percentage of their total bond portfolio and the insurers had considerable time to make the divestment.

[TABLE 10]

The results presented in Table 10 suggest the insurers suffer from lower returns with the onset of the disclosure and subsequent divestments. To calculate the returns, we sum the unrealized gains or losses and the interest payments received and accrued for the insurer's bond portfolio for each year. We scale the amount by the size of the bond portfolio to create *Tot Return*. We follow the prior tests and examine the change in returns between the disclosing and non-disclosing insurers before and after the announcement of the California Rule. Column (1) shows the coefficient on the interaction term is negative and significant (coef. = -0.00105, t-stat = -2.33) suggesting the disclosing insurers experienced lower returns. If divestment causes the poor performance, the lower returns should be concentrated in those insurers who divested the most from the pre- to the post-period. We partition the California-licensed insurers based on the change in their fossil fuel holdings in those two periods. In Columns (2) and (3), we partition the sample with *High* denoting disclosing firms that decreased their fossil fuel holdings at a rate higher than the median and *Low* for those below the median. The reduction is concentrated in the *High* group which suggests those insurers who divested the most experienced the worst subsequent returns. We present the results of a Wald Chi-Squared test which shows the coefficients from the two groups are statistically different from one another (diff. = -0.0018, p-value = 0.068). The results support the concerns mentioned at

the time of the rule's announcement. Divestment did come at a cost to the disclosing insurer.¹²

4.3 SENSITIVITY TESTS

In this section, we explore a variety of alternative specifications, samples and proxies for our main variables. The results are presented in Table 11.

[TABLE 11]

4.3.1 Alternative specifications

Panel A presents the coefficient and t-stat for the main coefficient ($Treat \times Post$) based on various model specifications. In row (1), we run the regression with no firm or quarter-year fixed effects. In row (2), we replace firm fixed effects with parent company fixed effects to account for unobservable time-invariant characteristics at the parent company level. Parent companies, or holding companies, often own several insurance companies (Insurance Information Institute, 2021). There may be similar cultures, investment strategies and managers across the insurers, within the same parent company. In row (3) to account for the possibility that the effect of covariates varies across treated and control firms, we repeat the baseline analyses but interact each control variable with $Treat$. Similarly, in row (4) to account for the possibility that the effect of covariates varies across the pre- and post-period, we repeat the baseline analyses but interact each control variable with $Post$. In row (5), we change the post-period start date to the start of 2017 instead of 12/31/2016. For all these different specifications, the main coefficient remains negative and significant.

¹² In untabulated analyses, we examine the type of bonds divested and find it is primarily the highly liquid utility bonds rather than the bonds from the higher emitters such as coal producers. This suggests that firms consider the costs of divesting.

4.3.2 Alternative samples

Panel B presents the results with different samples. In row (6) we exclude small Californian insurers below \$100M in nationwide premiums. In row (7), we restrict the sample to insurers licensed in states that require the NAIC climate survey. The effect documented in this paper may be due to insurers responding to that survey, as opposed to the specific disclosure regulation. In row (8), we use end of the year holdings instead of quarterly holdings. In all the different samples, the coefficient of interest remains negative and significant.

5. Conclusion

This paper examines the effect of mandatory disclosure targeted at non-capital market participants on investors' portfolio and policy choices. Using a California rule by the state's insurance department that publicized the fossil fuel holdings of insurers licensed in the state, we find the disclosure resulted in a significant reduction in fossil fuel holdings. On average, insurers reduced their holdings by approximately 20 percent. They also became more likely to adopt risk and investment management policies that relate to climate change. Even after the disclosure ceases we find the disclosing insurers do not revert to their pre-policy holdings of fossil fuel investments nor do they change their investment policies once they are in place. The managers divest coal and utility securities in particular and retain more liquid and higher credit quality fossil fuel securities.

This paper contributes to our understanding of the effects of requiring investment companies to provide information regarding fossil fuel investments to non-capital market participants. As policymakers around the world are currently proposing and adopting

similar regulations that require institutional investors to specifically disclose their fossil fuel investments (Duran, 2021; Halper, Bussiere and Shriver, 2022; Teu, 2021; Treacy, Sako and Yeu, 2022), this paper helps to inform those decisions.

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Appendix A
Variable Definitions

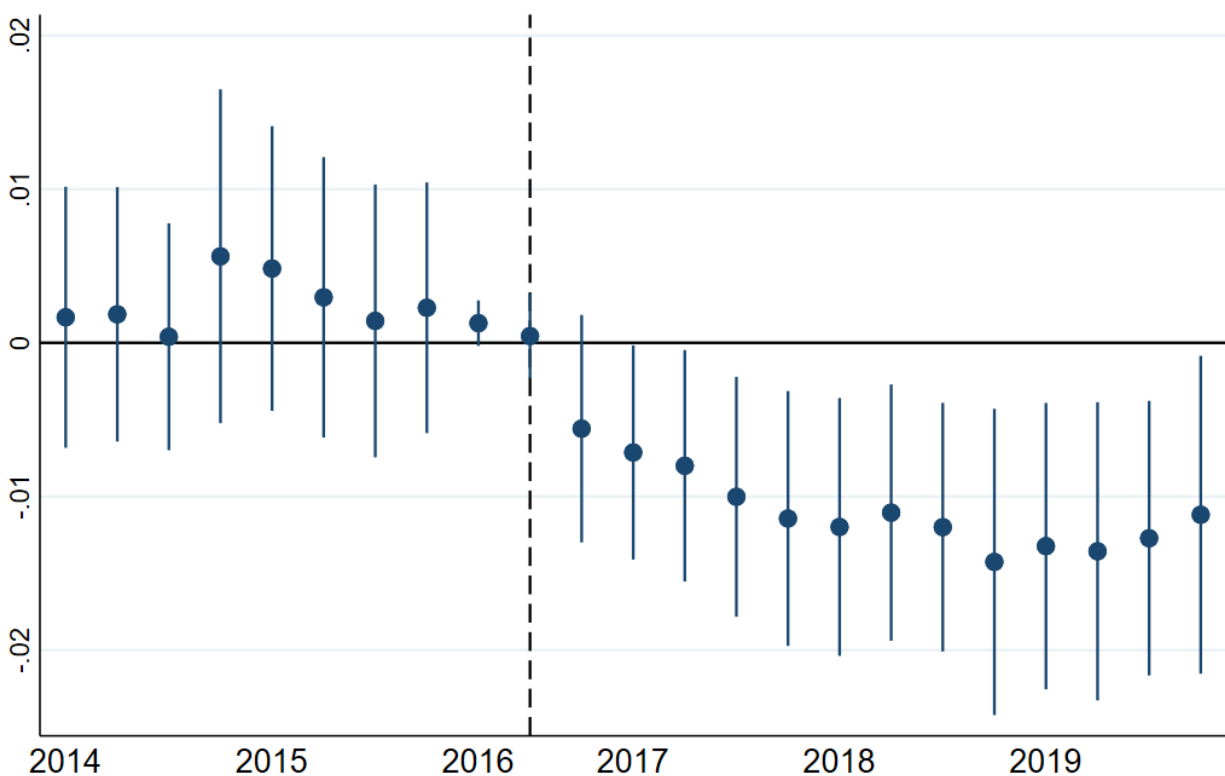
<i>Variable</i>	<i>Description</i>	<i>Data Source</i>
<i>Bid/Ask Spread</i>	Daily bid-ask spread	WRDS Bond Database
<i>Coal</i>	Indicator variable equal to one for firms in the coal extraction industry	CDI website
<i>Coal Prices</i>	Quarterly change in the price of coal	FRED
<i>Log Dollar Volume</i>	Log of daily trading volume	WRDS Bond Database
<i>Fossil Fuel Securities / Tot Bonds</i>	Par value of fossil fuel investments divided by the total par value of the firm's bond portfolio	NAIC + CDI Website
<i>Fossil Fuel Investments (\$M)</i>	Par value of fossil fuel investments	NAIC + CDI website
<i>Log Gross Premiums</i>	Log of Insurer's gross premiums	Bureau van Dijk Orbis
<i>Investment Income</i>	Percentage of insurer's income derived from the investment portfolio	Bureau van Dijk Orbis
<i>Log Offering Amount</i>	Log of the security's offering amount	WRDS Bond Database
<i>Natural Gas Prices</i>	Quarterly change in the price of natural gas	FRED
<i>Oil & Gas</i>	Indicator variable equal to one for firms in the oil and gas extraction industries	CDI website
<i>Oil Prices</i>	Quarterly change in the price of oil	FRED
<i>Other</i>	Indicator variable equal to one for fossil fuel securities not in one of those three preceding groups	CDI website
<i>Log Par-Value Volume</i>	Log of daily par trading volume	WRDS Bond Database

<i>Policy Change</i>	Indicator variable equal to one if the insurer changes their answer (from “No to “Yes”) to the question - does the company have a climate change policy with respect to risk management and investment management?” - after the onset of the California Rule	NAIC climate survey
<i>Portfolio</i>	Indicator variable equal to one or zero if the firm replies “yes” or “no” to the following question: “has the company considered the impact of climate change on its investment portfolio?”	NAIC climate survey
<i>Post</i>	Indicator variable equal to one for the period after the announcement of the California Rule (from 12/31/2016 onwards) and zero for the prior period	CDI website
<i>Risk & Investment Mgmt Policy</i>	Indicator variable equal to one or zero if the firm replies “yes” or “no” to the following question: “does the company have a climate change policy with respect to risk management and investment management?”	NAIC climate survey
<i>S&P Rating</i>	The security’s bond rating from Standard & Poor’s	WRDS Bond Database
<i>Sold to Related Insurer</i>	Indicator variable equal to one if the insurer sells a fossil fuel investment to an insurer with the same parent company and zero otherwise. A security is considered sold to another insurer if they buy the security (with same 9-digit CUSIP) within one week of the selling insurer disposing of the security.	NAIC
<i>Strategy</i>	Indicator variable equal to one or zero if the firm replies “yes” or “no” to the following question: “has [the insurer] altered its investment strategy in response to these considerations?”	NAIC climate survey
<i>Tot Return</i>	Annual return for the firm’s bond portfolio	NAIC
<i>Log Total Assets</i>	Log of Insurer’s total assets at the end of the fiscal year	Bureau van Dijk Orbis
<i>Total Bond Fair Value (\$M)</i>	Total par value of the insurer’s bond portfolio	NAIC

<i>Treat</i>	Equal to one for California-licensed insurers and zero otherwise	CDI website
<i>Utilities</i>	Indicator variable equal to one for utilities	CDI website
<i>Yield-to-Maturity</i>	Yield to maturity of the security	WRDS Bond Database

Figure 1

Effect of Disclosure on Fossil Fuel Holdings Over Time



Notes. This figure displays the dynamic effects of the California Rule on insurers' fossil fuel investments. We interact $Treat \times Quarter-Year$, where $Treat$ is equal to one for California-licensed insurers and zero otherwise. The base quarter is 9/30/2016. We plot the estimated coefficient along with the 90% confidence intervals.

Table 1

Sample Selection

Main Sample

Step	Observations
All monthly observations covered by the NAICS data	295,308
Exclude observations that do not have Bureau van Dijk Orbis information	(86,437)
Exclude firms that do not have observations in both the pre- and post-periods.	(1,664)
Exclude firms that do not have certain NAIC control variables	(2,652)
Exclude firms that do not have net investment income	(7,358)
Exclude observations after 2019	(46,930)
Exclude observations NOT in March, June, September or December	(106,447)
Total quarterly observations - main sample	43,820
Exclude observations with missing bond characteristics	(2,740)
Total quarterly observations	41,080

Notes. This table outlines the sample selection process.

Table 2

Summary Statistics

	Ind/Cont	N	mean	sd	p25	p50	p75
Dependent Variables:							
<i>Fossil Fuel Securities / Tot Bonds</i>	C	43820	0.068	0.084	0.019	0.055	0.092
<i>Utilities</i>	C	43820	0.037	0.057	0.000	0.026	0.052
<i>Coal</i>	C	43820	0.001	0.004	0.000	0.000	0.000
<i>Oil & Gas</i>	C	43820	0.025	0.052	0.000	0.016	0.035
Test Variables:							
<i>Treat</i>	I	43820	0.171	0.377	0.000	0.000	0.000
<i>Post</i>	I	43820	0.617	0.486	0.000	1.000	1.000
Control Variables:							
<i>Log Gross Premiums</i>	C	43820	17.27	2.26	15.93	17.65	18.96
<i>Log Total Assets</i>	C	43820	17.80	2.03	16.61	18.01	19.25
<i>Investment Income</i>	C	43820	0.312	0.459	0.040	0.079	0.858
Bond Characteristics:							
<i>Log Par-Value Volume</i>	C	41080	16.61	1.03	16.08	16.70	17.24
<i>Log Dollar Volume</i>	C	41080	16.64	1.01	16.12	16.73	17.26
<i>Bid/Ask Spread</i>	C	41080	0.00	0.00	0.00	0.00	0.00
<i>Log Offering Amount</i>	C	41080	13.42	0.40	13.19	13.40	13.61
<i>S&P Rating</i>	C	41080	7.27	1.73	6.25	7.29	8.28
<i>Yield-to-Maturity</i>	C	41080	0.03	0.02	0.02	0.03	0.04
Additional Variables:							
<i>Fossil Fuel Investments (\$M)</i>	C	43820	44	207	0	3	14
<i>Total Bond Fair Value (\$M)</i>	C	43820	499	2220	15	59	213

Notes: This table presents the summary statistics for the main sample with quarterly observations. Variable definitions are in Appendix A.

Table 3

Effect of Mandatory Disclosure on Fossil Fuel Investments

Dep. Var =	<i>Fossil Fuel Securities / Tot Bonds</i>						
	No Matching				Entropy Balanced		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Treat × Post</i>	-0.013*** (-5.64)	-0.0130*** (-5.64)	-0.0128*** (-5.76)	-0.0130*** (-5.64)	-0.0116*** (-5.11)	-0.0097*** (-5.45)	-0.0116*** (-5.11)
<i>Log Gross Premiums</i>		-0.000624 (-0.99)	-0.000836 (-1.26)	-0.000618 (-0.98)	0.00367** (2.59)	0.00200 (1.20)	0.00371*** (2.61)
<i>Log Total Assets</i>		0.000618 (0.71)	0.00135 (1.54)	0.000603 (0.69)	-0.0046*** (-3.41)	-0.0021 (-1.58)	-0.0046*** (-3.46)
<i>Investment Income (%)</i>		0.00224** (2.24)	0.00202* (1.86)	0.00225** (2.24)	-0.00381 (-0.79)	-0.00191 (-0.42)	-0.00379 (-0.79)
<i>Post</i>			-0.00194 (-1.21)	-0.00176 (-1.01)		-0.000807 (-0.39)	-0.000182 (-0.08)
<i>Coal Prices</i>				-0.0250* (-1.73)			-0.0150 (-0.71)
<i>Natural Gas Prices</i>				0.0104*** (3.98)			0.0104*** (3.06)
<i>Oil Prices</i>				-0.00846*** (-4.73)			-0.00867*** (-3.42)
Firm FE	Y	Y	Y	Y	Y	Y	Y
Quarter-Year FE	Y	Y	N	N	Y	N	Y
State-Year FE	N	N	Y	N	N	Y	N
Observations	43820	43820	43820	43820	43820	43820	43820
R-squared	0.818	0.818	0.824	0.818	0.830	0.845	0.830

Notes. This table presents an estimate of the effect of the California Rule on insurers' fossil fuel investments. The sample consists of quarterly observations. The dependent variable *Fossil Fuel Securities / Tot Bonds* is the par value of fossil fuel investments divided by the total par value of the firm's bond portfolio. *Treat × Post* is a binary variable that equals one for California-licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 onwards). Columns (1), (2), (4), (5) and (7) report results controlling for firm and quarter-year fixed effects. Columns (3) and (6) report results controlling for firm and state-year fixed effects. Columns (5) through (7) use entropy-balanced matching on gross premiums, total assets, bond size and the value of the fossil fuel investments held by the insurer in the pre-period. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 4

Effect of Mandatory Disclosure on Fossil Fuel Investments Over Time

Dep. Var =	<i>Fossil Fuel Securities / Tot Bonds</i>		
	coef. (1)	t-stat (2)	sign. (3)
$Treat \times Q = -10$	0.001	(0.23)	-
$Treat \times Q = -9$	0.001	(0.28)	-
$Treat \times Q = -8$	0.000	(-0.01)	-
$Treat \times Q = -7$	0.005	(0.83)	-
$Treat \times Q = -6$	0.004	(0.79)	-
$Treat \times Q = -5$	0.003	(0.46)	-
$Treat \times Q = -4$	0.001	(0.18)	-
$Treat \times Q = -3$	0.002	(0.36)	-
$Treat \times Q = -2$	0.001	(0.44)	-
$Treat \times Q = -1$	0.000	(-0.31)	-
$Treat \times Q = 1$ (12/31/2016)	-0.006	(-1.22)	-
$Treat \times Q = 2$	-0.008	(-1.66)	*
$Treat \times Q = 3$	-0.008	(-1.76)	*
$Treat \times Q = 4$	-0.011	(-2.13)	**
$Treat \times Q = 5$	-0.012	(-2.32)	**
$Treat \times Q = 6$	-0.012	(-2.41)	**
$Treat \times Q = 7$	-0.012	(-2.24)	**
$Treat \times Q = 8$	-0.012	(-2.47)	**
$Treat \times Q = 9$	-0.015	(-2.52)	**
$Treat \times Q = 10$	-0.014	(-2.46)	**
$Treat \times Q = 11$	-0.014	(-2.45)	**
$Treat \times Q = 12$	-0.013	(-2.44)	**
$Treat \times Q = 13$	-0.012	(-1.94)	*
Controls		Y	
Firm FE		Y	
Observations		43820	
R-squared		0.818	

Notes. This table displays the dynamic effects of the California Rule on insurers' fossil fuel investments. The dependent variable *Fossil Fuel Securities / Tot Bonds* is the par value of fossil fuel investments divided by the total par value of the firm's bond portfolio. We interact $Treat \times Quarter$, where $Treat$ is equal to one for California-licensed insurers and zero otherwise. The base quarter is set as September 30, 2016, the quarter just prior to the enactment of the California Rule. $Q = 1$ refers to observations at 12/31/2016, $Q = 2$ are observations at 3/31/2017 and so on. Columns (1) through (3) display the estimated coefficient, t-statistic and level of significance respectively.

Table 5

Effect of Mandatory Disclosure on Investment Policies

Dep. Var =	<i>Risk & Investment Mgmt Policy</i> (1)	<i>Portfolio</i> (2)	<i>Strategy</i> (3)
<i>Treat × Post</i>	0.0485** (2.52)	0.0523*** (2.97)	0.0815*** (3.00)
<i>Log Gross Premiums</i>	0.00165 (0.22)	-0.00123 (-0.27)	-0.00219 (-0.25)
<i>Log Total Assets</i>	0.00783 (0.51)	0.00404 (0.45)	-0.0208* (-1.66)
<i>Investment Income (%)</i>	0.00583 (0.15)	0.0383 (1.25)	0.0519 (0.81)
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	4623	4623	4623
R-squared	0.797	0.746	0.702

Notes. This table presents the effect of the California Rule on insurers' responses to the NAIC Climate Risk survey. The sample consists of annual observations of insurers with available responses to the survey. The dependent variable is equal to one if the insurer answers "yes" and zero if the insurer answers "no" to the following three questions. For Column (1) the question is "does the company have a climate change policy with respect to risk management and investment management?" Column (2) asks "has the company considered the impact of climate change on its investment portfolio?" And Column (3) asks "has [the insurer] altered its investment strategy in response to these considerations?" *Treat × Post* is a binary variable that equals one for California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 to 2019). All columns use firm and year fixed effects and a host of control variables. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 6

Investment Policies – Cross-Sectional Tests

Dep. Var = Sample =	<i>Fossil Fuel Securities / Tot Bonds</i>		
	CA-licensed Insurers		
	(1)	(2)	(3)
<i>Policy Change</i> × <i>Post</i>	-0.0350*** (-4.50)	-0.0352*** (-4.55)	-0.0352*** (-4.56)
<i>Log Gross Premiums</i>		0.00688*** (3.23)	0.00697*** (3.26)
<i>Log Total Assets</i>		-0.00832*** (-3.01)	-0.00828*** (-3.01)
<i>Investment Income (%)</i>		-0.00820 (-1.14)	-0.00812 (-1.13)
<i>Post</i>			-0.000340 (-0.08)
<i>Coal Prices</i>			-0.0267 (-0.64)
<i>Natural Gas Prices</i>			0.0118** (2.10)
<i>Oil Prices</i>			-0.0116*** (-2.87)
Firm FE	Y	Y	Y
Quarter-Year FE	Y	Y	Y
Observations	7500	7500	7500
R-squared	0.825	0.825	0.826

Notes. This table examines the change in fossil fuel investments for those California-licensed insurers that do or do not adopt a risk and investment management policy. The sample consists of quarterly observations. The dependent variable is *Fossil Fuel Securities / Tot Bonds*. *Policy Change* is an indicator variable equal to one if the insurer changes their answer (from “No to “Yes”) to the question - does the company have a climate change policy with respect to risk management and investment management?” - with the onset of the California Rule. *Post* is a binary variable equal to one for the period after the announcement of the California Rule (from 12/31/2016 onwards) and zero for the prior period. We include firm and quarter-year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 7

Risk and Investment Management Policy – Changes in Policy

Dep. Var =	<i>Fossil Fuel Securities / Tot Bonds</i>			
	Always Yes (1)	Switch		Always No (4)
No to Yes (2)		Yes to No (3)		
<i>Treat × Post</i>	-0.00657*** (-3.83)	-0.0392*** (-5.04)	0.000156 (0.04)	-0.00216 (-1.20)
<i>Log Gross Premiums</i>	-0.000923 (-1.37)	-0.000874 (-1.32)	-0.000996 (-1.46)	-0.000844 (-1.25)
<i>Log Total Assets</i>	0.00225** (2.41)	0.00193* (1.88)	0.00241** (2.45)	0.00209** (2.15)
<i>Investment Income (%)</i>	0.00277*** (2.78)	0.00244** (2.45)	0.00291*** (2.73)	0.00265*** (2.69)
<i>Post</i>	-0.00258* (-1.82)	-0.00217 (-1.18)	-0.00274* (-1.80)	-0.00269* (-1.84)
<i>Coal Prices</i>	-0.0218* (-1.71)	-0.0267* (-1.68)	-0.0256* (-1.75)	-0.0249* (-1.82)
<i>Natural Gas Prices</i>	0.0104*** (4.28)	0.00987*** (3.60)	0.00998*** (3.97)	0.0100*** (4.13)
<i>Oil Prices</i>	-0.00793*** (-4.75)	-0.00862*** (-4.55)	-0.00782*** (-4.48)	-0.00758*** (-4.50)
Firm FE	Y	Y	Y	Y
Quarter-Year FE	Y	Y	Y	Y
Observations	38956	38208	36824	38744
R-squared	0.818	0.815	0.810	0.812

Notes. This table examines the changes in fossil fuel investment between those insurers that do or do not adopt risk and investment management policies with the onset of the California Rule. We analyze four groups: i) those insurers who always have risk and investment management policy (i.e. “Always Yes”), ii) those insurers that go from not having a policy to having a policy (i.e. “No to Yes”), iii) those insurers that go from having a policy to not having one (i.e. “Yes to No”), and iv) those insurers that never adopt a policy (i.e. “Always No”). The dependent variable *Fossil Fuel Securities / Tot Bonds* is the par value of fossil fuel investments divided by the total par value of the firm’s bond portfolio. *Treat × Post* is a binary variable that equals one for California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 to 2019). We include firm and quarter-year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 8

Investment and Policies when the Disclosure Regulation Ceases

Dep. Var =	<i>Risk & Investment Mgmt Policy</i>		<i>Fossil Fuel Securities / Tot Bonds</i>	
	(1)	(2)	(3)	(4)
<i>Treat × Post (= 2020)</i>	-0.0402 (-1.42)	-0.0356 (-1.20)	-0.00180 (-0.88)	-0.000864 (-0.44)
<i>Log Gross Premiums</i>	-0.0191 (-0.84)	0.00512 (0.47)	0.000942 (0.94)	0.00103 (1.06)
<i>Log Total Assets</i>	0.0109 (0.39)	-0.0220 (-1.07)	0.00221* (1.86)	0.00191* (1.69)
<i>Investment Income (%)</i>	0.0163 (0.32)	-0.0334 (-0.62)	0.0000312 (0.05)	-0.000259 (-0.41)
Firm FE	Y	Y	Y	Y
Quarter-Year FE	Y	N	Y	N
State-Year FE	N	Y	N	Y
Observations	1849	1819	27640	27640
R-squared	0.865	0.910	0.885	0.891

Notes. This table examines policy and fossil fuel holding changes before and after the disclosure regulation ceases in 2020. The sample period is from 2018 to 2021 with annual observations for Columns (1) and (2) and quarterly observations for Columns (3) and (4). *Treat x Post (= 2020)* is an indicator variable equal to one for California-licensed insurers in the post-period after the disclosure regulation ends (2020-2021). Columns (1) and (2) use the dependent variable *Risk & Investment Mgmt Policy* which is an indicator variable equal to one if the insurer has a risk and investment management policy as it relates to climate change and zero otherwise. Columns (3) and (4) use *Fossil Fuel Securities / Tot Bonds* which is the par value of fossil fuel investments divided by the total par value of the firm's bond portfolio. *Treat × Post* is a binary variable that equals one for California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 onwards). We include firm and quarter-year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 9

PANEL A: Window Dressing at the end of the year

Dep. Var = Sample =	<i>Fossil Fuel Securities / Tot Bonds</i>			
	Q4 2016 to Q1 2017 (1)	Q4 2017 to Q1 2018 (2)	Q4 2018 to Q1 2019 (3)	Pooled (4)
<i>Treat × Post (= Q1)</i>	-0.00201 (-1.06)	-0.000274 (-0.56)	-0.000771 (-0.98)	-0.000988 (-0.63)
<i>Log Gross Premiums</i>	0.000201 (1.55)	-0.000304 (-1.31)	0.000366 (1.38)	-0.00105* (-1.79)
<i>Log Total Assets</i>	-0.000248 (-1.15)	0.000203 (0.78)	-0.000241 (-0.94)	0.000423 (0.84)
<i>Investment Income (%)</i>	0.000298 (0.38)	0.00157* (1.97)	0.00107** (2.27)	0.00224*** (2.74)
Firm FE	Y	Y	Y	Y
Quarter-Year FE	Y	Y	Y	Y
Observations	13622	13385	13065	40072
R-squared	0.968	0.990	0.979	0.919

Notes. Panel A presents the results of the window dressing test. We use monthly observations and restrict the sample to observations three months before and three months after the end of 2016, 2017 and 2018, respectively. We follow the main specification with the difference that *Post* is equal to one for observations in the first quarter of each year and zero if the observation is in the 4th quarter of the previous year. The dependent variable *Fossil Fuel Securities / Tot Bonds* is the par value of fossil fuel investments divided by the total par value of the firm's bond portfolio. *Treat × Post* is a binary variable that equals one for California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016 onwards). Columns (1), (2) and (3) restrict the sample to monthly holdings at the end of 2016, 2017 and 2018 respectively while column (4) combines all three years. We include firm and quarter-year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

PANEL B: Related Party Transactions

Dep. Var =	<i>Sold to Related Insurer [0,1]</i>		
	(1)	(2)	(2)
<i>Treat × Post</i>	0.0232 (0.62)	0.0228 (0.60)	0.0227 (0.60)
<i>Log Gross Premiums - Seller</i>		0.000116 (0.00)	-0.0180 (-0.53)
<i>Log Total Assets - Seller</i>		0.00801 (0.25)	0.0675* (1.70)
<i>Investment Income (%) - Seller</i>		-0.0109 (-0.30)	0.0325 (0.48)
<i>Log Gross Premiums - Buyer</i>			0.0185 (0.48)
<i>Log Total Assets - Buyer</i>			-0.0752* (-1.70)
<i>Investment Income (%) - Buyer</i>			-0.0470 (-0.78)
Firm FE	Y	Y	Y
Quarter-Year FE	Y	Y	Y
Observation	6470	6470	6470
R-squared	0.576	0.576	0.577

Notes. Panel B presents the results of the related insurers test. The dependent variable *Sold to Related Insurer* is equal to one if the insurer sells a fossil fuel investment to an insurer with the same parent company and zero otherwise. A security is considered sold to another insurer if they buy the security (with same 9-digit CUSIP) within one week of the selling insurer disposing of the security. *Treat* is equal to one for California-licensed insurers and zero otherwise. *Post* is equal to one for observations on 12/31/2016 or thereafter and zero otherwise. Column (1) presents the results with only firm and quarter-year fixed effects. Column (2) adds seller insurer control variables and column (3) adds buyer insurer control variables. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 10

Effect of Mandatory Disclosure on Investment Returns

Dep. Var =	<i>Tot Return</i>	<i>Tot Return</i>	
	(1)	Divestment of Fossil Fuel Investments High (2)	Low (3)
<i>Treat × Post</i>	-0.00105** (-2.33)	-0.00209*** (-2.89)	-0.000254 (-0.34)
<i>Log Gross Premiums</i>	-0.0000704 (-0.45)	-0.0000718 (-0.45)	-0.0000669 (-0.41)
<i>Log Total Assets</i>	0.000516*** (2.74)	0.000546*** (2.79)	0.000579*** (3.11)
<i>Investment Income (%)</i>	0.000158 (0.67)	0.000107 (0.47)	0.000178 (0.71)
Wald Test	-	-0.001836*	
(<i>p-value</i>)	-	0.068	
Firm FE	Y	Y	Y
Year FE	Y	Y	Y
Observations	11318	9972	9970
R-squared	0.494	0.479	0.478

Notes. This table shows the results of the effect of the California Rule on investment returns. The sample consists of yearly observations. The dependent variable *Tot Return* is the annual return for the firm's bond portfolio. *Treat × Post* is a binary variable that equals one for large California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016-2019). In Columns (2) and (3), we examine *Tot Return* and partition the sample with *High* denoting disclosing firms whose decline in fossil fuel securities from the pre- to the post-period is above the median and *Low* below the median. All columns include firm and year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 11

Sensitivity Tests

	Coef. (1)	T-Stat (2)
Panel A: Alternative Specifications		
(1) No Firm or quarter-year FEs	-0.0136***	(-3.50)
(2) Parent Company FEs	-0.0124***	(-3.43)
(3) $Treat \times Controls$, Firm and quarter-year FEs	-0.0118***	(-3.78)
(4) $Post \times Controls$, Firm and quarter-year FEs	-0.0118***	(-3.78)
(5) Post-period starts in 2017	-0.0109***	(-4.03)
Panel B: Alternative Samples		
(6) Exclude Californian non-disclosing insurers	-0.0127***	(-3.73)
(7) Restrict to only NAIC climate survey states	-0.0115***	(-4.58)
(8) Annual instead of quarterly holdings	-0.012***	(-3.99)

Notes: This table shows the results of several sensitivity tests. The sample consists of firm-year observations. The dependent variable is *Fossil Fuel Securities / Tot Bonds* in rows (1) through (8). $Treat \times Post$ is a binary variable that equals one for large California licensed insurers after the announcement of the California Rule (i.e. 12/31/2016-2019). Row (1) runs the main specification with no firm or year fixed effects. Row (2) substitutes firm fixed effects for parent company fixed effects. Rows (3) and (4) control for firm and year fixed effects and the interaction of $Treat$ with the controls and $Post$ with the controls, respectively. For row (5), the post-period is from (2017 – 2019). In row (6) we exclude the Californian insurers below the premium threshold who are not required to disclose. In row (7) we restrict the same to only insurers domiciled in states that are part of the annual NAIC climate survey. In row (8) we use end of the year portfolio holdings instead of quarterly holdings. All rows control for *Log Gross Premiums*, *Log Total Assets* and *Investment Income* and employ firm and year fixed effects. Variable definitions are in Appendix A. Standard errors are clustered at the state-year level. T-stats are displayed in parentheses. *, **, and *** indicate significance levels of 10%, 5% and 1%, respectively.