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Corporate promotion and climate change: an analysis of key variables affecting advertising spending by major oil corporations, 1986–2015

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Abstract
Advertising by fossil fuel companies is a ubiquitous element of modern political life. Promotional campaigns in the service of a corporation's position toward environmental issues such as climate change are prevalent in the oil and gas sectors, where corporate image is seen as a valuable asset in managing risk, controlling negative media attention, and overcoming resistance by antagonistic civil society groups. This article assesses advertising expenditures by five major oil and gasoline companies for the time period 1986 to 2015. We examine four major factors that may influence spending on advertising by the oil and gas sectors: (1) the overall reputation of the oil and gas sector; (2) congressional attention to climate change; (3) media attention to climate change; and (4) a series of control variables including major oil spills, the publication of major climate change reports, overall public concern about climate change, GDP, and oil prices. We find that the factors that most influence corporate promotional spending are media coverage and congressional attention to the issue of climate change.

Keywords Major oil corporations · Climate change · Advertising

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1 ExxonMobil advertisement, 2017

Advertising by fossil fuel companies is a dominant strategy to manipulate environmental discourse and influence political outcomes around climate change. A recent television commercial by ExxonMobil extolled the virtuous acts of their employees in their "To Do List"[1] campaign. Similar campaigns include Chevron's "People Do"[2] (Porter 1992) and Royal Dutch Shell's "What If Your Idea Could Change the World?"[3] All of the major oil companies engage in extensive promotional campaigns. In a recent analysis, the media watchdog Media Matters for America found that in one week on CNN, advertisements by the fossil fuel industry outweighed climate change news coverage by a factor of nearly 5–1.[4]

These ad campaigns are part of broader efforts by corporations to increase their corporate reputation and overall legitimacy to obtain what is commonly described in the industry as a "social license to operate" (Harvey and Bice 2014). Legitimacy or "the acceptance on the part of a given audience that a particular actor…is generally seen to be acting properly toward pro-social objectives within an established set of values, norms, and expectations" (Manheim 2011: 22–3) is pursued by corporations to achieve this social license through reputation-management strategies such as corporate social responsibility (CSR) initiatives or "corporate citizenship" programs. Corporations with more favorable reputations maintain a competitive advantage (Fombrun and Shanley 1990; Porter and Kramer 2002) and "are more likely to enjoy greater degrees of trust and loyalty by various stakeholders, including consumers and investors" (Walsh et al. qtd. in Gatzert 2015). This is an especially important factor in the oil sector, which has had a negative public reputation since the beginning of the twentieth century. In *The History of the Standard Oil Company* (1904), Ida Tarbell painted a picture of Standard Oil as a greedy and rapacious corporation, willing to despoil the natural environment and engaged in ruthless competition to maximize profits. To counteract this reputation, fossil fuel companies have attempted to burnish their image in various ways, from employee welfare programs in the early 1900s, through wartime industrial "statesmanship," and into contemporary multimedia promotional campaigns (Marchand 1998; Beder 2002; Hoggan 2009). The aim of these campaigns is to project the corporation as a positive, responsible, and legitimate social actor (Ludlam 1974).

These campaigns have important impacts on the likelihood of climate action. The predominant analysis of public debates over climate change has focused on the promulgation of climate misinformation (Dunlap and McCright 2015). This form of analysis has yielded considerable insight into the efforts to sow doubt about climate science. However, it fails to address the extensive efforts to also promulgate positive information about fossil fuel corporations. By promoting a positive image of fossil fuel companies, these campaigns are aimed at increasing the public reputation of these corporations, which assists the corporation in managing risk, controlling negative media attention, and overcoming resistance by antagonistic civil society groups, thereby decreasing the likelihood of governmental regulatory action. A positive corporate reputation can serve to decrease public and political demand for climate legislation. Thus, a fuller picture of the efforts of fossil fuel corporations to oppose climate

[1] https://www.youtube.com/watch?v=iqQq984RY_k
[2] https://www.youtube.com/watch?v=bReBO55XzZc
[3] https://www.ispot.tv/ad/AwKw/shell-a-breath-of-fresh-air-featuring-kiki-sukezane
[4] http://mediamatters.org/research/2016/04/25/study-cnn-viewers-see-far-more-fossil-fuel-advertising-climate-change-reporting/209985

legislation involves both the promulgation of climate misinformation and promotional efforts to enhance corporate reputation and legitimacy.

Over the past two decades, an extensive literature has emerged that centers on the rise of promotional techniques to shape political action (Anderegg and Goldsmith 2014; Bennett and Manheim 2001; Greenberg et al. 2011; Palenchar and Fitzpatrick 2009; Pfau et al. 2007; Walker 2014). Although politics has long been subject to influence by interest groups and other forms of advocacy, the growth and professionalization of influence in the form of advertising, public relations, and public affairs management have had a major impact on political and legislative action. As diverse groups vie for public attention across multiple communication channels, it has become common practice for corporations, government, and advocacy organizations to employ "information and influence campaigns" (IICs), defined as "systemic, sequential and multifaceted effort[s]" to promote viewpoints that orient the political decision-making process toward their desired outcomes (Manheim 2011:18). These campaigns involve a number of interrelated activities, such as issue advertising campaigns, lobbying, participation in legislative debates (McGarity 2014), efforts to obtain positive media coverage, employment of third-party spokespersons to advocate for desired policies, and grassroots ("astroturf") mobilization (Stauber and Rampton 2002). In addition, corporations engage in promotional advertising campaigns to enhance their legitimacy and reputation. Yet, despite the growing recognition of the role of promotional campaigns in political action around climate change (Beder 2002; Hoggan 2009; Schlichting 2014), there has not been to our knowledge a sustained analysis of oil and gas sector companies' IICs and their connection to climate change.

To expand the analysis of climate change communications beyond existing misinformation efforts, we seek to initiate research into the use of IICs in climate change politics. While we know that oil companies engage in extensive reputation-building campaigns to enhance their legitimacy, we lack an understanding of the extent of these campaigns or what factors drive these activities. This article represents an initial effort to conduct an empirical analysis of IICs related to climate change politics. Since this is an early effort, we constrain our analysis to promotional advertising expenditures of major oil companies. Subsequent analyses can expand their purview to encompass the entire range of activities involved in IICs. In the section 2, we review the literature regarding the relationship between corporate promotion and political legitimacy, and how these efforts can impact both stakeholder perception and legislative action. In section 3, we provide a brief historical description of the development of fossil fuel corporate promotion efforts. We then turn to an empirical analysis of these efforts, conducting a time series regression analysis of the factors that influence industry promotional spending. We conclude with a discussion of the results and further research needs.

2 Corporate promotional campaigns

The origins of political public relations and the application of advertising techniques to influence public policy originated in the efforts of the press agent Ivy Lee before World War I (Habermas 1989:193–194). Rather than enter into political debates to ascertain the common interest, institutions could use publicity techniques to intervene in civil society and secure a political and cultural advantage through the manipulation of communications and media. This was accomplished by representing the particular interests of an organization as being in the general public interest. The goal was not to engender critical reflection and debate, but rather to generate goodwill and prestige for a given position, thus strengthening public support for that position (Knight 2010, Magnan 2006:32). The consensus that results is one based on persuasive appeals through the application of advertising techniques (Sievers 2010:136; Walker 2014). It provides a cultural resource in the form of general dispositions that can then be drawn upon to develop support for a specific policy decision (Habermas 1989:201, Calhoun 1993:26).

As media outlets have proliferated, the bases of a common public opinion have fragmented. Greenberg et al. (2011): 69) noted: “It can no longer be assumed that there is any unity of reason acting as the point of departure and destination for public discourse. Public discourse is fragmented structurally and culturally as different, incommensurable forms of interest come into competitive play.” In this situation, organizations have powerful incentives to engage in activities to set the terms of the debate to favor their preferred policy outcomes. Empirical analyses of advertising campaigns show that they can have a substantial impact on public opinion. Pfau et al. (2007), utilizing a controlled experiment, demonstrated that repeated exposure to carefully crafted messages significantly shifted the test subjects’ support for different policy measures. In this “promotional” public sphere, a distinct advantage is maintained by well-resourced organizations with sufficient economic, political, or organizational capacities to generate publicity campaigns on behalf of their positions (Greenberg et al. 2011:69) and thus realize a significant advantage in influencing the public agenda and political processes (Cooper and Nownes 2004:564).

Given their potential for competitive advantage, advertising and other forms of professionalized advocacy are used by powerful organizations and community groups alike (Howard 2006; Karpf 2016; Kreiss 2016). Thus, it has become a common practice for all manner of organizations to engage the services of promotional specialists to impact the political decision-making process to favor their desired outcomes (Mix and Waldo 2015:126, Manheim 2011:172). These advertising campaigns can be seen as strategic political communications efforts that aim to modify perceptions of key actors and the public to accomplish certain goals. The objective is to bring about a shift in the beliefs of the targeted audience. In this sense, these campaigns rely on the promulgation of propaganda (Collison 2003), which Carey (1995): 20) defines as “communications where the form and content is selected with the single-minded purpose of bringing some target audience to adopt attitudes and beliefs chosen in advance by the sponsors of the communications.”

Two promotional strategies in which fossil fuel companies engage are issue advertising and image advertising. Issue advertising (also called advocacy advertising, single-issue advertising, controversy advertising, and legislative issue advertising) is the creation of media messages by an organization to advocate its position on political or social issues (Sethi 1977). They generally are time limited and focus on a specific issue. Because issue advertisements are ads about matters of public policy as opposed to products or candidates, they are not subject to federal campaign finance regulation (Falk et al. 2006).[5] Neither are they bound by any requirement to present a “balanced” or detailed perspective on complex issues. Waltzer (1988) observed that, in general, “[corporate advocacy] advertisements present the corporation’s definition of the issue, structure of facts and argument, and preferred policy alternative.

[5] Issue advertising is also sometimes referred to as marketplace advocacy, in reference to the idea that unlike product/service advertising and image advertising, issue advertising represents an effort to “protect the company’s market by influencing a legislative outcome or a policy debate” (Gaither and Gaither 2016; Miller and Lellis 2016).

The corporation's view of the problem and its resolution is offered as accurate, valid, and in the public interest. The advertisement may ignore or deny the facts, arguments, interpretations, conclusions, and recommendations of the sponsor's opponents" (44).

A second form of advertising is image advertising. It is aimed at increasing the legitimacy and reputation of the organization sponsoring the advertising (Tedlow 1979). They are longer term efforts and are not tied to a specific political issue. Image advertising highlights the importance of the "intangible" elements of the firm in addition to tangible ones. Corporate image and identity construction are believed to build and maintain trust and loyalty, not only among "external" audiences such as consumers but also among internal audiences like employees. Image advertising is a key part of building a company's reputation. It builds the firm's attractiveness and serves as a source of competitive advantage for the firm.

Image advertising is understood to be part of a company's "social responsibility." Attention to the "triple bottom line" (financial, social, environmental) performance is meant to show companies' interest in and commitment to activities beyond the economic. Whereas "Milton Friedman famously described the social responsibility of business to maximize shareholder wealth" (Pomering and Johnson 2009: 107), today's businesses conceptualize social responsibility in terms of broad social obligation beyond shareholder benefits and environmental commitments to offset polluting behaviors. Frandsen and Johansen (2011) argue that organizations actively try to shape the external field of organizational relationships through their communications efforts. To establish legitimacy in this larger field, companies attempt to promote themselves as representing norms of rationality, progress, and appropriate conduct. This includes efforts to manage overall industry sector reputation (Barnett and Hoffman 2008). Indeed, promotional campaigns in the service of a corporation's social responsibility are prevalent in the oil sector, where corporate reputation is seen as a valuable asset in managing risk, whether the everyday risks of day to day operations or the broader risks of fluctuating shareholder value.

3 Major Oil company promotional efforts

Corporate reputation has long been understood to be a valuable asset for oil companies in "buffering negative critical incidents" (Tischer and Hildebrandt 2014) such as oil spills, overcoming resistance by antagonistic civil society groups, and differentiating a company's position from that of others in the sector (Frynas 2010). As Bortree (2009) shows, green initiatives are one form of corporate legitimacy seeking. In general, corporations with poorer environmental records spend more on promotional campaigns to gloss over their poor performance (Cho et al. 2006).

Between WWII and the mid-1960s, extractive industries held considerable influence over the nature and dissemination of scientific research around environmental issues (Conley II 2006). Starting in the 1970s, however, in the wake of increased awareness of environmental damage and the rise of the public interest movement, corporations faced tighter government regulation and increased scrutiny by a growing set of opposing groups, including environmentalists (Vogel 1989). The role of big business and free enterprise in the USA at this time was less clear, and more contentious, than it had been since prior to WWII. Feeling "squeezed out of the public communications space by more vocal activists" (Kerr 2005) and especially that media treatment was unfair and underinformed, corporate leaders turned to new forms of advertising as part of a broader public relations and public affairs effort to influence targeted audiences and policy (Aronczyk 2018; Vogel 1989).

The development of post-WWII corporate promotional activities in the oil industry was arguably led by Mobil Oil. Mobil was a key actor in the legal struggle to create a free speech right for corporations, which culminated in the Supreme Court decision in First National Bank of Boston v. Bellotti in 1978 (Kerr 2005). It also developed an aggressive public relations campaign. In 1970, Mobil began buying space on the Op-Ed page of the *New York Times* (Kerr 2004; Schmertz 1977; Brown and Waltzer 2005; see also St. John III 2014b). Between 1970, when the *New York Times* first launched its Op-Ed page, and 1988, Mobil Oil used this space nearly every Thursday to promote its corporate citizenship and express views on public policy. Its overarching viewpoint was to emphasize the need for growth in oil use (energy) and the economy. In its evaluation of its public relations program (Mobil Oil 1982), Mobil claims that their Op-Ed effort shifted the editorial stance of the paper: "the *Times* has altered or significantly softened its viewpoint to positions similar to Mobil's on at least seven key energy issues" (Mobil Oil 1982: II-B-1).

This advertorial campaign was hardly the only way Mobil advanced its public policy position, even in the 1970s. Between 1975 and 1977 alone, Mobil representatives appeared on 365 TV shows, 211 radio shows, and gave 80 newspaper interviews.[6] The company also supported speakers' programs, wrote bylined articles, and recorded "electronic news releases" (a precursor to the now-ubiquitous video news releases or VNRs) to distribute nationally to radio stations. They sponsored sports events as well (Schmertz 1988).

One reason Mobil initially focused on print sources for its issue advertising in the 1970s was that the three major news networks of the era (ABC, NBC, CBS) did not allow controversial issue advertising. To overcome this problem and gain the attention of TV viewers, Mobil began to underwrite programs on public television, notably the British television programs Upstairs, Downstairs and Masterpiece Theater. "Because of its interest in single-topic programs, public television became the best place for a company to shape a policy message without its being cluttered by other advertisers. Instead of creating a noncommercial alternative to network television, public television had created a link between underwriters and their series" (Ledbetter 1997: 154). The strategy behind this approach was to improve corporate image by association with cultural excellence (St. John III 2014a). In assessing the impact of these programs, Mobil Oil Company saw them as highly successful: "Our Op-Ed program and our support for "Masterpiece Theatre," in particular, have enabled the company to become part of the "collective unconscious" of the nation, as the changed views of opinion leaders have gradually molded general public opinion (Mobil Oil 1982: II-A-1)."

Along with Mobil Oil, other oil companies expanded their corporate image campaigns in the wake of the energy crisis. In the late 1970s, Shell initiated a public relations program centered on the theme "Come to Shell for Answers." The idea of this campaign was to establish a partnership with the autodriving public as a willing partner to assist in meeting the consumer's needs. This was based on the premise "that the company that is no stranger to the public can be no enemy" (Shell Oil 1978: 59). Later campaigns included "People Do" by Chevron (Porter 1992), "Beyond Petroleum" by British Petroleum (Driessen 2003), and "Energy Solutions" by Exxon-Mobil (Plec and Pettenger 2012). All of the major oil companies now have large-scale corporate promotion campaigns.

As global climate change has risen as an issue, corporations have turned to a number of strategies, including funding the promulgation of scientific misinformation (Supran and Oreskes 2017), lobbying, and other political activities either on their own or through their trade associations.

[6] 1977_Schmertz_Mobil Oil_Speech_PRSA171–5.pdf

Additionally, corporate promotion campaigns have focused on presenting corporations as responsible corporate citizens, taking appropriate action to address climate change. As a potential major influence on the operations of fossil fuel companies, responding to climate change should be a significant factor in the focus and levels of effort invested in corporate promotion activities. However, there is a dearth of analyses of either the impacts or drivers of corporate promotional activities. To address this issue, we turn to an analysis of corporate promotion spending.

4 Analysis of promotional spending

To expand our understanding of the drivers and impacts of corporate promotion spending, we focus on the five major fossil fuel companies in the USA: ExxonMobil, Shell, ChevronTexaco, British Petroleum, and ConocoPhillips. As discussed above, corporate promotion activities span a wide range of activities including issuing press releases, influencing media coverage, sponsorship of events and shows, in-house media/event monitoring, and running corporate promotion advertising campaigns. Many of these activities are not measurable in terms of expenditures, as these data are not made public by industrial actors. However, one publicly available expenditure measure exists that is comparable across these different corporations—advertising spending. Kantar Media has collected advertising expenditures in a wide array of categories for virtually all of the commercial purchases of advertising space for over 40 years. One category of data that has been continuously collected is advertising spending on corporate promotion. This category is *separate* from any issue advertising spending or product advertisement spending. Thus, it provides a valid empirical measure of one key aspect of corporate promotion campaign spending. In this analysis, we utilize this data as a proxy measure of the overall level of corporate promotional efforts.

Utilizing the Kantar Media database, we created a time-series dataset that includes advertising expenditure figures for five major oil and gasoline companies between 1986 to 2015 (see Fig. 1).[7] Throughout the time period of 1986 to 2015, corporate promotional spending for the five major oil companies in the USA averaged $120 million per year.

However, an examination of this figure shows three distinct periods with significant spending level differences in each period. Corporate advertising expenditures were relatively low through the end of 1996, with an average of $35 million spent annually. Beginning in 1997 and continuing through 2004, average annual spending increased markedly to an average of $102 million per year. Finally, Fig. 1 shows that expenditure averages jumped again between 2008 and 2016, to an average of $217 million per year.

5 What drives promotional spending

To further examine the factors that drive these shifts in expenditure, data was compiled on four major factors that prior scholarship suggests might influence major oil company promotional expenditures.

[7] Data obtained from Kantar Media Ad$pender data base for the time period 1995 to 2015. Data from 1986 to 1994 obtained from the predecessor publication to the Kantar Media database, T*he Advertising Red Books*. Only corporate promotion spending was counted. Figure represents this data, adjusted for inflation in constant 2015 dollars. Totals for corporations include previously separate corporations. See Table S-1 in Supplemental Material for data compilation.

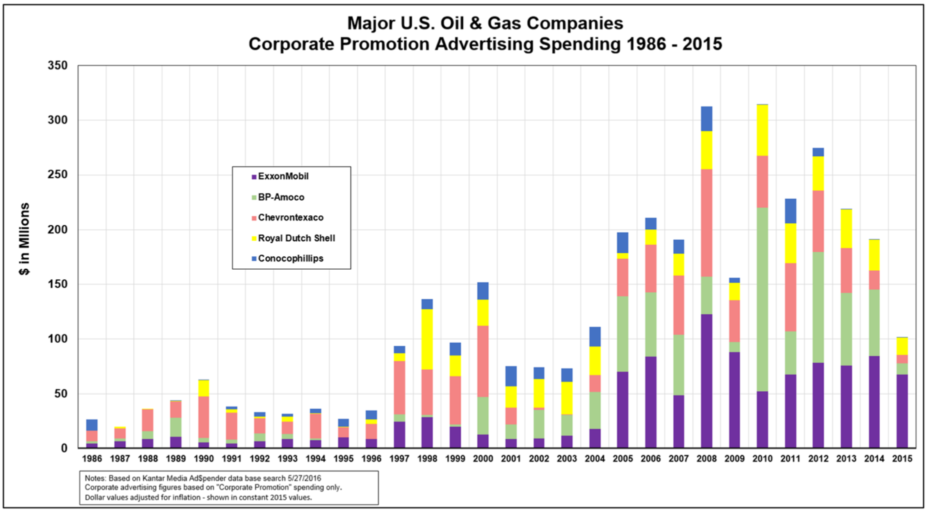

Fig. 1 Corporate promotion spending by major oil corporations 1986–2015 (in constant 2015 dollars)

5.1 Congressional attention to climate change

The first potential determinant of shifts in corporate promotional expenditures we evaluated was the extent of political attention to climate change by members of the US Congress. Since low levels of corporate reputation are related to an increased possibility of both increased regulatory scrutiny and regulatory reform to pressure perceived "bad" actors to modify their practices, we hypothesized that corporations would have an incentive to increase their promotional expenditures when regulatory or legislative action around climate change is pending. To measure this variable, we collected data on levels of congressional attention to climate change based on the number of hearings, bills, treaties, or legislation related to climate change considered by the congress in each of the years in our series.

5.2 Corporate reputation

The second factor that may influence corporate promotional spending is the overall reputation of the corporation. Since corporations use promotional campaigns to maintain or increase their overall public reputation, we expect spending to be dependent on overall corporate reputation. Smith, Smith & Dunbar (2014) show that corporate image advertising increases when the image of the corporation is low and decreases when it is high. Since data on individual corporate reputations is not publicly available, we assessed the overall reputation of the oil and gas industry by compiling data from *Fortune Magazine's* annual corporate reputation index for the petroleum sector and from public opinion metrics derived from the survey Public confidence in oil and gas industry (PCO&G).[8]

5.3 Media attention to climate change

Shifts in media attention to climate-related issues could also influence corporate promotional spending. As media coverage of an environmental issue increases, the potentially impacted

[8] See Supplemental Material for full description of the construction of this scale.

industries will likely seek to mitigate adverse press by increasing advertising expenditures (Schumann et al. 1991). Thus, we would expect increased climate-related coverage in the media to lead to increased corporate spending on promotional campaigns. Media attention to the issue of climate change was measured utilizing counts of news articles on climate change in the *New York Times* and on broadcast news.

5.4 Public concern over climate change

Finally, shifts in public concern about climate change could be related to promotional spending by major oil companies. To gauge the influence of shifts in overall public concern on the issue of climate change, we use the annual climate change threat index (CCTI) developed by Robert Brulle and his colleagues (Brulle et al. 2012).[9]

Our statistical analyses also consider other potentially important (albeit, less theoretically interesting) factors that might influence corporate promotional spending. These include (a) the number of major oil spills in the USA, (b) years in which major climate change reports (IPCC and NRC) were issued, (c) gross domestic product (GDP), and (d) oil prices. In each case, we expect that these factors would significantly impact oil companies' promotional expenditures.

6 Analysis

While our series includes the most extensive data currently available on corporate promotional expenditures by major oil corporations (1986–2015), our analytical options are constrained by the fact that our analysis will be limited to just 30 cases (i.e., 30 years of annual data). This means that advanced statistical techniques (e.g., structural equation modeling or vector autoregression techniques) that might otherwise be well suited for estimating shifts in corporate spending on PR, are not likely to produce reliable point estimates given such a small sample size. To estimate our model, we utilize a standard, least squares, time-series regression technique that has been shown to produce accurate estimates when sample size is small. But even this technique requires that we limit the number of explanatory variables in the models (see Austin and Steyerberg 2015 for a broader discussion).

Another common problem that scholars confront when estimating time series data has to do with trending. Most time-series estimation techniques assume that the data is stationary (i.e., mean, variance, and autocorrelation are constant over time) because analyses of non-stationary data tends to "underestimate standard errors and thus overstate '*t*' values" (Johnston and DiNardo 1997: 260). Non-stationary or stochastic trends in time-series data is very common. Tests for non-stationarity (i.e., the Dickey-Fuller Test for unit root) show that all non-transformed variables in our models except for the dummy variable identifying the release of major climate reports contain stochastic trends. To remove these trends in the series, we employ the most common statistical correction which is to first-difference the variables (i.e., transform the variables into a series of change scores from one period to the next). Statistical tests of the first-differenced variables suggest that all stochastic trending was removed after the transformation. De-trending the series ensures that the point estimates we present below are reliable.

[9] See Supplemental Material for full description of the construction of this scale.

Several other statistical issues were also considered to ensure the most reliable results. First, causal order between our explanatory variables and the outcome are derived from theory and prior empirical work but to ensure that changes in the explanatory variable precede changes in our outcome measure, we lag most independent variables in our models by one year (i.e., values of an IV in Time 1 are used to predict shifts in the value of the DV in Time 2). Two variables in our models, however, are more clearly exogenous to spending and, as such, do not require such a lag structure. If PR expenditures are employed by Big Oil to respond to major oil spills or the release of major climate reports, then this is likely to happen in the same year as such events. We assume all other independent variables require a lag given that opinion and reputational signals take a year to both gauge and develop a desirable PR strategy.

A second statistical issue we consider is the presence of first-order autocorrelation. Statistical tests suggest (Durbin Watson Statistic = 2.08) that including an autoregressive term (AR1) is unnecessary. Third, multicollinearity between our explanatory variables was assessed. Results from the variance inflation factor test suggest that media related to climate change as well as political attention to the issue are highly correlated. This precludes us from including both variables in the same equation because doing so will produce unreliable estimates. We overcome this problem by alternating the variables in two separate equations. We also assess the explanatory power of an additive index that combines the two factors into a single variable. It is also important to note that corrections for both non-stationarity (first-differencing) and lagging to impose a causal order each drop the sample size by one case, so all of models presented below are estimated with 28 cases. Finally, we present robust standard errors (White's correction) in all of our models to ensure that unspecified heterogeneity is not influenced our findings. Doing so further ensures that the results we present are not statistical anomalies.

7 Results

Table 1 shows the means, standard deviations, ranges, and expected signs for all the variables in our analyses. The data shows that a great deal of variation exists across nearly all of our variables (line graphs of all the important variables in our models are presented in the supplemental material—Fig. S3). Most importantly, we see that our outcome measure has varied widely, from a low of less than $20 million in 1987 to a high of $314 million in 2010. We also see the vast shifts in media coverage of climate change as it is ranged from a low of 41

Table 1 Means, standard deviations, and predicted signs ($n = 30$)

Variable	Predicted direction	Mean	SD	Min	Max
Big oil promotional expenditure (in millions of US$)	NA	119.91	90.08	19.54	314.62
Big oil corporate reputation index	–	6.54	.50	5.75	8.19
(CCTI)	+	42.00	4.06	33.69	49.34
Media coverage of CC index	+	352.47	268.93	41.00	1241
Political attention to CC index	+	85.47	82.19	8	337
Major CC reports	+	0.27	0.45	0	1
Oil spill volume (/10,000 gal)	+	939.22	3758.60	19.62	20,771.28
Gross domestic product	+	10,708	4207.19	4579.6	18,219.3

reports in a single year (1986) to a high of 1241 in 2007 as well as sizable shifts in political attention and the aggregate volume of oil spills. The multivariate results presented below will provide insights into how such variation in these explanatory variables might influence corporate promotional expenditures by major fossil fuel corporations.

Table 2 presents the results from our time-series regression models predicting corporate promotional expenditures between 1986 and 2015. The model sequence presented in the table is designed to avoid the sizable multicollinearity that exists between political attention to climate change and media coverage of the issue. Model 1 presents findings from an equation that tests an additive index of the two variables which we call "Elite Cues." The second and third models introduce each of the two correlated variables, separately. We see from the results that only a few of the variables we consider in our models have a statistically significant influence on corporate promotional expenditures. As expected, the most powerful and consistent determinants of corporate promotional spending by major oil corporations are a congressional activity on climate change and media coverage of the issue. Importantly, despite expectation to the contrary, neither the release of major climate change reports like the IPCC nor shifts in public concern about climate change appear to have a significant influence on major oil corporation promotional spending. The control for economic growth (GDP) was significant in two of the three models and oil spill volume was significantly related to PR expenditures by Big Oil in just one model.

Together, these findings support claims that corporations will use favorable promotional campaigns as a tool to avoid the potential of additional regulatory scrutiny. Based on our findings, nothing motivates corporate spending on corporate promotion more than media coverage on climate change and congressional action on climate change. It appears that major oil corporations may be concerned with the potentially negative influence that increased media coverage of climate change might have on their overall reputation or how such coverage may influence congressional action on climate change. To avert such possibilities, corporate executives at major oil companies appear compelled to increase corporate promotion expenditures.

Equally interesting is what does *not* drive corporate promotional expenditures. It is seemingly unexpected that the release of major climate change reports does not increase corporate promotion expenditures by major oil companies. While counterintuitive, it is

Table 2 Time series regression estimates of the determinants of big oil promotional expenditures (in millions of US$), 1986–2015

CCTI (t-1)	− 6.582 (3.199)	− 5.436 (3.008)	− 5.945 (3.148)
Elite cues index (t-1)	0.158** (0.046)		
Media coverage of CC index (t-1)		0.153* (0.069)	
Political attention to CC index (t-1)			0.678*** (0.140)
Major CC reports	11.224 (19.143)	5.799 (20.061)	− 7.111 (15.294)
Corporate reputation index (t-1)	− 23.025 (15.517)	− 16.157 (16.851)	− 35.029 (19.320)
Oil spill volume (10,000 gal)	0.005** (0.001)	0.006 (0.001)	0.001 (0.001)
GDP	0.092* (0.041)	0.090 (0.048)	0.115** (0.04)
Constant	− 44.035* (16.931)	− 42.499 (21.761)	− 53.028 (18.825)
Number of cases (years)	28	28	28
R^2	0.620	0.549	0.714

All variables in the equations are first-differenced and all explanatory variables except oil spills, major climate reports, and GDP are lagged by one year (denoted by t-1)

Significance (two-tailed tests): $^*p \leq 0.05$; $^{**}p \leq 0.01$; $^{***}p \leq 0.001$

Robust standard errors are in parentheses below the unstandardized coefficients possible that the lack of response to these major reports is due to their limited role in influencing public opinion related to climate change (similar findings were reported in Carmichael and Brulle 2017, Carmichael et al. 2017, Brulle et al. 2012). It is also plausible that major oil companies are reluctant to directly challenge climate science immediately after the release of a climate reports because the climate science is so incontrovertible. Finally, shifts in public opinion on climate change do not appear to influence corporate promotion expenditures by major oil companies. This is rather important as it suggests that corporate executives are less concerned with public mood on climate change and focused almost exclusively on shaping the public debate by responding to negative media coverage and by using corporate promotion efforts to influence policy makers in the congress.

7.1 Additional considerations

Beyond what we present in Table 2, we also considered alternative specifications of our existing variables as well as additional explanatory factors that might influence the outcome (not shown but available from the authors). First, we assessed the possibility that shifts in a more direct measure of revenue within the sector (oil prices) might have a significant influence on promotional expenditures. Results were not substantively altered when such a measure was introduced into our models. Finally, we also considered the potential influence of public confidence in the oil industry. Data on public confidence is not available for our entire series, but we did assess the explanatory power of this measure for the available years and found it did not influence the outcome or our original findings.

8 Discussion and conclusion

This analysis has some important limitations. First, any measure of corporate advertising spending is necessarily limited. In the USA, scholars lack access to private company data. A potential proxy research method could be to rely on company data from other countries where it is more freely available. Second, corporate promotion activities are integrated into a series of actions, only one of which is corporate promotion advertising. This analysis is based on the assumption that corporate promotion spending is a reliable proxy for the total corporate promotion spending. This is certainly the lower bound of spending on this activity. Third, in the current digital media context, advertising has taken on multiple dimensions. The typical gatekeeper function of legacy media has given way to a far more fragmented public sphere and an unprecedented number of options and platforms to promote particular viewpoints on public policy. Accounts of media spending by corporations are therefore not always representative of total spending levels. Any future analyses will need to focus on the development of additional empirical measures to account for these relationships. Fourth, the measure of the corporate reputation of the oil and gas industry is limited and incomplete. A more robust measure of both the oil and gas sector's and individual corporate reputations would greatly enhance this analysis. Fifth, the content of these campaigns remains unexamined. A content analysis of these campaigns could greatly add to our understanding of how promotional campaign efforts are structured over time.

With these limitations, the empirical analysis strongly supports the existing literature's analysis of the function and drivers of corporate promotion efforts. The data clearly indicates that the level of promotional effort by major oil companies directly corresponds to levels of congressional action and media coverage related to climate change. As the perceived level of threat of legislative or regulatory action increases or increased adverse media coverage, major oil companies will expand their efforts to improve their corporate reputation. This effort aims at increasing the perceived legitimacy of these corporations, and in the process, decrease the possibility of regulations or legislation that would change its business operating procedures.

Corporate promotional advertising efforts by the major oil corporations is a big business. Since 1986, these five oil corporations have spent nearly $3.6 billion in advertising purchases for corporate promotion. The bulk of this spending (61%) occurred from 2006 to the present, which corresponds to the increased public and congressional attention to climate change in recent years. Not unexpected, the major oil companies spent $315 million in 2010 alone, which is when the highest possibility of binding climate legislation occurred. This high level of corporate promotional spending took place in response to the legislative battle from 2009 to 2010 over the House of Representatives passage of the Waxman-Markey Climate bill (American Clean Energy and Security Act of 2009) and the subsequent Senate consideration of the Kerry-Lieberman climate legislation (American Power Act) (McGarity 2014). It should be noted that this is a conservative estimate of the total level of expenditures on this activity.

The analysis of intentional barriers to climate change action has concentrated on the promulgation of climate misinformation. This article adds an additional dimension to prior analyses. The intentional promulgation of what essentially amounts to fossil fuel corporate propaganda by these corporations can have a major impact on the perceptions of the public and major stakeholders regarding the need for legislative action to address climate change. As Mobil Corporation admitted in its analyses of its own promotional efforts, they have been able to shift the editorial stance of the *New York Times* to favor their desired positions on energy issues (Schmertz 1986; Supran and Oreskes 2017). More insidiously, Mobil claims to have embedded favorable perceptions of their corporation into the “collective unconscious” of the public. Sophisticated propaganda campaigns designed to manipulate public and elite perceptions of the major oil companies are a significant barrier to meaningful climate action. Climate action proponents need to recognize and address this factor to achieve success.

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