The effect of the 2010 Gulf oil spill on public attitudes toward offshore oil drilling and wind development

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HIGHLIGHTS

- We assess whether the Gulf oil spill affected attitudes to offshore energy.
- Overall support for offshore wind (82%) was greater than for offshore oil (59%).
- Support for expanded offshore oil drilling decreased but not significantly.
- Support for offshore wind development increased slightly, again not significantly.
- Although overall support levels did not change, the strength of feeling did.

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ABSTRACT

In April 2010, the Deepwater Horizon oil well exploded, releasing over four million barrels of oil into the Gulf of Mexico. This paper presents data from two national mail surveys undertaken in 2008 and 2010 that compare public attitudes to both offshore oil drilling and offshore wind development pre- and post-spill. The results show that while there was a drop in support for expanded drilling (from 66% in 2008 to 59% in 2010) the change was not significant. There was, however, a significant decrease in support for offshore drilling among coastal residents. There was a slight, non-significant increase in support for offshore wind development which remained significantly higher than support for offshore oil (80% in 2008 and 82% in 2010). Despite there being no significant change in overall support levels, there was a shift in the strength of feeling regarding offshore oil, with 80% of Americans either less supportive or more opposed to expanded drilling in 2010 than they were in 2008.

1. Introduction

Shortly before 10 p.m. on April 20, 2010, 48 miles (77 km) off the coast of Louisiana and two-and-a-half-miles (4 km) beneath the surface of the Gulf of Mexico, the Macondo well blew out. Freed from its confines beneath the seabed, methane gas raced to the surface, igniting as it reached the Deepwater Horizon drilling platform. The ensuing explosion resulted in the death of eleven workers, the destruction of the drilling platform, and the largest ever accidental release of oil into the ocean in U.S. history, significantly eclipsing that caused by the Exxon Valdez in 1989 (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011). This paper uses data from two national mail surveys undertaken before and after the Deepwater Horizon oil spill to assess whether the incident affected American attitudes toward expanded offshore oil drilling and toward the development of offshore wind, an alternative ocean-based source of energy.

1.1. Public support for offshore energy development

The majority of Americans are supportive of both offshore oil drilling and offshore wind development. Prior to the Deepwater Horizon disaster, a series of polls conducted by Rasmussen Reports found consistently high levels of support for offshore drilling. In June 2008, support levels were at 67% (Rasmussen Reports, 2008). They increased marginally to 68% in November of that year – around the time the first survey discussed here was conducted – and remained at that level one year later (Rasmussen Reports, 2009). Polling conducted in the aftermath of the spill showed less enthusiasm for offshore drilling, with support levels reaching a low of 56%, but by December, 2010, this number had risen to 60% and by April, 2011, support for offshore drilling was back to its pre-spill level of 67% (Rasmussen Reports, 2011a). After the spill, fewer people were in favor of deepwater drilling than of offshore drilling in general, with just 47% of those asked in July, 2010 supporting the practice. As with
offshore drilling in general, support levels rebounded in the months following the spill, reaching 53% in September, 2010 and 59% in April, 2011 (Rasmussen Reports, 2011b).

Other opinion polls show a similar trend. In August 2008, a CNN/Opinion Research Corporation poll reported that 74% of respondents supported increased drilling for oil and gas offshore in U.S. waters. By May, 2010, support had dropped to 49% but one year after the spill in April 2011, support had risen once again to 69% (PollingReport.com, 2010). Polls by Fox News and CBS News also show a drop in support for increased offshore drilling immediately after the Gulf spill and report lows of 44% and 40%, respectively (PollingReport.com, 2010), although neither news agency resampled public opinion at a later date. Lastly, polls undertaken in Florida by Quinnipiac University follow the same pattern. In April 2010 (about a week before the spill), 66% of Floridians supported increasing the amount of offshore drilling for oil and gas (Quinnipiac University, 2010a). By June, support had dropped to 42% (Quinnipiac University, 2010b). Ten months later in April, 2011, as was the case with the Rasmussen Reports polls, support had rebounded to 60% (Quinnipiac University, 2011).

Demographically, Republicans are far more likely to favor oil and gas drilling than Democrats. This was shown to be true in each of the three Rasmussen polls mentioned above, for example, in the June 2008 Rasmussen poll, 85% of Republicans supported the practice compared to 57% of Democrats. Similarly, in the March 2011 Quinnipiac University poll, whereas 82% of Republicans support increasing offshore drilling, only 43% of Democrats did so (Quinnipiac University, 2011). There are also pronounced differences in the perceived effects offshore drilling will have on gasoline prices. In the same June 2008 poll, 78% of conservatives believed that expanded U.S. offshore drilling is at least somewhat likely to bring prices down, compared to just 57% of moderates and 50% of liberals.

Given that there are no existing offshore wind turbines in U.S. waters, research into public attitudes toward offshore wind has focused on the potential for development along the Eastern Seaboard, where the resource is close to major load centers. For example, in comparing support levels for offshore wind in Delaware and Cape Cod, Firestone et al. (2009) found that people were more supportive of wind in Delaware than in Cape Cod. While 77.8% of Delaware residents were in favor of a wind project located just off the coast, only 43.8% of Cape Cod residents supported the proposed Cape Wind project. It should be noted, however, that the Delaware survey asked about a hypothetical wind project (the survey was conducted before the Delaware project was publically announced) whereas the Cape Cod survey questioned respondents about the already proposed, and highly contentious, Cape Wind project. Firestone et al. (2009) also looked at the factors that most affect people’s decisions to either support or oppose offshore wind. Interestingly, both supporters and opponents listed environmental impacts and electricity rates as important factors in their decision, demonstrating that wind power can be thought of as having both negative and positive impacts in these areas.

Findings from a follow-up survey show majority support for local offshore wind projects in both regions (Firestone et al., 2012). In Cape Cod, support levels rose substantially to 57.2% and in Delaware they remained more-or-less constant at 80.6% (for this survey, Delawareans were asked about the then-proposed NRG Bluewater Wind project, not a hypothetical wind project). It is generally accepted that support levels for specific projects are lower than for wind power in the abstract sense (Bell et al., 2005). However, the Delaware survey reported a very high level of support for a particular project.

In contrast to offshore oil drilling, political affiliation is a poor predictor of offshore wind power support. Using a multiple regression model, Firestone and Kempton (2007) conducted further research into Cape Cod residents to assess the influence of various factors on support levels for the Cape Wind project. Although people who voted for John Kerry, the Democrat candidate in the 2004 presidential election, were more likely to support the Cape Wind project than those who voted for George Bush (56.2% in favor compared to 50.7%) the difference was not statistically significant (Firestone and Kempton, 2007). Similarly, Klick and Smith (2010) found political affiliation to have little effect in determining support for offshore wind at the national level. Klick and Smith attribute this to the fact that both Democrat and Republican leaders back greater investment in wind power; unlike offshore drilling, it has not become a partisan issue. Firestone and Kempton (2007) found a similar situation in Cape Cod.

In summary, the majority of Americans support both offshore wind development and offshore oil drilling. From the polling data, the Gulf oil spill did appear to negatively affect attitudes toward offshore drilling in the immediate term but, less than a year after the spill, support had rebounded close to pre-spill levels. Further, while political differences play a role in support for offshore drilling, they do not appear to be a determinant of offshore wind power support.

2. Methods

The data for this project was supplied by two national mail surveys. The first, conducted in November and December 2008, was a broad survey that covered issues relating to people’s attitudes toward the ocean and included questions concerning the use of ocean energy resources. The second was a follow-up survey to respondents of the first survey. It was undertaken in August and September 2010 and only included questions related to ocean energy. Dillman’s Tailored Design Method was used as a general guide to conduct both surveys (Dillman, 2007). The first four elements of Dillman’s method were followed (a clear and easy-to-understand questionnaire, multiple mailings, the inclusion of return envelopes with real stamps, and personalized correspondence) but, given financial constraints, it was neither possible to include a token monetary incentive (Dillman’s fifth element) nor to follow up each survey with a couriered mailing.

2.1. 2008 Survey

In the fall of 2008, 1,600 surveys were administered to residents of the continental United States. Given cost limitations and the inherent differences (namely geographic and cultural) between Alaska and Hawaii and the rest of the United States, it was decided that the survey would only target residents of the lower 48 states. To ensure people receive from all parts of the continental United States were sampled, and to allow for interregional comparisons, a balanced, stratified random sample was drawn from the population of these states.

For the purposes of sampling, the lower 48 states were split into five geographic regions. Half of the 1600 surveys were sent to coastal residents (those living in a coastal county) and half to non-coastal inhabitants. As more U.S. residents live in non-coastal

1 In December 2011, NRG put active development of its offshore wind projects on hold.

2 In this study, the definition of a coastal county differs from the official U.S. government definition. The National Oceanic and Atmospheric Administration (NOAA) considers a county to be coastal if it meets one of the following two criteria: (1) at least 15% of its total land area is located within the nation’s coastal watersheds (as defined by the Office of Ocean Resources Conservation and Assessment’s Coastal Assessment Framework); or (2) the county accounts for at least 15% of the land area of a coastal cataloging unit (a U.S. Geological Survey-defined drainage basin). Given that a number of these counties are a significant distance inland and that one of the objectives of this study was to focus on coastal residents who actually live near the ocean or the Great Lakes, only counties that physically border either the open ocean or a major coastal body of water (such as the Chesapeake Bay) were used to provide the sample for the four coastal strata.
counties than coastal counties, sampling 800 residents in each area effectively oversampled coastal county residents. The purpose of oversampling was to create a balanced sample between coastal and non-coastal residents, as the primary comparison of interest was between residents of these two areas.

The 800 surveys that were mailed to coastal residents were further subdivided into four substraata – East Coast, West Coast, Gulf Coast, and Great Lakes – with each area receiving 200 surveys. Along with the fifth (the Inland) subgroup, these strata make up the five regions defined in the study.

The survey was pretested at various stages of its development and a near-final version was tested at three Delaware Division of Motor Vehicle locations. No major problems, biases, or issues were uncovered with either the question format or the overall survey design. After thorough pretesting, the survey was administered. Up to four mailings were sent to each address. On or about November 6, 2008, everyone in the sample received an initial survey packet, which included a cover letter, the survey booklet, and a pre-addressed and stamped return envelope. A follow-up postcard was sent out 11 days after the first mailing, followed by a second survey pack 25 days after the reminder postcard. Lastly, a second postcard was sent six days after the second mailing. Of the 1600 surveys mailed out, 611 were completed and sent back. An additional 75 were returned as undeliverable, giving a bad address rate of less than 5%. Accounting for these bad addresses, the survey yielded a response rate of 40%.

2.2. 2010 Survey

Almost two years later, survey respondents were sent a brief follow-up survey. Certain questions were repeated from the 2008 survey in an attempt to ascertain whether survey respondents had changed their mind about the merits of drilling and developing wind offshore. Additionally, new questions asked respondents to indicate whether the Gulf oil spill had affected their attitudes toward offshore drilling and wind development. As before, the survey was thoroughly pretested.

Of the 611 follow-up surveys that were mailed out, 395 were completed and returned and a further 64 were sent back as undeliverable (giving a 72% response rate). Upon receipt, the age and sex of each respondent was cross-checked with the information provided in 2008 to ensure both surveys were completed by the same person. Twenty-six of the surveys were removed from the sample due to inconsistencies in the demographic data, resulting in a final sample size of 369 respondents.

Data in the returned surveys were coded, entered into a database, and then double-checked to ensure coding accuracy. In order to ensure the sample data represented the national population and, in turn, to draw inferences from the sample to the broader population, the data were weighted according to region, sex, age and income.

3. Results and discussion

3.1. Support for offshore energy development

Support levels for both the expansion of offshore drilling and the development of offshore wind changed only slightly between 2008 and 2010, with support for expanded oil drilling decreasing from 66% to 59% and support for wind development increasing from 80% to 82%. While significantly more people supported offshore wind than expanded drilling in both years (the difference was significant at the 5% level in 2008 and at the 1% level in 2010), the changes within each category (a decrease of seven percentage points in the case of expanded drilling and an increase of two percentage points for offshore wind) were not statistically significant. The decrease in support for expanded drilling was similar to that seen in the polls discussed previously. Based on the data presented here and on the polling information, it seems safe to say that any reduction in support for the expansion of offshore oil drilling following the Gulf oil spill was both minor and temporary. Similarly, there were no discernible changes in support for offshore wind power, an alternative ocean-based energy source.

However, although there was not a significant change in support for either expanded drilling or offshore wind development, it should not be inferred from the data that attitudes toward offshore energy development remained stagnant. When the data are investigated in more detail, it becomes apparent that the similar levels of support seen in 2008 and 2010 were not the result of the same people answering the questions the same way. Rather, they were due to roughly similar numbers of respondents changing their minds about whether they supported the two forms of offshore energy development. This is particularly apparent with regard to offshore wind. Table 1 reveals that in fact 47% of those who opposed offshore wind in 2008 changed their minds and supported its development two years later, whereas 53% still opposed in 2010. Conversely, 89% of those who supported offshore wind in 2008 still supported it in 2010 and just 11% of 2008 wind supporters became opponents in 2010. The aggregate level of support for offshore wind development did not change significantly because there were many more people who supported in 2008 than opposed. Although almost half of the 2008 wind opponents changed their position, this equaled fewer than 30 people, about the same number of respondents who switched from supporting to opposing wind (11% of 283). In short, although the overall level of support for offshore wind increased by two percentage points, more than half of those who opposed offshore wind in 2008 changed their position and supported it in 2010.

A similar, if not as extreme, situation occurred with support for expanded offshore drilling (Table 2). Interestingly, in this case, identical proportions of respondents changed their minds. Of those who supported the expansion of drilling in 2008, 77% still supported it in 2010, whereas 23% had changed their position and were against it. Similarly, of those who opposed expanded drilling in 2008, 77% still opposed in 2010 and 23% supported. In this case, because more people supported expanded offshore drilling in 2008 than opposed (241 compared to 113), a greater number of people became opponents of the practice in 2010 than became supporters, even though the actual proportion of those who changed their minds between 2008 and 2010 was identical.

Further, merely looking at the number of people who changed their mind regarding offshore drilling and wind development provides only a partial picture of the effect of the Gulf oil spill on public opinion because it does not register intensity of feeling. The 2010 survey also asked respondents whether the Gulf oil spill

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3 The only exception to this rule is the offshore wind logistic regression model, which was weighted based on sex only. Because that model only has approximately 50 observations, very few observations fell within each demographic category for the age (e.g., 18–25), income, and region variables. As a result, weighting by those variables would have given an inordinate weight to several observations.

4 It should be noted that question wording differed slightly between the drilling and wind questions. As the U.S. already has an operational offshore oil program, respondents were asked about their views on expanding offshore drilling. Conversely, as there are no existing offshore wind projects, the questions regarding wind referred to support for offshore wind in general. Given the similarities between support for expanded drilling found here and support for offshore drilling in general as reported by other studies, it appears that this difference in question wording had little effect on people’s responses.
made them more or less supportive of, or more or less opposed to, drilling for oil and installing wind turbines in the ocean. Among those who supported expanded drilling in both years, 15% reported a decrease in their level of support in 2010, whereas 10% reported an increase in their level of support. Seventy-five percent stated that their opinion had not changed. Of those opposed to expanded offshore drilling in both years, 65% reported an increase in their level of opposition in 2010, whereas 3% reported a decrease in their level of opposition. Slightly less than one third (32%) of drilling opponents replied that the spill had no effect on their position. Regarding offshore wind, among those who supported offshore wind in both years, 41% reported an increase in their level of support in 2010, 2% reported a decrease, and 57% remained unchanged. Of those who opposed offshore wind in both years, 11% reported an increase in their level of opposition in 2010 and 24% reported a decrease. Again, the majority (64%) reported no change in their level of support.

These data suggest that while the overall level of support for expanded offshore oil drilling remained relatively constant in the aftermath of the Gulf spill, opposition to offshore oil hardened. In contrast, supporters of offshore wind tended to be more supportive of it and opponents less opposed, although in each case, the majority reported no change in their level of support. Respondents who opposed expanded offshore drilling were then asked what they thought the government should do regarding existing offshore oil wells. Almost half (48%) of offshore oil expansion opponents thought the government should continue drilling at existing offshore oil exploration and development sites but ban the development of new wells; 36% thought that all offshore drilling should be phased out over the next ten years; and 16% thought the government should ban all offshore drilling immediately. In other words, more than half of those opposed to expanded drilling believed that all drilling off the U.S. coast should cease by 2020.5

The final question in the 2010 survey asked whether the U.S. government should do more to promote offshore drilling and/or wind development. Ten percent thought the government should do more to promote offshore drilling, 37% thought offshore wind should be promoted, 34% believed both should be promoted, 11% thought neither, and 8% were unsure. In short, while 44% (10% + 34%) favored increased government support for expanded drilling, 71% (37% + 34%) supported the promotion of offshore wind development.

3.2. Effect of demographic variables on support for offshore energy development

A number of significance tests (Wald tests) were conducted to determine if certain demographic characteristics (region, sex, age, race, and political persuasion) accounted for any differences in support for offshore energy development. First, with regard to where people live, no significant differences in support for either expanded drilling or wind were found between coastal-county and inland residents. However, given that many of the coastal counties stretch a number of miles inland, respondents who lived in a zip code bordering the ocean were analyzed separately to better understand the attitudes of people living very close to the ocean. In 2008, coastal-zip residents were more supportive than inland residents of expanded offshore oil drilling (78% compared to 64%, a finding significant at the 10% level); by 2010, these positions had reversed, with coastal-zip residents being less supportive of expanded drilling than inland residents (43% compared to 60%, again significant at the 10% level). As can be seen from these percentages, this reversal of support is due to the sharp drop in support for expanded drilling among people living by the coast (from 78% to 43%, a change significant at the 1% level) rather than from increased support among inland residents.

In both surveys, men were more likely to support both forms of offshore energy development than women. In 2008, 70% of men supported expanded drilling, compared to 61% of women; in 2010, the percentages had fallen to 63% and 53%, respectively. Regarding offshore wind development; in 2008, 85% of men and 77% of women supported the installation of wind turbines in the ocean. By 2010, support levels stood at 82% for men and 80% for women. None of these differences were significant, however.

To account for the affect of age, respondents were divided into seven categories (18–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+). Few significant differences were found between age groups regarding support for the expansion of offshore drilling. Sixty-two percent of respondents aged 45–54 supported expanded drilling in 2008, compared to just 52% in 2010 (a decrease significant at the 5% level). Similarly, in 2008, 65% of respondents aged 55–64 supported expanded drilling versus 58% in 2010 (again significant at the 5% level). No significant changes were seen with regard to support for offshore wind.

With regard to race, in 2008 white Americans were significantly more likely to support the expansion of offshore oil drilling (71% in favor) than non-white Americans (38%), a difference significant at the 5% level. However, by 2010, support for expanded drilling among white Americans had fallen to 61% (a decrease significant at the 5% level) and a significant difference no longer existed between white and non-white Americans (support levels among non-white American rose marginally to 40% in 2010). As with age, no significant changes occurred regarding support for offshore wind.

Lastly, as was seen in the aforementioned polling data, in both years there were significant differences between Democrats and Republicans in their support for expanded offshore drilling. In 2008, just 40% of respondents who identified themselves as Democrats supported expanded offshore drilling compared to 84% of Republicans (a difference significant at the 1% level). This pattern was repeated in 2010 with 43% of Democrats and 86% of Republicans again supporting offshore drilling (again significant at the 1% level). The stark differences between Republicans and Democrats with regard to offshore drilling should not come as a surprise when one considers the political atmosphere at the time the first survey was administered. The offshore drilling issue had

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5 The question asked about “drilling” rather than production. Entities drill for oil to explore the economic potential of areas they have leased from the government or to develop a well for production. Thus, although “drilling” activities at a given well may cease, the well could continue producing oil for many years.
become very politically partisan and, in the run up to the 2008 Presidential election, shouts of “Drill, baby, drill” became synonymous first with the campaign of Sarah Palin, the Republican candidate for the Vice Presidency, and then with the Republican party as a whole (Lakshmanan, 2008). Although both Democrats and Republicans ultimately voted to lift the moratorium on offshore drilling, in the American public’s mind, support for drilling struck a partisan chord in both 2008 and 2010.

In contrast, offshore wind consistently received high levels of support from both Democrats and Republicans. Eighty-three percent of Democrats supported offshore wind in 2008, as did 87% in 2010. Similarly, 87% and 81% of Republicans supported offshore wind in 2008 and 2010, respectively. As might be expected, there were no significant differences between the two groups in either year. As discussed earlier, offshore wind has enjoyed strong bipartisan support, particularly among the Mid-Atlantic States of Virginia, Maryland, Delaware, and New Jersey. Recently, however, some conservatives have come out in opposition to offshore wind. For example, in New Jersey the group ‘Americans for Prosperity’ has campaigned against the state’s plans to develop 1100 MW of wind energy off its southern coast (Johnson, 2011). Whether the slight decrease in support for offshore wind among Republicans in the 2010 survey is indicative of a broader trend remains to be seen but, as discussed further below, the perceived cost of offshore wind could become a barrier to wider public acceptance, particularly with the increased scrutiny of government spending in today’s political climate.

3.3. Multiple regression analysis of individuals who changed their minds

To better appreciate the factors that motivated individuals to move from supporting to opposing expanded drilling and from opposing to supporting offshore wind power, we developed a pair of logistic regression models, each of which analyzes a subset of the data. The first uses the dependent variable opposeoil2010, which is assigned a ‘1’ if the respondent opposed expanded drilling in 2010 but supported it in 2008, and ‘0’ if he or she supported in both years (and therefore did not change their opinion). The second model uses the dependent variable supportwind2010, which was assigned a ‘1’ if the respondent supported offshore wind power in 2010 but opposed it in 2008, and ‘0’ if he or she opposed it in both years. The independent variables in each model were the same: male, white, college, income200K, age35–64, children, coastalzip, democrat, otherpolitics. These variables are described in detail in Table 3.

The regression model presented in Table 4 analyzes opposition to expanded oil drilling in 2010 among that subset of the sample who supported the practice in 2008. The model has two significant variables, both at the 5% level; however, only one – living in a coastal zip code (coastalzip) – has a positive effect on opposition (and thereby a negative effect on support). The model shows that, among those who supported expanded drilling in 2008, residents of coastal zip codes were almost five times more likely to oppose expanded drilling in 2010 (odds ratio of 4.88, p = .011). This finding fits with the Wald tests presented above and supports the notion that the Gulf oil spill significantly affected the attitudes of people living close to the ocean.

Interestingly, the model’s only other significant variable (white) had a negative effect on opposition. That is, among people who supported expanded drilling in 2008, white Americans were 81% less likely than non-white Americans to change their minds and oppose it in 2010.6 This is despite the overall increase in opposition to expanded drilling among white Americans in the broader population.

As Table 5 shows, the regression model that analyzes the characteristics of opponents of offshore wind in 2008 who became supporters in 2010 is much stronger. It has a pseudo $R^2$ of 0.546, a $p$-value of 0.036, and contains two variables significant at the 1% level (age35–64 and democrat) and three at the 5% level (white, income200K, and otherpolitics). In short, the model indicates that, among those who opposed the development of offshore wind power in 2008, people who were white, had an annual income of over $200,000, were middle-aged, and did not identify themselves as Republicans (i.e., they either stated they were Democrats or had some other political affiliation) were significantly more likely to alter their position and support offshore wind development in 2010. This finding is interesting insofar as these characteristics tend not to predict support for wind among the broader population. As previously discussed, studies have found little difference in offshore wind support levels due to political persuasion (Firestone and Kempton, 2007; Klick and Smith, 2010) and a very high income (over $200,000) has been shown to result in opposition to offshore wind (Firestone and Kempton, 2007).

3.4. Reasons given for supporting and opposing offshore energy development

In both surveys, respondents were asked why they either supported or opposed the expansion of offshore oil drilling and the development of offshore wind. In each case, survey respondents were given a choice of six answers and asked to select the response they agreed with most. Table 6 presents the results of these questions. Listed in Table 6 are responses from both the

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6 An odds ratio of exactly one can be interpreted as having no effect on support, whereas an odds ratio greater than one denotes a positive effect and a ratio less than one a negative effect. Odds ratios greater than one can be interpreted as increasing the odds by the factor listed (an odds ratio of 2.00 means that the variable in question results in a person being twice as likely to support the energy choice). To convert odds ratios less than one into an understandable measure, subtract one from the odds ratio and multiply by 100. Here, an odds ratio of 0.19, means the odds of support change by –81% (0.19 − 1 × 100). In other words, they decrease by 81% (Long, 2007).
Table 4
Logistic regression of factors influencing shift toward opposition to expanded offshore oil drilling.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>Odds ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>-.378</td>
<td>.490</td>
<td>.685</td>
<td>.441</td>
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<td>white</td>
<td>-1.637</td>
<td>.756</td>
<td>.194</td>
<td>.030**</td>
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<td>college</td>
<td>.360</td>
<td>.699</td>
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<td>.607</td>
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<td>income200K</td>
<td>.030</td>
<td>1.234</td>
<td>1.030</td>
<td>.981</td>
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<td>age35-64</td>
<td>.256</td>
<td>.509</td>
<td>1.292</td>
<td>.615</td>
</tr>
<tr>
<td>children</td>
<td>-.309</td>
<td>.509</td>
<td>.734</td>
<td>.543</td>
</tr>
<tr>
<td>coastalzip</td>
<td>1.586</td>
<td>.621</td>
<td>4.884</td>
<td>.011***</td>
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<td>democrat</td>
<td>.259</td>
<td>.745</td>
<td>1.296</td>
<td>.728</td>
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<tr>
<td>Otherpolitics</td>
<td>.995</td>
<td>.574</td>
<td>2.705</td>
<td>.083</td>
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<tr>
<td>constant</td>
<td>-.593</td>
<td>1.207</td>
<td>.243</td>
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</tr>
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</table>

No. of observations = 217; log pseudolikelihood = – 102.22; Wald $\chi^2$ = 15.91; probability $\chi^2$ = .0689; pseudo $R^2$ = .1301.
** Significant at the 5% level.

Table 5
Logistic regression of factors influencing shift toward support for offshore wind development.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>Odds ratio</th>
<th>p</th>
</tr>
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<tr>
<td>Male</td>
<td>-.251</td>
<td>1.015</td>
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<td>.805</td>
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<td>White</td>
<td>4.264</td>
<td>1.786</td>
<td>71.089</td>
<td>.017**</td>
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<td>College</td>
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<td>1.455</td>
<td>20.531</td>
<td>.038**</td>
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<td>38.398</td>
<td>.001***</td>
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<td>1.188</td>
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<td>17.066</td>
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<td>.013</td>
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</tr>
</tbody>
</table>

No. of observations = 50; log pseudolikelihood = – 19.40; Wald $\chi^2$ = 173.96; probability $\chi^2$ = .0357; pseudo $R^2$ = .4638.
*** Significant at the 1% level.
** Significant at the 5% level.

The change in responses between 2008 and 2010 implies a subtle shift from a focus on national security to a more libertarian outlook (using domestic resources simply because they exist and can be used, rather than using them to specifically reduce oil imports). This shift mirrors the rise of the Tea Party and is more apparent when only the responses of those who support drilling and oppose wind are considered. Granted, this is only a very small subset of the overall sample (n=14) but in 2008, 83.6% of this group supported expanded drilling to reduce foreign oil imports whereas just 2.7% supported drilling because the resource is there to use. In 2010, however, these percentages had reversed with 27.5% selecting a reduction in foreign oil imports as the reason they supported expanding drilling and 59.4% choosing the fact that the resource is available. Both of these changes were significant at the 10% level.

It is also possible that the war in Iraq, which had a much higher public profile in 2008 than it did in 2010, colored respondents’ attitudes toward foreign oil imports in the first survey. Gasoline prices were higher in 2010 than in 2008 but not by much ($2.80 per gallon compared to $2.46) and this fits with the slight, non-significant, increase in the number of people who selected the cost of gas as a reason for supporting expanded drilling in the second survey.

Regarding opposition to expanding oil drilling, there were some non-significant changes in the responses people provided. One might think that if the Gulf oil spill was to have had any impact on people’s attitudes toward offshore drilling then it would have been manifested in concern over the potential environmental impacts of drilling. Indeed, among the entire sample, the number of people who cited the risk of environmental damage as being too high did increase from 33.5% in 2008 to 46.3% in 2010, indicating that the spill did have an effect in this regard, although the lack of significance makes it difficult to state unequivocally that this is the case. The other commonly chosen response as to why people opposed expanded offshore drilling was a general belief that the U.S. should try to reduce the amount of oil it uses, not try to seek out new sources. The number of people who selected this answer decreased slightly from 55.4% in 2008 to 41.5% in 2010. Similar, non-significant changes were found in the support wind/oppose drilling subset.

Among respondents who supported offshore wind development, in both 2008 and 2010 the most commonly cited reason was that it is a source of clean energy. However, there was a marginally significant decrease in the number of people in the entire sample who selected this response (from 48.7% in 2008 to 37.4% in 2010, significant at the 10% level). Correspondingly, there were slight, non-significant increases in the number of people who believed that offshore wind will help reduce dependency on foreign oil (14.8% in 2008 to 20.5% in 2010) and that we should use the wind resource simply because it is there to be used (15.5% to 23.7%). At 15.4%, the number of people who supported offshore wind based on the jobs it might create remained unchanged. The drop in the number of people who supported wind because it is a source of clean energy was more apparent among the subset of respondents who supported wind but opposed expanded drilling.

As with expanded drilling, the simple fact that the U.S. has an offshore wind resource became more of reason for people to support its development in 2010. Again, this change seems to fit with a more laissez faire approach to the development of U.S. energy resources. The increased support for wind power as a means to reduce foreign oil imports either suggests that respondents have made the link between electrifying the light vehicle fleet and wind energy (see conclusion) or more likely represents confusion over the present ready substitution of energy sources for one another (wind energy for oil). It is true that, in sufficient quantities, wind power would displace other sources of generation such as the more traditional coal and gas burning power plants. However, in the near-term, wind power, which is used for

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7 While the survey instrument did not define “clean energy” we assume that respondents understood it to mean energy generated from sources with low or zero emissions, which have minimal human health, environmental, and climate impacts.
electricity, would do little to reduce the amount of imported oil, the majority of which is used in the transportation sector (although limited quantities of oil are used for electricity generation in the Northeast).

Lastly, Table 6 presents the responses of those who opposed offshore wind development. As can be seen, among the entire sample there were significant changes in the primary reasons given in 2008 and in 2010. In the first survey, almost three-quarters (73.0%) of respondents cited the negative impact wind turbines might have on birds and other ocean life as the primary reason they opposed. By 2010, this number had fallen to 28.3% (a difference significant at the 10% level). Conversely, the number of people who opposed offshore wind based on its cost rose from just 1% in 2008 to 50.6% in 2010, an increase significant at the 5% level. These changes were magnified in the oppose wind/support dril-ling subset, with 70.7% of this group opposing wind due to the impact on wildlife in 2008 compared to 13.3% in 2010 (a decrease significant at the 10% level) and 1.4% opposing because of the cost in 2008 compared to 61.4% in 2010 (an increase significant at the 5% level).

There are a number of potential explanations for these changes in the reasons that underpin offshore wind opposition. However, it is important to underscore that, a change in the reason given by an individual for opposition does not necessarily mean that the reason given in 2008 (e.g., impact on bird life) no longer resonates with that person. Rather, all that can be concluded from the data is that at least one of the other choices was more important in 2010 than the impact on bird life. Thus, it could be that in 2010 people were less concerned about the environmental impacts of offshore wind than they were in 2008. Alternatively, it could be that the environmental concerns of those who opposed offshore wind in 2008 were alleviated and those individuals became supporters of offshore wind. Lastly, the changes could reflect a shift in priorities, spurred by a general concern about both the state of the U.S. economy and the cost of large-scale offshore wind projects.

Interestingly, in neither of the surveys was the visual impact of offshore wind turbines cited as a main reason for opposition. In 2008, 1.4% of wind opponents stated they opposed offshore wind power because wind turbines would spoil the view from the beach; by 2010 this number had fallen to 0.8%. This is not to say that the visual impact of turbines has no bearing at all on support for offshore wind power, but rather that data presented here confirm the findings of other research, that aesthetic objections to potential offshore wind development are far from being the primary driver of opposition (Firestone and Kempton, 2007; Firestone et al., 2009; Kempton et al., 2005).

4. Conclusion

Despite the fact that, with over four million barrels of oil lost, the BP Deepwater Horizon spill was the largest accidental release of oil into the ocean in U.S. history, it appears that the event did little to dampen public support for offshore drilling. While data

**Table 6**

Reasons given for supporting and opposing offshore energy development.

<table>
<thead>
<tr>
<th>Why support drilling?</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>180</td>
<td>180</td>
<td></td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Gas prices are too high</td>
<td>3.2%</td>
<td>7.0%</td>
<td></td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Reduce dependency on foreign oil</td>
<td>84.6%</td>
<td>64.7%</td>
<td>**</td>
<td>83.6%</td>
<td>27.5%</td>
<td>*</td>
</tr>
<tr>
<td>Risk of environmental damage is too high</td>
<td>5.4%</td>
<td>18.7%</td>
<td>*</td>
<td>2.7%</td>
<td>59.4%</td>
<td>*</td>
</tr>
<tr>
<td>Will take years to get into production</td>
<td>5.7%</td>
<td>8.1%</td>
<td></td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Should reduce amount of oil we use</td>
<td>6.4%</td>
<td>3.3%</td>
<td></td>
<td>13.7%</td>
<td>13.2%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why oppose drilling?</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>88</td>
<td>88</td>
<td></td>
<td>69</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Oil is sold in a global market</td>
<td>2.0%</td>
<td>4.3%</td>
<td></td>
<td>2.1%</td>
<td>7.2%</td>
<td></td>
</tr>
<tr>
<td>Risk of environmental damage is too high</td>
<td>53.5%</td>
<td>46.3%</td>
<td></td>
<td>40.4%</td>
<td>45.5%</td>
<td></td>
</tr>
<tr>
<td>Will take years to get into production</td>
<td>7.4%</td>
<td>8.7%</td>
<td></td>
<td>3.5%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Oil rigs would spoil the view from the beach</td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>We should reduce amount of oil we use</td>
<td>55.4%</td>
<td>41.5%</td>
<td></td>
<td>51.3%</td>
<td>47.3%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why support wind?</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>226</td>
<td>226</td>
<td></td>
<td>77.4%</td>
<td>71.3%</td>
<td>**</td>
</tr>
<tr>
<td>Reduce effects of climate change</td>
<td>2.7%</td>
<td>1.4%</td>
<td></td>
<td>0.4%</td>
<td>3.0%</td>
<td></td>
</tr>
<tr>
<td>Reduce dependency on foreign oil</td>
<td>14.8%</td>
<td>20.5%</td>
<td></td>
<td>12.4%</td>
<td>14.2%</td>
<td></td>
</tr>
<tr>
<td>Create green jobs</td>
<td>15.4%</td>
<td>15.4%</td>
<td></td>
<td>3.1%</td>
<td>5.7%</td>
<td></td>
</tr>
<tr>
<td>The resource is there, why not?</td>
<td>15.5%</td>
<td>23.7%</td>
<td></td>
<td>5.4%</td>
<td>18.9%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2.9%</td>
<td>1.5%</td>
<td></td>
<td>1.4%</td>
<td>6.8%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why oppose wind?</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
<th>2008</th>
<th>2010</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>22</td>
<td>22</td>
<td></td>
<td>18.7%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Wind turbines will spoil the view from the beach</td>
<td>5.7%</td>
<td>0.0%</td>
<td></td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Negative effect on birds and ocean life</td>
<td>73.0%</td>
<td>28.3%</td>
<td></td>
<td>70.7%</td>
<td>13.3%</td>
<td>**</td>
</tr>
<tr>
<td>Expensive and more costly than other energy</td>
<td>1.0%</td>
<td>50.6%</td>
<td></td>
<td>1.4%</td>
<td>61.4%</td>
<td>*</td>
</tr>
<tr>
<td>We have enough wind power on land</td>
<td>17.8%</td>
<td>15.4%</td>
<td></td>
<td>21.9%</td>
<td>20.9%</td>
<td></td>
</tr>
<tr>
<td>Wind power is unreliable</td>
<td>1.9%</td>
<td>1.9%</td>
<td></td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4.8%</td>
<td>3.8%</td>
<td></td>
<td>6.0%</td>
<td>4.4%</td>
<td></td>
</tr>
</tbody>
</table>

**Significant at the 5% level.  
* Significant at the 10% level.**
presented here show a drop in support for expanded offshore drilling (66% to 59%) the difference was not significant and, judging by national opinion polls, any effect was likely only temporary. Only the attitudes of Americans living close to the ocean were significantly altered by the spill, with people residing in zip codes abutting the ocean (particularly on the West Coast and around the Great Lakes) less likely to support expanded offshore drilling in 2010. However, the spill did appear to have an effect on the strength of public feeling, with 80% of Americans either less supportive of or more opposed to expanded offshore drilling in 2010 than in 2008. Indeed, while overall support levels remained relatively constant, opposition to offshore oil hardened. This is in contrast to the strength of feeling regarding offshore wind, whereby supporters tended to become more supportive and opponents less opposed. The survey also found that, among opponents of expanded offshore drilling, a majority (52%) believed that all offshore drilling (future and current) should be phased out over the next ten years.

Furthermore, the Gulf spill had no measurable effect on support for offshore wind, an alternative form of ocean-based energy. However, this was likely due in large part to the very high baseline level of support that was found (80% in 2008). It is important to remember that, in both years, significantly more Americans preferred offshore wind to expanded offshore drilling. Whereas support for offshore drilling was split along political party lines, both surveys found broad bipartisan support for offshore wind power. In short, given a choice between the two, Americans would rather develop U.S. offshore wind resources than expand the nation’s offshore drilling program but overall, they are supportive of both forms of energy development.

Perhaps it should come as no surprise that the Gulf oil spill did not significantly reduce public support for offshore drilling; after all, previous spills have not diminished society’s appetite for oil and although wind power has grown exponentially in recent years, its overall global market share is still less than 3% (Navigant Research, 2013). It will take many more years of sustained growth for wind power to take a significant market share from fossil fuels. Indeed, with over a third of survey respondents believing the government should promote both expanded offshore drilling and offshore wind development, it appears that many people envision offshore wind power as complementing offshore oil production rather than supplanting it.

In the past, however, there were no viable alternatives to oil; spills such as those caused by the Torrey Canyon (1967), the Amoco Cadiz (1978), and the Exxon Valdez (1989) simply had to be accepted as part of the cost of maintaining our modern way of life. Today, other options do exist. For example, electrifying a segment of the light vehicle fleet would reduce the amount of oil needed for transportation purposes (Baran and Legey, 2013; Thomas, 2012) and electrochemical storage could help address the intermittency issues that affect solar and wind power (Budischak et al., 2013; Delucchi and Jacobson, 2011; Kempton et al., 2007). While these electric-vehicle and storage technologies have yet to be widely adopted, they do at least offer an insight into how society could reduce its dependency on fossil fuels.

Our results raise a further question: if a major environmental disaster does not significantly affect support for expanded offshore drilling, then what would? While the Deepwater Horizon spill reduced support levels of people living on the coast and solidified opposition among those already opposed to offshore drilling, it did little to change the minds of anyone else. Despite the high levels of media coverage, it may be that the spill was too far removed from everyday life to significantly change attitudes. It may take multiple events that hit much closer to home (for example, droughts, floods, and other projected climate change impacts) to alter public opinion of offshore drilling (and of fossil fuels in general). Even then, the cost differential between fossil fuels and renewable energy might still make people unwilling to reduce their use of the former.

This last issue of cost is worth discussing further. Our data show that among offshore wind opponents, the perceived cost of offshore wind replaced the potential environmental impact on birds and other marine life as the main reason for opposition in 2010 compared to 2008. Additionally, while the vast majority of Republicans in both years supported offshore wind, support did dip slightly (from 87% in 2008 to 81% in 2010). Although it is not possible to state with any degree of certainty whether these changes are indicative of a broader trend in attitudes toward offshore wind, given the current political climate (with the rise of the Tea Party and the ideological debate over government spending) our data may portend a time when offshore wind struggles to maintain such high levels of bipartisan support.

Acknowledgements

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