



Labor Market Impacts of the 2010 *Deepwater Horizon* Oil Spill and Offshore Drilling Momentum

By Joseph E. Aldy (Harvard Kennedy School)

Introduction

On April 20, 2010, the Transocean *Deepwater Horizon* suffered a catastrophic blowout while drilling in a BP lease in the Gulf of Mexico's Macondo Prospect. This accident resulted in the largest oil spill in U.S. history and an unprecedented spill response effort. Due to the ongoing spill and concerns about the safety of offshore oil drilling, the U.S. Department of the Interior suspended offshore deep water oil and gas drilling operations on May 27, 2010, in what became known as the offshore drilling moratorium. The media portrayed the impacts of these events on local employment, with images of closed fisheries, idle rigs, as well as boats skimming oil and workers cleaning oiled beaches.

In "The Labor Market Impacts of the 2010 *Deepwater Horizon* Oil Spill and Offshore Drilling Moratorium," the paper this policy brief is based on, I examine the net impact of the oil spill, the drilling moratorium, and spill response on employment and wages in the Gulf Coast. The spill and moratorium represented unexpected events in the Gulf Coast region. The economic impacts of these events varied within and among the Gulf states. Coastal counties and parishes were expected to bear the vast majority of the effects of these

two events, while inland areas were expected to be largely unaffected. The moratorium was expected to affect Louisiana – with significant support of the offshore drilling industry – but not, for example, Florida, which had no active drilling off of its coastline. The timing and magnitude of the spill response varied across the states over the course of the spill as well.

Taking advantage of the unexpected nature of these events, I estimate the net effects of the spill, the spill response and the moratorium on Gulf Coast employment and wages. Despite predictions of major job losses in Louisiana resulting from these events, I find that the most oil-intensive parishes in Louisiana experienced a net increase in employment and wages. In contrast, Gulf Coast Florida counties south of the Panhandle experienced a decline in employment. Analysis of the number of business establishments, worker migration, accommodations industry employment and wages, sales tax data, and commercial air arrivals likewise show positive economic activity impacts in the oil-intensive coastal parishes of Louisiana and reduced economic activity along the Non-Panhandle Florida Gulf Coast.

These results yield several policy implications. First, a significant influx of resources appears to have offset

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much of the adverse impacts of the spill. This implies that the spill response was similar to a conventional fiscal stimulus, in that it created jobs and economic activity. Second, the ambiguity about the length of the drilling moratorium may have mitigated some of its adverse impacts. Given the uncertainty, rig owners may have decided to hold off before taking any drastic action such as mass layoffs or moving rigs to other regions of the world. And third, ex-ante (forecasted) analyses of the drilling moratorium that did not characterize the complexity and temporal attributes of the economic shocks to the region – such as the spill and spill response – may have been uninformative and potentially misleading for policy deliberations.

The next section describes the predicted labor market impacts reported in the media during the spill and moratorium in 2010. Next, I present the empirical strategy, followed by the empirical results and robustness and external validity checks. The final section concludes.

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Predicted Labor Market Impacts of the Spill and Drilling Moratorium

In the weeks after the *Deepwater Horizon* sank to the bottom of the Gulf of Mexico, analysts and politicians began to predict the potential employment impacts of the spill and the drilling moratorium. Various studies by economists and industry groups estimated

potential job losses in the tens of thousands, due to the spill's anticipated negative impact on fishing, recreation, and tourism.

Within a week of the U.S. government's announcement of the May 27 drilling moratorium, representatives of the oil and gas industry highlighted potentially large employment losses. The Louisiana Mid-Continent Oil and Gas Association identified potential job losses in excess of 30,000. In June, several economists at Louisiana State University independently estimated moratorium-related job losses in the range of 10,000 – 20,000 for the state of Louisiana. The U.S. government also employed regional multiplier models in two analyses: an internal Department of Interior assessment in July reportedly estimated job losses in excess of 23,000, while an interagency working group report published in September estimated job losses in the 8,000 – 12,000 range. John Hofmeister, the former CEO of Shell, stated that “50,000 people could lose their jobs.” This brief's statistical analysis of labor market data presents a significantly different assessment of the labor market implications of the drilling moratorium and spill response than those assumed in the multiplier model analyses.

Empirical Strategy

To reiterate, the *Deepwater Horizon* oil spill and the offshore drilling moratorium were two unprecedented and unexpected events. Additionally, the economic impacts of the spill and moratorium events varied within and among the Gulf States. Coastal counties and parishes in this region were largely affected by these two events, while inland areas were not. The scale of the spill response was also different across states and over time. These spatial and temporal characteristics of the spill and moratorium motivate the empirical framework.

I use a difference-in-differences strategy to estimate the impacts of the spill, spill response, and moratorium on employment and wages. In this framework, the spill and moratorium are considered exogenous events that “treat” coastal counties in the Gulf region. Given the surprise nature of both events, they can credibly be characterized as exogenous and hence the pre-event period should not include anticipatory behavior in the Gulf economy (i.e., relocating fishing vessels to the Atlantic coast in anticipation of the spill or relocating drilling rigs to another region in anticipation of the moratorium). I employ the National Oceanic and Atmospheric Administration’s definition of Gulf of Mexico coastal counties and parishes for Alabama, Florida, Louisiana, Mississippi, and Texas. These counties are assumed to be treated by the spill and spill response for May through July 2010. I estimate separate effects by state and break out the Florida Gulf Coast

into Panhandle and Non-Panhandle regions – the former of which experienced significantly more coastline oiling and spill response activity than the latter. In addition, I isolate the five Louisiana parishes identified by the U.S. government as most active in support of offshore drilling activities. These are assumed to be treated by the moratorium for June through October 2010. For the control group, I employ all non-coastal counties and parishes in these five states.

Results

To estimate the net effects of these events on employment, I use monthly 2010 data from the Quarterly Census of Employment and Wages (QCEW) at the county/parish level. I use the logarithm of aggregate employment as my dependent variable, and include indicator variables for various groups of the treated and untreated counties/parishes described

Table 1. Estimated Employment, Wage, and Establishment Impacts, 2010

	(1) Total Employment	(2) Weekly Wage	(3) Number of Establishments
Oil Parishes	1.2%**	2.0%**	0.80%**
LA Coast ex Oil Parishes	0.26%	-2.5%*	0.97%**
AL Coast	1.3%*	3.8%*	-0.17%
FL Panhandle Coast	-0.75%	-0.13%	-0.99%**
FL Non-Panhandle Coast	-2.7%**	-0.79%	-1.9%**
MS Coast	-0.16%	-1.5%	-0.014%
TX Coast	0.26%	-2.2%	0.064%
Sample Period	2010	2010	2010
N (counties)	534	534	534
N	5,340	1,602	1,602

Notes: The natural logarithm of employment, wage, and establishments are used as the dependent variables in the three regression models. The coefficients are displayed in percentages for ease of interpretation. Please see the working paper draft for the complete regression output. All models include fixed effects by county and month (or quarter for wage and establishment regressions). **, * denote statistical significance at the 1, 5 percent levels.

above. Table 1 regression (1) shows the net employment impacts of treatment by the spill, spill response, and moratorium by state and sub-state region. The results illustrate a statistically significant 1.2 percent employment gain in the Louisiana oil parishes, a statistically significant 1.3 percent employment gain in Alabama coastal counties, and a statistically significant 2.7 percent employment decline in Non-Panhandle Florida Gulf Coast counties. The tourism-oriented accommodations industry have an even larger percentage decline in employment along the Florida coast south of the Panhandle. Based on 2009 employment levels in these three regions, these statistically significant estimated impacts translate into about 3,000 more jobs in the oil parishes, 3,000 more jobs in the Alabama coastal counties, and 50,000 fewer jobs in the Florida coastal counties south of the Panhandle reflecting the net effects of the spill, spill response, and moratorium.

Complementing these employment impacts, I use quarterly wage data from the QCEW in another set of regressions. I find that the Louisiana oil parishes experienced a statistically significant increase in the average wage of about 2 percent (regression (2)). Likewise, the Alabama coastal counties enjoyed higher wages of about 4 percent during the spill. The rest of the Gulf Coast counties and parishes experienced economically small and statistically insignificant impacts on aggregate wages, although Non-Panhandle Florida coastal counties witness a statistically significant decline of at least 4 percent in accommodation industry wages. (Not shown. Please see the working paper version of this paper for more detailed regressions results).

Robustness and External Validity

Robustness of Empirical Strategy

I undertook an array of robustness checks of the base econometric model by accounting for employment seasonality and modifying the definition of coastal counties/parishes. I also substituted U.S. non-Gulf State counties as controls for the inland Gulf State counties and parishes, and omitted all Texas observations, since the state was effectively “up current” from the spill and largely unaffected by spill and spill response. The adverse employment impacts in Non-Panhandle Florida coastal counties hold across nearly all robustness

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checks. The results for Louisiana parishes are mixed across the robustness checks, with non-oil parishes experiencing statistically significant positive employment impacts when accounting for seasonality and with some variations in geographic controls. In some robustness checks, oil parish employment impacts fall to levels that cannot be statistically distinguished from zero. The positive and statistically significant wage impacts in the Louisiana oil parishes and the Alabama counties hold across virtually all robustness checks.

External Validity: Business Establishments and Worker Migration

The literature on local labor markets suggests that the number of business establishments and worker in- and out-migration can respond to shocks to labor demand. I employ QCEW data on the number of business establishments as well as IRS migration statistics to assess the net effects of these events on businesses and worker migration. I find a statistically significant 1 percent increase in Louisiana establishments and a statistically significant 1-2 percent decrease in Florida establishments (regression (3)) (which holds for an array of robustness checks). I find no statistically meaningful impact of these events on net migration to Gulf Coast counties, although there is some evidence of lower in- and out-migration for the Louisiana and Florida Gulf Coast in 2010.

External Validity: Sales Tax Revenue and Commercial Air Travel

As measures of external validity, I employed the base econometric specification with two alternative measures of economic activity. First, I analyzed parish-specific sales tax data for Louisiana. Second, I investigated quarterly air travel passenger arrivals by airport in the Gulf Coast states. These supplemental analyses show statistically higher levels of economic activity covered by the sales tax in the oil parishes than in other Louisiana parishes during this time, and some evidence of lower air passenger arrivals in Florida Gulf Coast airports than other airports during this time.

External Validity: Program Participation

The unprecedented mobilization of spill response resources – including more than 800 specialized skimmers, 120 aircraft, 8,000 vessels, and nearly 50,000 responders – provided employment opportunities that could counter the potential adverse effects of the spill

and the moratorium. The clean-up activities and compensation for economic damages provided by BP could counter the impacts of lost income on economic activity. BP's expenditures in the Gulf States for damage compensation and clean-up were quite significant, reaching billions of dollars.

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On June 16, 2010, as a part of a larger agreement, the White House and BP agreed that BP would set aside \$100 million for a Rig Workers Assistance Fund (RWAF) to benefit any rig workers laid off as a result of the drilling moratorium. The claims for displaced rig support workers were quite modest (less than 400), which is consistent with the evidence that few rigs left the Gulf of Mexico: only five of the 46 rigs operating on April 20, 2010 had left the region as of September 10, 2010.

Conclusion

The April 20, 2010 explosion on the *Deepwater Horizon* drilling rig precipitated several economic shocks to the Gulf Coast region: an unprecedented U.S. oil spill, an unprecedented mobilization of spill response resources, and an unprecedented moratorium on deepwater drilling. This policy brief has investigated the impact of these shocks on employment and wages in the Gulf Coast region.

The analysis of employment shows little adverse impact in Louisiana, the state closest

to the leaking well in the Macondo Prospect of the Gulf of Mexico. The various statistical models illustrate either statistically significant increase in employment in the oil parishes and the non-oil coastal parishes or small effects that are statistically indistinguishable from zero. The Louisiana oil parishes also enjoyed a statistically significant increase in the average wage across all panels and virtually all robustness checks, as well as greater levels of economic activity during the spill, spill response, and moratorium than non-oil coastal parishes and inland parishes in Louisiana. Non-Panhandle Florida gulf coast employment fell during the oil spill, as evident across panels and including various robustness checks. The analysis for the accommodations industry and the evaluation of commercial air passenger arrivals provides some additional evidence of the adverse impact of the spill on Florida coastal employment.

Throughout what was originally billed as a 6-month moratorium, Department of the Interior officials noted that it could end early (and in fact, the moratorium ended more than one month early). This uncertainty may have created an incentive for rig owners to wait to lay off workers or relocate rigs.

The results of these statistical analyses for the Louisiana parishes differ significantly from the predictions made with various state and regional multiplier models employed to assess the impacts of the drilling moratorium. The net effect of the spill, spill response, and drilling moratorium resulted in a statistically significant increase of about 6,400 – 20,000 in coastal Louisiana employment. The estimated employment losses forecasted by the multiplier models, in comparison to employment gains in my ex-post statistical analysis, suggest

several shortcomings of the multiplier tools. First, the *ceteris paribus* assumption made in the drilling moratorium multiplier analyses did not appropriately represent the economic environment in the Gulf Coast region during the summer of 2010. Everything else was not equal; a significant influx of spill response resources provided a source of income and employment for at least some of those displaced by the spill and the moratorium. Second, these multiplier models operated as if a significant number of drilling rigs would relocate to other regions and layoff a significant number of workers. This did not pan out, perhaps in part resulting from the uncertainty about future government regulation – including the length of the moratorium – in the Gulf of Mexico.

These results point to three policy ramifications. First, a significant pulse of resources in spill response appears to offset much of the adverse impacts of the spill. This is not a determination that the optimal level of spill response was pursued, but to simply note that the spill response delivers an array of immediate and longer-term economic and environmental benefits. Second, uncertainty about the length of the drilling moratorium may have diminished its negative effects. Throughout what was originally billed as a 6-month moratorium, Department of the Interior officials noted that it could end early (and in fact, the moratorium ended more than one month early). This uncertainty may have created an incentive for rig owners to wait to lay off workers or relocate rigs. And third, multiplier analyses that do not accurately capture the intricate traits of an economic shock may mislead policy makers. Though multiplier models provide analysts with a tool to conduct ex-ante analysis premised on a few assumptions about the economic environment that is by definition not available through statistical analysis of ex-post employment and wage data, economic models that, by assumption, fail to

account for the economic and employment impacts of response activities would also produce misleading predictions.

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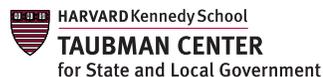
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