

*Executive Summary*

## **Employment Impacts of Upstream Oil and Gas Investment in the United States**

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After the Great Recession, cumulative employment growth was much higher for most oil and gas-producing states compared to the rest of the nation. Many have suggested that oil and gas states' higher employment growth was due to the simultaneous dramatic increases in oil and gas production from unconventional sources like shale gas and light tight oil. During this boom in upstream activity, many industry-funded studies suggested that the shale boom would lead to dramatic gains in national employment. Subsequently, the fall in oil prices that began in mid-2014 has caused investment and oil production to fall. This has led to layoffs by many of the same oil and gas companies that helped fuel job gains in the years prior.

Policymakers continue to focus on finding ways to boost employment, so understanding the oil and gas sector's potential to generate jobs (or destroy them when activity slows) is important. Job gains are a particularly important potential benefit to regulatory changes that induce more investment in shale resources. Before a meaningful amount of post shale boom data was available, industry-funded studies provided some early estimates of the job-creation potential in unconventional oil and gas development. These studies used input-output models that rely on strong assumptions about how investment dollars and labor demand flow throughout the economy. In contrast, we take a strictly empirical approach and statistically estimate the relationship between. This means we do not have to make strong assumptions on questions like "What fraction of production revenues are spent locally?" or "Does the increased supply of oil and gas cause a local boom in manufacturing, or are jobs created out-of-state?" Our study joins a growing number of studies that find that increased oil and gas drilling results in moderate increases in employment.

To measure upstream investment, we use the Baker Hughes state-level rig count. This provides us with a monthly measure of investment in each state. We then statistically estimate the dynamic relationship between monthly changes in the rig count and monthly changes in private, non-farm state-level employment. Our results suggest that an additional rig count is associated with 31 new jobs immediately, and around 315 in the long run. Around 90 percent of job gains accrue within two years of an increase in rig counts. It is important to note that we implicitly assume that a downward movement in rig counts will lead to job losses in the same way. Thus, if activity first increases and then decreases to its original level, no additional jobs will be created in the long run. Aggregating our results to the national level suggests that increased oil and gas activity during the 2005–2014 period may have created on the order of up to a quarter-million jobs.

Though Baker Hughes rig counts are a simple, timely, and consistent measure of the number of drilling rigs operating at any time across states, it is reasonable to expect the rig count—employment relationship to have changed over time. First, the quantity of investment dollars (and revenues) associated with a single rig count differs with whether the development is conventional or unconventional and whether wells are producing oil or gas. Costly, unconventional drilling for high-priced oil was likely a more potent job creator than inexpensive, conventional drilling for cheaper natural gas. Second, slack labor markets and high unemployment in the aftermath of the Great Recession might have meant firms

were able to hire more workers than during previous periods of low unemployment. To see whether such factors could have led to changes in the relationship between rig counts and employment, we test whether the rig count–employment relationship differs before and after 2008. We find an economically and statistically significant difference: Pre-2008, an additional rig represents 201 new jobs, while post-2008, it represents 375 new jobs. Unfortunately, it is impossible to distinguish the precise root of this change given the data at hand. Nevertheless, it is plausible that costly unconventional development was a more potent job creator than the earlier, conventional developments for a variety of reasons.

Our results imply that unconventional oil and gas development is a job creator at the state level in an economically meaningful, yet still moderate way. As the incoming administration reviews regulations that may affect the pace of oil and gas investment, it will be important to balance the potential job-creation benefits from increased investment and the potential health and environmental costs.