Employment Impacts of Oil and Gas Drilling
What’s Next?

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Objectives

1) Low oil prices $\implies$ falling investment $\implies$ job loss (quantify using rig-counts)

2) Unconventionals seem to affect employment more than conventionals
Rig-counts

- Rigs “actively exploring for or developing oil or natural gas”
- Baker Hughes publishes weekly since 1944
- Coincident with drilling investment
- Imperfect measure of input (labor) demand shock
Drop after Nov 2014 OPEC mtg

Rig−counts

O&G Emp

WTI

Dynamic panel model

\[
\Delta \frac{Emp_{it}}{Pop_{i,2000}} = \alpha(L) \Delta \frac{Emp_{it}}{Pop_{i,2000}} + \beta(L) \Delta \frac{Rigs_{it}}{Pop_{i,2000}} + \nu_i + \eta_t + u_{it}
\]

- Seasonally adjusted total private nonfarm employment (lags 1–12)
- Land-based rigcounts (lags 0–10)
- State + time FE
- Std errors adjusted for serial & cross-sectional correlation
Job multipliers

- Immediate impact:
  \[ \hat{\beta}_0 \approx 25.6 \text{ jobs per rigcount} \]

- Long-run multiplier:
  \[ LRM = \frac{\hat{\beta}(1)}{1 - \hat{\alpha}(1)} \approx 329 \text{ jobs per rigcount} \]
Cumulative job creation

Months after rig-count increase

Jobs created

0 6 12 18 24

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Predicted job impacts for O&G states

Run rigcount changes (Feb 1992–Oct 2017) through multipliers
Compare to actual mining employment

- Mining jobs added since Feb 1992
- (NB: mining includes O&G)
Texas has the most rigs
Black line is **actual** employment in **mining** (SA).

Loss of $\approx 30k$ mining jobs since Dec ’14.
Rigcounts have dropped \(\approx 1,100\) since Nov ’14

Implies LR job losses of \(\approx 350k\)

Likely an over-estimate (no migration)
Meaning for USA

- Black line is employment in O&G (SA).
- Loss of ≈ 60k O&G jobs since Dec ’14
Rig-counts have more impact Jan 2008+

- LRM increases from 198 (pre-2008) to 363 (post)
- Due to conventional vs unconventional?
Well count data

- Drillinginfo raw data
- Use spud-date (coincident with rigs)
- Raw data and DI index after May 2014
- More work required constructing wellcount
What we drill changes around 2008

Wellcounts (Drillinginfo)

- Vertical or Directional
- Horizontal

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Rigs are taking longer to drill

![Graph showing rig months per well (EIA vs DI wellcount data)](Image)

- **Drillinginfo**
- **EIA**

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This is driven by horizontal drilling
Same dynamic panel model

- 9 lags of wellcounts

- Basic model
  - Contemporaneous impact ≈ 3.6 jobs/well
  - LRM ≈ 53 jobs/well

- Separate wellcounts by direction:
  - Vertical LRM ≈ 33 jobs/well
  - Horizontal LRM ≈ 383 jobs/well (≈ rigcount LRM)
  - Strongly reject same coefficients or LRM
Cumulative job creation from wellcounts

![Graph showing cumulative job creation from wellcounts for horizontal and vertical or directional wells over 24 months after well-count increase.](image-url)
What’s going on?

- Horizontal wells require more investment
  - More rig-months per well
  - Larger cost/well
  - May not have existing midstream infrastructure

- Unconventional may also produce more

- Preliminary dataset leaves out some states
Conclusions

- More employment pain likely for medium term
- Rigcount decrease $\implies$ 350k jobs lost
  - O&G sector about 0.5 M
  - Total employment is 142 M

- Open questions
  - Why are wellcount multipliers so different?
  - Asymmetry in job-creation vs destruction?