

Oil Prices and State Unemployment

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Executive summary

For the past decades, the U.S. economy has been highly sensitive to unexpected oil price increases. The recent development in shale oil production reduced the dependence of the U.S. economy on imported crude oil but also created challenges for shale oil producing states, which became more vulnerable to reductions in oil prices.

In this paper, we study the effect of oil price shocks on state-level unemployment. First, we evaluate whether a linear model is suitable to analyze the effect of structural shocks in the crude oil market on state unemployment. We follow Kilian and Vigfusson (2011a) and use a nonlinear structural equation model that nests symmetric and asymmetric responses to oil price shocks. Then we compute impulse response functions by Monte Carlo integration and conduct a formal test on the impulse responses to evaluate whether the responses of state-level unemployment to positive and negative oil price shocks are symmetric. We find no evidence against the null of symmetry after accounting for the data mining problem that arises from repeating the test for different horizons and different states.

We then use a linear structural near-VAR model that disentangles supply shocks, aggregate demand shocks and oil-specific demand shocks in the crude oil market. We find that an adverse supply shock triggers an increase in unemployment for almost all states except for oil producing states such as Texas, Colorado and Wyoming where the responses are largely muted and insignificant. The biggest losers from an adverse supply shock are Ohio, Mississippi and West Virginia. A positive aggregate demand shock leads to a reduction in unemployment for both oil importing and oil exporting states. We find that the biggest winners from a positive aggregate demand shock are Illinois, North Carolina and Utah. Our results reveal that an oil-specific demand shock has little effect on unemployment across states. Yet, one notable exception is Delaware, which suffers from an important increase in unemployment following a positive oil-specific demand shock.

Finally, we dig into the contribution of each shock (oil supply shock, aggregate demand shock, oil specific demand shock, and unemployment shock) to the changes in state unemployment for three periods: the first period represents the start of shale oil boom until the end of the sample, the second period consists of beginning of the shale boom but without the recent oil price declines, the third period comprises the recent oil price decline period. We find

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that during the first and second period, aggregate demand shocks contributed the most into the changes in national and state-level unemployment rates. Interestingly, during those periods, aggregate demand shocks had a larger effect on unemployment than the unemployment shock. In the third period, we find that oil-specific demand shocks contributed almost as much as aggregate demand shocks to the cumulative changes in state-level unemployment rates. However, compared to all other shocks, unemployment shocks have contributed the most to the changes in state unemployment rates during that period.

Keywords: oil supply shocks, oil demand shocks, state unemployment.