Drought and Oil Production: The Effect of Drought on Non-Conventional Oil Production

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BACKGROUND

Beginning in 2010, high global oil prices and technological innovation in hydraulic fracturing dramatically increased Texas oil production. Massive water flows were required to support this boom in hydraulic fracturing. In the summer of 2011, water became scarce in Texas as a prolonged heat wave and subsequent severe drought spread across the state. Commercial, agricultural, and residential water users in drought regions faced extraordinarily low surface water levels in 2011, and oil producers faced increased competition for groundwater. These oil producers needed to purchase either higher priced ground water or water through expensive inter-basin transfers, which raised the marginal cost of oil production. Our initial research shows that producers responded to this exogenous increase in input price by decreasing water use in wells drilled in drought areas. We estimate the effect of decreased water use in hydraulically fractured wells over the lifetime of the well's production. Initial results suggest a moderate decrease in lifetime productivity for wells drilled in drought regions. Finally, we estimate the value of production and tax revenue lost due to drought to determine whether state regulators should prohibit all hydraulic fracturing during periods of drought.

OBJECTIVES

- Determine the effect that drought has on the costs of drilling hydraulic fracturing wells, the type and characteristics of wells drilled, and driller behavior
- Determine the effect on well production over the lifetime of the hydraulically fractured wells that are drilled during drought in comparison with those drilled during non-drought periods
- Determine the average foregone well production from wells that are drilled during drought and determine the subsequent increase in energy prices and lost tax revenue to the state

FINDINGS AND BENEFITS

Initial results suggest that oil producers respond to drought conditions by moderately decreasing water use. Lifetime well productivity is somewhat lower for wells drilled during a drought. These results suggest a welfare loss resulting from wells drilled during droughts. These wells do not produce all recoverable oil in place, reducing tax payments to the state.