

The Relationship Between Oil Price and Costs in the Oil Industry

Executive Summary

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The economic profession is still struggling to fully understand the crude oil price and the shocks driving it. The goal of this paper is to contribute to our understanding of the relationship between drilling costs, drilling activity and the real price of oil.

We use data from Wood MacKenzie on global drilling activity and costs of drilling to construct two quarterly time series capturing (i) the total number of exploration wells drilled in the oil industry and (ii) the average cost of drilling these wells. We use the constructed time series in combination with the real price of oil to estimate a three-dimensional structural VAR model. We use short run restrictions to decompose the variation in the data into three structural shocks. We also estimate the dynamic effects of these shocks on drilling activity, costs of drilling and the real price of oil and present the historical decomposition of the variables in the system.

We have three main results. Our first result is that a one-off 10% increase (decrease) in the price of oil (*oil price shock*) increases (decreases) global exploration activity by 4% within a year, which in turn leads to an increase (decrease) in cost of 3%, but with a time lag of 1-2 years. The logic behind this result is relatively straightforward. An increase in oil prices will boost cash flows and raise the expected rate of return on marginal projects for the industry. This initially increases drilling activity and eventually increases cost of drilling due to an upward sloping supply curve in the upstream sector.

An unanticipated increase in exploration activity (*activity shock*) does not seem to have a statistically significant effect on cost. On the other hand, as new oil supplies become available, oil price is negatively affected, reaching a new lower level within 1 year.

Finally, an increase in drilling costs (*cost shock*) does not seem to have a significant and long lasting effect on neither the oil price nor the drilling activity. However, the historical decomposition of the oil price reveals that an accumulation of small negative shocks on drilling costs in the end of the 1990s had a small but long lasting effect on the price of oil.

From the perspective of the private sector linking cost estimates to oil prices could improve planning and forecasting of long-term project economics in the oil and gas industry. It would produce more realistic estimates of project economics in particular for projects where capital spending is distributed relatively evenly across long project lifetimes, i.e. where costs are not entirely locked in at the beginning of a project's life cycle.

Our results should further help to contribute to the literature on the determinants of the price of oil. One of the more persistent hypotheses often heard in times of rising prices: That oil prices cannot fall because costs are too high. Our results clearly demonstrate that such statements are a fallacy. Meanwhile, oil price tend to be durably affected by shocks in global exploration activity.