

OPEC's Impact on Oil Price Volatility: The Role of Spare Capacity

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Executive summary

Although oil market analysts frequently mention the influence of spare production capacity, as yet there has been no quantitative economic investigation of its size or impact. Our study fills this gap by assessing how effective has been OPEC's stated policy of maintaining a buffer capacity to stabilize the price of oil.

We build and estimate a model where OPEC's ability to dampen price volatility is limited by its inability to precisely estimate the size of shocks to oil demand and supply, as well as potential execution errors and constraints when implementing production decisions. Price stabilization is only possible if the magnitude of such errors is small relative to the size and persistence of shocks to the market. Using monthly data ranging from September 2001 to October 2014, we find that OPEC has the ability (at least in theory) to stabilize the price of oil. The same conclusion holds when we only consider Saudi Arabia, or the OPEC subgroup formed by its four GCC members ("OPEC Core").

An assessment of the actual impact of OPEC's use of spare capacity corroborates this conclusion. We evaluate the monthly prices that would have been obtained if OPEC had not used its spare capacity to offset shocks. As a result, depending on one's particular beliefs regarding the short-run elasticity of global demand, OPEC's impact may be viewed as large or small—but in all cases our analysis indicates that OPEC has at least partially offset shocks and stabilized the oil price during the past fifteen years. Under plausible assumptions regarding the elasticity of demand, OPEC's stabilizing influence appears to have been very substantial, perhaps reducing oil price volatility by as much as half.

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Our analysis also suggests that Saudi Arabia has acted as a supplier of last resort and absorbed more shocks than the other OPEC members.

To the degree that OPEC wants to ensure the reliability of the global oil supply, the size of its buffer may at least indirectly be driven by the magnitude of global GDP losses caused by supply disruptions. From this perspective, we inquire whether the estimated size of OPEC's buffer (1.94 mmb/d for Saudi Arabia, 2.27 mmb/d for OPEC Core, and 2.64 mmb/d for OPEC) is large enough—or too large? To address this question, we first show that the value (to OPEC) of holding incremental spare capacity depends on:

- the parameters estimated from our model: existing size of the buffer, magnitude and persistence of shocks, and OPEC's estimation error; and
- the losses that OPEC presumably incurs when the buffer is not sufficient to avoid production shortfalls; these losses reflect OPEC's displeasure or disutility due to the inability to pursue its optimum course.

By assuming that OPEC has behaved rationally – i.e., optimized the size of its buffer by equating marginal value and marginal cost – we are able to infer the implicit magnitude of losses that rationalizes OPEC's investment in spare capacity. After comparing this result to an independent estimate of global economic losses due to oil supply disruptions (derived from a well-known world macroeconomic model), we find that the estimated size of OPEC's buffer has been in line with global macroeconomic needs.

For instance, if monthly global demand is assumed to be relatively elastic in the short term (-5%), the losses that rationalize OPEC Core's buffer comprise some 40% of the estimated economic losses that potential supply disruptions would impose on the global economy. This does not imply that the buffer is too small, only that the OPEC Core may for whatever reason be motivated to address only a portion of the damage caused by oil shocks. The OPEC Core is but one piece of a much larger picture when it comes to neutralizing the impact of oil shocks. We are unable to say whether it is reasonable to believe that 60% of the burden of dealing with oil price shocks should be left to individual consumers, producers, government agencies, and multilateral organizations.

Our study has focused on the past. We do not overlook the strategic change within OPEC in late 2014 to rebalance the market, but that episode followed the end of our sample period. In

any event, OPEC appears to have resumed its role in helping to stabilize the market, albeit at a lower price.