THE OXFORD INSTITUTE FOR ENERGY STUDIES
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UNIVERSITY OF OXFORD

OPEC at 60: The World With and Without OPEC

Technical Workshop on OPEC at 60: Contributions to the Global Economy and Energy Markets

Executive Summary

This presentation provides an historical perspective from 1990 to 2018 of the functioning of the world oil market with and without OPEC. Analysis builds on a new methodology simulating counterfactual (i.e. *what-if*) outcomes in the rich context of state-of-the-art structural VAR models of the world oil market to empirically assess OPEC's contribution to oil markets and the global economy by quantifying the impact of OPEC's balancing role via its spare capacity cushion on the historical evolution of oil supply and demand, oil prices, volatility, the joint evolution of the supply and demand elasticities, global stocks and global welfare. A *counterfactual scenario* is constructed of how global oil production would have evolved if OPEC had been producing at maximum capacity, held no spare capacity and had held no balancing role since 1990. The analysis also employs a general equilibrium approach to determine the global welfare implications of a world without OPEC spare capacity across oil-exporting and oil-importing regions. The welfare effects are calculated based on regional GDP gains and losses following changes in oil production patterns globally. The methodology to determine the impact on GDP is based on a computable general equilibrium (CGE) framework which offers a high level of detail regarding the world economy in terms of economic sectors and regional interdependencies.

The overarching aim is to assess the historical benefits and costs of OPEC for global oil market stability and the presentation makes the following key observations:

- In a world without OPEC, global oil production would have been higher by 2.5 mb/d compared to the actual output level between 1990 and 2018, with most of the difference attributed to Saudi Arabia. But the difference between actual and counterfactual production levels is not uniform across the entire period, with the two converging during periods in which OPEC was producing close to maximum capacity to meet rising oil demand (e.g. 2006–2008). Similar observations occur during periods in which OPEC producers switched to market share strategy, such as in 2015–2016. That said, the growth of global oil production from 1990 to 2018 would have been 1.5 mb/d lower compared to the actual observed and the volatility of global oil production would have averaged less than 0.8 per cent, compared to the actual 1 per cent, due to the absence of OPEC's output adjustments in response to oil supply and demand shocks hitting the market.
- Despite the decline in global oil production volatility however, oil supply shocks in the counterfactual scenario associated with geopolitical events in oil-producing countries and other shocks to crude oil production would have been significantly larger and more persistent. The reason is that without spare capacity there is little room for oil producers not affected by the geopolitical episode to increase production and offset the supply shortfall within a short period of time, nor is there much flexibility to bring new productive capacity on stream due to the lead times and long gestation periods associated with new production despite higher prices.

- Historical evidence shows that OPEC's spare capacity has had a smoothing effect on global oil price movements, with prices under the counterfactual scenario exhibiting much sharper cycles both on the upside and the downside. For instance, in a world without OPEC spare capacity, the price would have risen by $110/b, from $51.6/b in 2010 to $161.7/b in 2012, compared to $30.7/b in the actual world. In 2012, the Brent price would have been $39/b higher than the actual observed. On the other hand, in weak markets where OPEC had to cut output to balance the market, the oil price would have persisted lower-for-longer. For instance, following the 2008–2009 oil price collapse, in the absence of OPEC cuts prices would have remained in the $50-60/b range until early-2011, compared to the actual swift price recovery above $80/b by the second half of 2009.
- Prices in a world without OPEC's spare capacity would have been more volatile, relative to the actual observed. On a yearly basis, the volatility under the counterfactual scenario would have been higher by 15.5 per cent. This result is expected, as in the absence of a buffer any shock, no matter how small, will induce higher price volatility.
- In a world where OPEC is producing at maximum capacity, oil supply and demand would have become even less elastic, with the average elasticity estimates halved compared to the actual. On average, over the entire period the counterfactual short-run price elasticity of oil supply closes to 0.06 from the actual 0.1. This is expected as with no spare capacity the oil market loses its ability to buffer abrupt supply disruptions. Interestingly, oil demand elasticity also declines in the counterfactual scenario to -0.8 on average, compared to the actual -1.3. Oil demand essentially becomes less price sensitive because oil consumers anticipate that in the case of a major supply shock, a shortfall in production cannot be replaced by other producers, leading to an even higher share of precautionary demand in total oil demand. A direct implication of the joint steepening of the oil supply and demand curves is that even small amounts of excess demand or excess supply require large changes in oil prices to clear the market. As a result, oil price shocks would have been twice as large as the actual observed.
- In a world in which OPEC produces at maximum capacity, oil supply would have been consistently higher than demand and stocks would have persistently built and therefore global stocks would have been at a much higher level. Two important issues arise. First, is the issue of the cost of holding more inventories above-ground which is more expensive than holding inventories below-ground, and who bears the cost of storage, with a big part of the cost likely shifting to final consumers and importing countries. In the absence of spare capacity and in times of heightened uncertainty and political instability, fears of actual disruptions deeply affect stockholding behaviour and the desired inventory levels have to increase both for precautionary reasons, but also because of expectation of future price increases. Second, while spare capacity may be utilised to stabilize prices in the short- and medium-run, higher stocks may have had fewer stabilising effects because stock withdraws would have been very rigid during historical episodes.
- In the counterfactual scenario, OPEC market share would have been 2.1 per cent higher relative to the actual observed. Saudi Arabia would have experienced a slightly higher gain in market share relative to other OPEC oil producers by 2.6 per cent, mainly due to its large low-cost oil reserve base and the lack of geopolitical episodes affecting its crude oil production.
- Shifts in OPEC oil output policy and abandonment of its balancing role have global welfare implications. On the one hand, increases in OPEC's output under normal market conditions leads to an increase in world GDP. The gains in world GDP associated with a 25 per cent oil price decrease are $50 billion, $75 billion and USD $150 billion in 2004, 2007 and 2011 respectively. However, in the absence of spare capacity, supply shortfalls from elsewhere lead to increasing negative impacts on world GDP across time. In absolute terms, for a 27 per cent price increase induced by a negative supply shock, the cost of the supply shortfalls in the absence of spare capacity on world GDP increases from $60 billion in 2004, to $80 billion in 2007 and $185 billion in 2011. The cost of lack of spare capacity grows significantly after 2012 with the net global welfare loss values in the order of $250-450 billion, and by 2017 this is estimated at $360 billion. This observation underscores the growing welfare importance of spare capacity over time to smooth out unexpected and abrupt oil shocks.