

Cooperate or Compete? Insights from Simulating a Global Oil Market with No Residual Supplier

Bertrand Rioux,^{a*} Abdullah Al Jarboua,^a Fatih Karanfil,^a Axel Pierru,^a Shahd Al Rashed^a
and Colin Ward^a

Structural changes in the global oil market are disrupting conventional market dynamics and the roles played by competing and cooperating producers. Industry players are adjusting to the tight oil revolution and the possibility of a plateauing or peaking global oil demand. In particular, OPEC and Saudi Arabia, its top producer, are reshaping the organization's role as the primary residual supplier to the world oil market and have invited other major exporters to contribute to stabilizing prices under the Declaration of cooperation.

Given these changes, what if OPEC decided to cease organizing residual production collectively? In this paper, we develop an economic equilibrium model that uses detailed oil supply activities calibrated using Rystad Energy's Ucube upstream oil and gas database. We design scenarios to assess the medium-term consequences (i.e. up to 2030) of a shift in the structure of the world oil market. This includes competitive scenarios that assume all oil producers behave as price takers (i.e. no residual supplier). We contrast the competitive scenarios with a reference scenario in which the actions of a residual supplier result in a market outcome aligned with WEO's projections. We examine two cases within the reference scenario: in the first, OPEC members collectively operate as a residual supplier; in the second, Saudi Arabia acts as the only residual supplier, and other OPEC members join the competitive fringe. Using a demand curve calibrated to WEO's projections, we simulate competitive scenarios under different constraints capping investments, given that the amount of capital available globally for investment in the upstream oil sector can be influenced by global megatrends (such as shifts in funds allocation due to environmental concerns).

The results from our competitive market scenarios indicate that between 2020 and 2025 prices would decline on average by up to U.S. \$11/b (14 percent) relative to prices in our reference scenario. Prices subsequently recover to the reference residual supplier scenario levels. Prices under our competitive market scenarios have a high sensitivity to growth in tight oil production. Depending on upstream investment trends, we find significant variability in the mid-term price response.

When all countries behave competitively, we find that a reduction in the global investment cap results in an increase in the cash flows of low-cost producers. The cap implicitly raises the investment costs for all projects by imposing a scarcity premium on investment, but low-cost producers remain profitable. This for instance means that Saudi Arabia would benefit from a decrease in the financial resources available for the global upstream oil sector.

We also study the economics of the residual supplier and investigate whether serving as a residual supplier can increase Saudi Arabia's oil revenues relative to purely competitive market behavior (at least in the context of our reference scenario). We estimate Saudi Arabia's free cash flows, defined as net revenues less capital expenditures, under the competitive and residual supplier scenarios. We find that when acting as a residual supplier without support from OPEC, Saudi Arabia's profits are lower than in the competitive scenarios. The fundamental reason behind this finding is that Saudi Arabia's market share is relatively small, and the price elasticity of global demand is too high.

^a King Abdullah Petroleum Studies and Research Center (KAPSARC).

* Corresponding author. E-mail: bertrand.rioux@kapsarc.org.