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Rethinking Significance of Shale Revolution

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International energy markets have plunged into a serious instability as the new coronavirus outbreak has developed into a pandemic to unleash giant global economy risks that are feared to exceed those following the Lehman Brothers failure. As the flows of "people" and "goods" are stalled, stagnating "money" flows, generating anxiety and causing an economic spiral, prices in oil and other major energy commodity markets are crashing on falling demand.

Even in the situation, a joint oil production cut initiative between the Organization of the Petroleum Exporting Countries and non-OPEC oil-producing countries such as Russia has broken up, vanishing oil-producing countries' cooperation expected to support oil prices. Instead, major oil-producing countries like Saudi Arabia and Russia are racing to increase oil production in a price war. Crude oil prices have crashed as the production race has coincided with an oil demand fall and a loosening supply-demand balance triggered by the new coronavirus pandemic. The key West Texas Intermediate crude oil futures contract remained above $50 per barrel until February 24, declined below $40/bbl on March 9, slipped below $30/bbl on March 16 and sank to $20.37/bbl on March 18, coming to the brink of dropping below $20/bbl. As no optimism can be warranted for future developments, the possibility of the price's dip below $20/bbl cannot be denied.

In this situation, attention naturally focuses on the two major factors behind the market destabilization and price crash -- the loosening supply-demand balance amid the new coronavirus pandemic and oil-producing countries' race to increase production. When looking at the whole picture of the oil market, however, we find the significance of U.S. shale oil production or the U.S. shale revolution. Although the new coronavirus pandemic has decisively contributed to the loosening supply-demand balance, the oil market had been in oversupply even before the pandemic's influence emerged. All market participants recognize that the biggest factor behind oversupply has been the continuous expansion of U.S. shale oil production.

Russia's refusal to enhance the OPEC-plus joint production cuts, though triggering the collapse of the initiative, represented its reluctance to benefit U.S. shale oil producers. The subsequent production race among Saudi Arabia and some other oil-producing countries is designed to cap U.S. shale oil production expansion even at the cost of oil price drops affecting their economies. They also eye reconstruction of the joint production cut initiative. In this way, we have no choice but to recognize great changes through the U.S. shale revolution as a key indirect background factor behind the current oil market volatility. In rethinking the significance of the revolution, I would like to consider some assumptions and hypotheses using past data in the following.

U.S. oil production once peaked at 11.3 million barrels per day in 1970 and followed a long downtrend until the first half of the 2000s. During the downtrend, production temporarily increased until the mid-1980s as production started at Alaska's Prudhoe Bay oil field in the late 1970s. After the temporary rebound, U.S. production continued to decline and totaled 6.99 million bpd in 2006, down

some 40% from the peak in 1970. According to data from the International Energy Agency, U.S. oil consumption in the year stood at 21.05 million bpd and net U.S. oil imports at 14.06 million bpd, indicating that the United States depended on imports for 66% of its oil supply. Then, a mainstream view was that U.S. oil production would continue decreasing over a long time. Oil market stakeholders' common wisdom was that the United States' dependence on oil imports would increase inevitably.

However, the shale revolution that started in the mid-2000s reversed the then "common wisdom". U.S. oil production bottomed in 2006 and turned up, hitting a record high of 17.21 million bpd in 2019. The increase of 10.22 million bpd from 2006 is equivalent to Saudi Arabia's recent production level. The production expansion led net U.S. oil imports in 2019 to fall to 3.26 million bpd, with the rate of dependence on oil imports falling to 16%. Shale oil production expansion has taken the United States one step closer to oil self-sufficiency. U.S. energy policy priority has transitioned to the utilization of "abundance" from responses to "shortage".

While there are no "ifs" in history, I would like to consider what would have happened if U.S. oil production continued a downtrend without the shale revolution. If U.S. oil production declined at an annual rate of 2% in a manner to extend the past downtrend, production in 2019 would have fallen to 5.38 million bpd. Given U.S. oil consumption totaling 20.47 million bpd in the year, net U.S. oil imports would have been 15.09 million bpd, with the rate of dependence on oil imports at 74%. The United States would have been the world's largest oil importer with net oil imports being 1.5 times as much as Chinese imports. If so, top U.S. energy policy priority would have been given to energy security as well as responses to the rising dependence on imports. The above is only a hypothetical calculation, but illustrates the enormous impact of the shale revolution.

If U.S. oil production in 2019 were not the actual result of 17.21 million bpd but the calculated 5.38 million bpd in a long downtrend without the shale revolution, the production gap would have been covered by a production increase in other oil-producing countries to achieve a global supply-demand equilibrium. In 2006 when U.S. oil production bottomed, OPEC production (including natural gas liquids) totaled 34.73 million bpd, with the world depending on OPEC for 41% of oil supply. In 2019, however, the rate of the world's dependence on OPEC oil declined to 35%, with OPEC production rising only slightly from 2006 to 35.51 million bpd. If OPEC covered the abovementioned U.S. production gap (between the actual result and the estimate for the long downtrend case without the shale revolution), OPEC production in 2019 would have totaled 47.34 million bpd, up 11.83 million bpd from the actual result, with the rate of the world's dependence on OPEC oil reaching 47%.

Without the shale revolution, the United States would have remained plagued with energy security anxiety as a giant oil importer with a high rate of dependence on oil imports and OPEC would have been required to produce 10 million bpd more than the actual result, with the world depending heavily on OPEC. Actually, however, the result was the opposite. U.S. energy policy priority has transitioned to the utilization of "abundance". The oil supply-demand balance has loosened substantially. OPEC has been required to enhance production cuts instead of expanding production. Furthermore, the collapse of the OPEC-plus joint production cut initiative has led to a price war. The sharp U.S. production expansion through the shale revolution that had not been foreseen, the subsequent import decline (and the export increase) and growing global oversupply have been seen not only for oil but also for natural gas and LNG, indicating how giant the impact of the shale revolution has been.

The current crude oil price crash will undoubtedly exert a negative impact on U.S. shale oil production. Until recently, U.S. oil production in 2020 had been expected to increase by about 1 million bpd from the previous year. If the WTI price slips below $20/bbl and remains weak, U.S. shale oil production would be discouraged from increasing. In fact, U.S. oil production in 2016 declined from the previous year in response to the previous oil price crash from the second half of 2014. In addition to global economy risks and oil-producing countries' production race, a future U.S. shale oil production trend would exert great influence on the international oil market. Over a longer term, when U.S. shale oil production would peak or whether it would not peak would greatly influence the market supply-demand balance, major players' power balance and each country's energy security stance. If U.S. oil production peaks sometime, it would be a turning point. The shale revolution will remain an important matter of concern to the world.

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