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OIL AND GAS PRICE VOLATILITY WORKSHOP

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WORKSHOP: THE VOLATILITY OF OIL AND NATURAL GAS MARKETS

Dramatic changes throughout global oil and natural gas markets, especially the boom in US production from the exploitation of shale deposits, have raised questions about the potential for an increase in market volatility in the future. To discuss the possibility of higher volatility and the implications for producers and consumers, the Center on Global Energy Policy at Columbia University convened a high-level workshop in December 2016 under the Chatham House Rule. This note summarizes key elements of that discussion.

OIL PRICE VOLATILITY: US SHALE HAS RESHAPED THE OIL MARKET, BUT BOOM-BUST CYCLES ARE PROBABLY HERE TO STAY

The workshop began with a discussion of OPEC's decision to reduce oil output in November 2016 in an attempt to speed up the rebalancing of the oil market. Participants noted that while there had been a great deal written about how the decision marked an apparent change of direction of the producer group's policies over the previous two years, it did not mark a return to the oil market dynamics that had characterized much of the past four decades. The forces at work in the new oil market, especially due to the emergence of shale oil production in the United States, had changed the nature of oil trade fundamentally. Indeed, some participants suggested that OPEC's most recent intervention could be interpreted as a sign of weakness rather than a reassertion of its market power. What we have been witnessing, according to this interpretation, is a deep and painful oil price bust finally pushing the increasingly desperate producer group into action.

In addition, there was widespread skepticism among attendees about OPEC's ability to execute the production reductions agreed to in November 2016, especially given the organization's long history of poor compliance with agreed cuts. Some participants noted that many OPEC producers face immense budgetary pressures and thus can hardly afford to curb supplies to the market, while non-OPEC producers, such as Mexico and Russia, appear to be presenting natural oil declines as deliberate production curtailments. It is worth noting that some non-OPEC producers, such as Norway, have been able to increase production despite the low oil price environment, thus putting additional pressure on OPEC. Participants generally recognized that most of the actual cuts will likely fall on top OPEC oil exporter Saudi Arabia, where preparations for actual production reductions were already well underway.

Discussants also debated the changes in the market brought about by US shale oil. Even though US shale oil has fundamentally disrupted the global oil market and introduced substantial volumes of short-cycle production into the supply mix, US shale has not become a true swing supplier as some analysts had expected. Indeed, several factors seem to indicate the global oil market lacks an effective market balancer that can promptly respond to both oversupply and undersupply situations. US shale lacks the needed level of flexibility as well as a coordinated production strategy, and OPEC is lacking enough spare capacity.

Participants noted that the oil price boom and bust cycles are most likely here to stay, and increased volatility is a distinct possibility in the foreseeable future. But volatility may not matter as much as the actual price level for US consumers (and the economy as a whole), while producers—and their investment decisions—may be more sensitive to volatility expectations than to the actual level of volatility in the oil price.

The session also identified oil demand dynamics and the role of storage in mitigating volatility as promising areas for future research.

During past cycles, oil price volatility has been driven by the inelasticity of both supply and demand. The impact of US shale on the responsiveness of supply is well researched and increasingly well understood. But a less well-understood aspect of volatility is how demand elasticity may have changed as demand growth shifted from developed to developing countries over the past decade. The removal of subsidies and gradual energy price liberalization in key emerging economies further complicates the flexibility of demand, which will be an important determinant of future oil price volatility.
Given the constraints facing OPEC and shale oil, participants said global storage capacity is emerging as the primary balancing factor in the global oil market. Understanding storage dynamics and capacity will also be crucial to understanding future price volatility. Transparency around storage is better than transparency around OPEC. But storage is much more dispersed around the world than production capacity, so even with better visibility, only about two-thirds of global storage capacity can be accurately assessed at the moment.

OUTLOOK FOR NATURAL GAS PRICE VOLATILITY: NO CONSENSUS AROUND THE VOLATILITY IMPLICATIONS OF GREATER AMERICAN NATURAL GAS TRADE

Participants also debated how the increase in US natural gas exports and the nation's growing interconnectedness with the global natural gas market could impact gas volatility. Two sets of arguments were presented, one suggesting that—all else being equal—greater American natural gas trade will reduce volatility, while the other anticipated higher volatility as a result of growing US natural gas exports to Mexico and the rest of the world.

The first argument is rooted in microeconomic theory, which indicates that the ability to trade more natural gas enhances the flexibility of supply in the domestic market and helps supply and demand adjust more smoothly, much the same way as seasonal gas storage does. According to this argument, greater trade should help mitigate excessive price swings and thus reduce—rather than increase—domestic gas price volatility in the United States. The flexibility embedded in US

LNG contracts supports this dynamic. Falling domestic gas prices in America will incentivize greater natural gas exports, which in turn has an upward effect on domestic prices. As a result, the price decline is less steep than it otherwise would be without the opportunity for exports. If gas prices rise in the United States, then exporters can sell American gas back into the domestic market, thereby mitigating the extent of the price increase. The relatively high price elasticity of gas demand also acts against volatility. In most of its applications, other fuels can substitute for natural gas. Consumption, therefore, can adjust up or down relatively easily in response to sharp natural gas price swings. Several participants noted that counterseasonal demand in the wider Atlantic basin, particularly in Latin America, can reduce the chances of price volatility in the United States.

Most of the recent market developments, on the other hand, seem to indicate greater gas price volatility ahead as the United States integrates more deeply into the global natural gas market and also consumes growing volumes of natural gas at home. A gradual move toward spot LNG trade and the globalization of gas market fundamentals mean that demand shocks in any part of the world (such as the recent nuclear outages in France) can more directly feed back into US domestic natural gas prices, which in turn could lead to higher price volatility in America. Gas consumption is also increasingly tied to intermittent renewable generation in the power sector, which naturally results in more uncertain demand and higher short-term volatility in gas prices. One participant argued that natural gas demand is often fairly lumpy (e.g., whether an electricity plant or industrial process operates or not), adding to chances of increased volatility. The possibility of LNG capacity shut-ins—both for economic reasons and due to extreme weather events, such as hurricanes—can further reinforce short-term price volatility in the domestic gas market, although some participants did not anticipate shut-ins to occur purely on economic grounds. US pipeline gas exports to Mexico may emerge as the greatest driver of US gas price volatility in the future, though that will largely be determined by actual export volumes, potential bottlenecks along the supply chain, and the nature of downstream gas demand on the Mexican side of the border. Political uncertainties around potential energy trade restrictions with Mexico add further unpredictability into the mix. Estimates of future pipeline export volumes to Mexico fall between 5 and 15 billion cubic feet per day, which represents an enormous range of uncertainty, with potentially major implications for volatility.

Participants highlighted three market uncertainties that can have an especially large impact on the future level of gas price volatility related to US natural gas trade. First, Mexico's domestic gas production outlook will determine how much gas will flow from the United States via pipeline. Participants generally agreed that Mexican production declines will likely continue in the medium term. Therefore a continuing ramp-up in US-Mexico gas trade volumes is the most likely scenario. Second, the break-even economics of Russian gas will determine to what extent Russia can compete with American LNG in the European market. Estimates of Russia's short-run marginal cost range between $2.5 per MMBtu (as reported by Gazprom) and $4 per MMBtu, which is too wide a range to provide a clear answer. Third, productivity improvements in US shale gas production will determine how competitive US gas can be in overseas markets. Participants generally agreed that shale gas productivity has room for further improvement, and the overseas competitiveness of US LNG can improve substantially in the future. It is a remarkable development of the last few quarters that large parts of the Eagle Ford and Haynesville play now can produce gas at a Henry Hub break-even price of $2.5 per MMBtu. As infrastructural bottlenecks continue to exist in parts of the United States, a geographically more diversified supply base may also have implications for future price volatility.

When it comes to gas price volatility in the United States, a very complex picture emerges with no easy or uniform answers. The lack of consensus around the volatility impacts of greater American natural gas exports suggests that this may be a promising area for future research.

ECONOMIC IMPLICATIONS OF ENERGY PRICE VOLATILITY: LIMITED OPTIONS AT THE FEDERAL AND HOUSEHOLD LEVELS

Participants noted that the latest oil price collapse had significant economic impact in small producing states, though the economy of Texas has proven more resilient in the latest oil price downturn than during past episodes.

The macroeconomic impact at the national level—as reflected in both GDP and unemployment numbers—has been rather modest. The stimulus to consumers from lower oil prices was largely offset by a significant drop in energy-related investments, while the negative trade impact of lower domestic production was more than offset by continuing growth in refined product exports.

Severe oil price fluctuations may have significant distributional impacts within the main oil producing states, but these effects are much less pronounced in other states and at the aggregate level of the US economy. It is debatable how big a role federal policy could (or should) play in mitigating the negative economic impacts in the more vulnerable oil producing states, and most participants seemed skeptical of federal interference to mitigate volatility. These uniquely state-level challenges might be best solved at the state and local levels.

Hedging could provide a market-based alternative for consumers to mitigate the most harmful effects of unexpected oil price spikes, but it is not really a feasible option at the household level. Individuals and households are often unable (or unwilling) to bear the cost of hedging, which can be substantial, particularly on longer-term horizons. It is not immediately obvious who would take the other side of the trade in many cases. Physical hedges also need to be backed up by physical storage capacity. Cushioning against price spikes over the longer term would be too costly for anyone, let alone for households, because traders require proper compensation for building and maintaining the vast storage capacities that would be needed to offer hedges to a large number of individual consumers.

POLICY IMPLICATIONS OF ENERGY PRICE VOLATILITY: LIMITED ABILITY TO MANAGE AND LIMITED CAPACITY TO CUSHION AGAINST OIL PRICE VOLATILITY

Consumers in the United States care deeply about fuel prices, which represents a meaningful portion of household expenditures. The setup of the refueling infrastructure (with prices displayed at every gas station and individuals having to pay separately for refills) further reinforces the psychological importance of the fuel price for Americans. As a result, the price of gasoline is a highly politicized issue in the United States, and doing nothing is often not an option for policymakers in the event of sudden price increases.

Some participants remained skeptical that there is a market failure associated with fuel price swings that the government should address in the first place. And even if there is a role for government in theory, the federal government most likely lacks the capacity to effectively control oil price volatility as a market manager.

But when the federal government inevitably tries to intervene, the first imperative should be to avoid the most harmful impulsive responses, such as restricting energy exports, imposing import tariffs, introducing domestic price controls, or trying to use the SPR for market management in times of sharp price increases. Blaming OPEC, speculators, or oil companies for price swings is equally counterproductive, although such naming and shaming typically remains a mere rhetorical exercise with little actual market impact.

The US Strategic Petroleum Reserve (SPR) remains an important political reserve to cushion against genuine supply emergencies. But several participants noted that the SPR is highly ineffective as a market management tool to protect American consumers from excessive gasoline price moves, and it never was the purpose of the SPR to do so. The size of the SPR is simply too small to meaningfully impact global oil supply balances, oil prices, or even price expectations. Negotiating a coordinated release with IEA partners is fraught with political difficulties. Ill-timed interventions can displace private storage rather than relieve supply shortages, and the federal government has to act on insufficient data in most cases, as the required secrecy precludes in-depth market surveys prior to an intervention. Automatic SPR-based price stabilization is even more problematic, as the government is in no position to know what the optimal price target should be, and data quality is insufficient to support automatic trigger mechanisms.

In the longer term, oil producing states would be well-advised to establish (or use existing) rainy-day funds or trust funds to cushion against the adverse economic impacts of oil price swings, according to some attendees. Diversifying the tax base (e.g., by relying less on severance taxes alone) and state economies (e.g., by incentivizing college graduates to stay in the state) can also help make oil producing states more resilient in the face of volatile oil prices. Norway and GCC countries can offer valuable lessons for some of these states on the management of reserve funds, such as spending countercyclically, investing in long-term growth, and relying on noncyclical revenues to fund operating budgets.

However, the implementation of sound fiscal policies and rainy-day funds faces substantial challenges at the state level. The state and local officials who are in charge of implementing such policies are often constrained by a lack of institutional capacity, term limits, and political resistance to preserving tax revenues, among many other things.

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