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OIL SHOCK

DECODING THE CAUSES AND CONSEQUENCES OF THE 2014 OIL PRICE DROP

Jason Bordoff and Akos Losz

THE global energy market is undergoing a historic transformation. Some major consumers of energy are now sharply growing production, with the United States emerging as the world's top petroleum producer, thanks to a dramatic reversal of its oil and gas fortunes through innovations in shale development. And major producers of energy are emerging as some of the fastest growing consumers of energy—especially in the Middle East and Latin America.

Energy has been among the largest drivers of U.S. economic growth and shifting trade patterns, played a key role in global conflicts from Russia and Ukraine to the South China Sea, and continues to be the primary source of global greenhouse gas emissions that portend potentially severe climate change impacts. Among the world's most pressing challenges are to promote

faster economic growth, supply the energy needed to pull a billion more people out of extreme poverty, and promote geopolitical cooperation rather than competition over energy resources—all the while protecting the health of the planet and dramatically lowering greenhouse gas emissions. These are indeed staggering challenges.

As the world confronts these fast-moving dynamics, the global energy market has just experienced one of its largest shocks in recent history: the rapid drop in the price of oil. This has had several significant consequences.

HISTORICAL LESSONS

In June 2014, few people in the oil and gas industry suspected that a collapse in oil prices was looming, as ISIS forces were closing in on Baghdad, threatening another major supply disruption in the volatile Middle East

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An oil refinery in California

Photo: Gulliver Image / Getty Images

region. Indeed, despite many consequential shifts in the oil market—from the Arab Spring to an American energy renaissance—the price of oil had been remarkably stable in the previous three years. This was largely the result of an accidental coincidence, as a historically high level of global supply disruptions from Libya, Iran, Nigeria, and elsewhere—which have at times exceeded more than three million barrels per day since mid-2013—was offset by roughly equal growth in America's oil supply.

Yet the oil market reached an inflection point sometime in the third quarter of 2014. The uneasy balance between geopolitical instability in OPEC and booming production in North America gave way

to growing oversupply in the market. A temporary resumption of Libyan exports from mid-2014 was a major trigger for the oil price slide, but prices continued to fall even after Libyan production tumbled again in the fourth quarter of 2014. The selloff accelerated dramatically in November, when Saudi Arabia refused to cut production at OPEC's semi-annual meeting in Vienna, even though its current output—boosted in part as a response to the original loss of Libyan supply in mid-2011—remained at a high level of nearly 10 million barrels per day. With this policy shift, Saudi Arabia seemingly abandoned its role as the oil market's swing supplier, handing control over the oil price back to the market and letting the price of crude fall freely.

To understand the causes and consequences of the recent oil price drop, it is helpful to review Saudi behavior in the three prior oil price crashes of 1985–1986, 1997–1998, and 2008–2009.

1985–1986

Of the three major oil price crashes of the previous three decades, the 1986 oil price collapse has perhaps the most striking similarities with today's market environment. Both price falls were precipitated by a slowly but steadily building oversupply in the market at a time of weak demand. Non-OPEC supply was booming in the first half of the 1980s, just as it has been in recent years. The North Sea was the most disruptive oil play of the day, where production increased by 1.5 million barrels per day between 1980 and 1985. Other producing regions outside OPEC (including Alaska, Mexico, Brazil, Oman, Egypt, India, China, and Malaysia) added another 3.8 million barrels per day to global oil supply during the same period.

With quota discipline weakening within OPEC, Saudi Arabia increasingly bore the full brunt of market forces and acted as the sole swing supplier in the market. The Saudis slashed production, with output falling to 2.2 million barrels per day by the summer of 1985, from more than 10 million barrels per day in 1981. By this time, the cost of balancing the market far outweighed the benefits for Saudi Arabia, and the country's oil

export revenues dropped by four-fifths between 1981 and 1985. By mid-1985, the Saudis had had enough. They gave up on defending prices, and started focusing on regaining lost market share by using a particularly aggressive pricing strategy: the so-called netback deals that guaranteed a fixed per barrel profit to refiners. Other producers soon followed suit, and oil prices dropped by more than two thirds from \$30 to below \$10 per barrel in the eight months between November 1985 and July 1986.

When the Saudis relinquished control over the oil price in 1985, fellow OPEC members knew that prices were bound to fall, but they expected that the higher cost producers would have to shut down first before the pressure fell on them. They calculated that North Sea production was uneconomical below \$20 per barrel, and did not anticipate that prices would fall much below that level for an extended period. However, the operating costs in the North Sea turned out to be much lower than had been widely anticipated. Many in the market are learning a similar lesson today about the economics of U.S. shale production, much of which has been proven viable at prices well below the roughly \$80 per barrel break-even level estimated prior to the recent price collapse.

After diplomatic pressure exerted on Saudi Arabia from the United States and

others—and the drafting of a carefully-crafted agreement among major OPEC and non-OPEC producers to cut back production—oil prices stabilized in the \$15-18 per barrel range by 1987. But apart from a brief spike during the first Gulf War, oil prices did not return to the 1979–1985 average levels—in the \$28-37 range in nominal terms, and between \$60-104 in real 2013 dollars—again until the 2000s.

1997–1998

Oil prices remained relatively stable in the \$15-20 per barrel range during most of the mid-1990s, but the price of Brent crude started to slide again in 1997, even falling into single-digit territory by the end of 1998. This price collapse was distinctly different from the supply-induced crash of 1986, with demand playing the key role.

Prior to the price crash, oil demand had been robust—fuelled by the so-called East Asian economic miracle of rapid economic growth in the Asian “tigers” and the successful modernization of newly-industrialized Thailand, Indonesia, and Malaysia. Rising demand accommodated increasing supply, with Venezuela, Nigeria, and others in OPEC disregarding quotas and Iraq exporting under the oil-for-food program, allowing it to ramp up production from 0.6 million barrels per day in 1996 to 2.1 million barrels per day by 1998. Countries outside OPEC collectively added another 3.7 million barrels per day to

the global supply mix in the five years between 1993 and 1998.

When OPEC members decided to lift official quotas at their Jakarta meeting in 1997, the decision was made on the assumption of continued strong Asian economic growth, as well as a concern by some producers, notably Saudi Arabia, that some others were producing beyond their quotas and thus taking away market share. They were unaware of the economic crisis that was about to engulf them, and thus seemingly had little concern for potential oversupply or an impending price collapse in the oil market. In reality, OPEC was slated to boost supply just as demand was crashing. By the end of 1997, panic had spread throughout Asia as the collapse of the Thai currency in July 1997 spread to other countries, putting a temporary end to the rapid expansion of global oil demand. In response, the oil price fell by half between October 1997 and December 1998.

In this case, the Saudis, seemingly wary of their experience in 1985–1986, did not unilaterally cut production and risk bearing the full brunt of lost revenue and market share. As oil scholar Robert Mabro wrote in 1998:

The point that Saudi Arabia has been making consistently since 1985 [...] seems to have sunk in. Saudi Arabia's willingness to cut output on its own to

influence the course of oil prices could not be taken for granted.

The oil price recovery after the 1997–1998 crisis was relatively rapid; the price of Brent tripled to \$30 per barrel from February 1999 to June 2000. Venezuela’s president Hugo Chavez quickly reversed course on OPEC quotas, arguing that they needed to be observed by OPEC countries. Faced with plummeting oil revenues, all OPEC countries—and several non-OPEC ones as well—agreed to restraint. As oil supply was curtailed in 1998–1999 by around a million barrels per day—with about 60 percent of that coming from Saudi Arabia—demand also rapidly picked up pace as Asian economies recovered. The combination of supply discipline and a demand surge of 2.5 million barrels per day between 1998 and 2000 set the stage for an unprecedented price boom from the early-2000s, as China joined the group of rapidly industrializing Asian economies.

2008–2009

Following decades of low oil prices and under-investment in productive capacity during the 1980s and 1990s, the emergence of China and a group of other emerging economies from the early 2000s caught the oil market by surprise. China alone added 500,000 barrels

per day to global oil demand each year between 2002 and 2007. Average annual demand growth in the non-OECD group was 1.3 million barrels per day during the same period. Supply struggled to keep pace with this frenetic boom in demand and, soon enough, nominal oil prices started to break new records each year between 2004 and 2008, peaking at \$147 in July 2008.

The global financial crisis and the subsequent collapse of demand then precipitated a spectacular oil price fall in 2008–2009, when oil collapsed to a low point of \$30 per barrel in December 2008.

The recovery from the 2008 collapse was relatively quick. Oil prices were back at \$50

per barrel by April 2009, at \$75 per barrel by the end of 2009, and consistently above \$100 per barrel after 2011, until the most recent price collapse in 2014.

The V-shaped price recovery in 2009 was due to a combination of decisive OPEC action, a quick rebound in non-OECD demand, and an added geopolitical risk premium after the Arab Spring in 2011. OPEC members agreed to production cuts totaling 4.2 million barrels per day between September and December 2008—an unprecedented

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amount—and delivered about 2.4 million barrels per day in actual production reductions by the end of 2008.

Global oil demand, which took a hit in 2009, came back with force in 2010, as stimulus spending restored economic growth in much of the developed world and the breakneck pace of oil consumption growth continued almost unabated in the emerging economies. The heightened level of geopolitical risk and a sharp increase in unplanned outages in Libya, Syria, Yemen, Iran, and a host of other countries, helped keep oil prices at an elevated level between 2011 and 2014, although the unfolding North American production boom offset these supply disruptions and thus kept oil from spiking even further.

DECODING THE 2014 OIL PRICE CRASH

Unlike the demand-driven price crashes of 1997–1998 and 2008–2009, which were caused in large measure by severe economic downturns, today’s oil price crash bears more similarity to the supply-driven fall of the 1980s. And the ultimately ineffective effort by Saudi Arabia in 1985–1986 to stem the price fall, followed by an abrupt reversal aimed at regaining lost market share, helps inform today’s oil market dynamic.

The American oil revolution of the past few years has been one of the most geopolitically consequential events in the global oil market in decades.

The primary factor driving the 60 percent decline in the price of crude from June 2014 to January 2015 has been the remarkable growth of U.S. tight oil production. The technological innovation of combining horizontal drilling with hydraulic fracturing first gave rise to a dramatic increase in American natural gas production, and the technology was then applied to extract oil from shale and other tight rock formations. Since 2008, oil production in the United States has risen 80 percent, or four million barrels per day. Due to both rising production and declining consumption, American oil imports have fallen sharply from 60 to 20 percent of U.S. consumption,

which averaged 19 million barrels per day in 2014. The volume of oil the United States is projected to need to import in 2025 is today a staggering 14 million barrels per day lower than the American government projected it would be less than a decade ago.

The American oil revolution of the past few years, which led directly to today’s oil price collapse, has been one of the most geopolitically consequential events in the global oil market in decades in at least three ways. First, it has vanquished, at least temporarily, OPEC’s ability to set a floor on the world oil price. Second, it has

the potential to depress oil prices for years to come, which could yield enormous benefits to the world's largest oil consumers, but also pose risks of instability in some of the world's largest and most vulnerable petrostates. Finally, it has important environmental impacts—on the one hand increasing oil demand and reducing the competitiveness of alternatives, but on the other creating a unique opportunity to reduce budgetary strain and harmful carbon emissions by easing the phase-out of costly fuel subsidies.

AMERICA GETS BACK IN THE “SWING”

In the pre-World War II period, the United States was both the world's largest oil producer and simultaneously a major net exporter of oil. America was the “swing producer” of the day. After the East Texas oil boom of the 1930s, the Texas Railroad Commission stepped in to curtail production to avoid a price collapse, thereby preserving a sizeable spare capacity for the United States and effectively setting the market price of oil for more than three decades. America turned into a net importer of oil in 1947, yet remained the world's leading producer until 1970, retaining the role of “swing supplier” until 1971. In a momentous decision in March 1971, the Texas Railroad Commission gave up the remnants of America's spare production capacity and allowed all-out production from the East Texas fields for the first time in a quarter century.

In the decades following the 1973 Arab oil embargo, the role of swing producer passed from the United States to OPEC, particularly Saudi Arabia, backed by a handful of neighboring Gulf states. Today, only Saudi Arabia and to a lesser extent Kuwait and the United Arab Emirates maintain any meaningful level of “spare capacity”—which is the ability to rapidly ramp up production in response to shortages. For years, only Saudi Arabia, along with other Gulf producers in small measure, have been willing to meaningfully curtail production to respond to market surpluses.

Yet in November 2014, Saudi Arabia refused to play this historic role as the market stabilizer, declaring that they would let the oil market balance itself through low prices rather than through Saudi production cuts. Whether this Saudi oil policy will persist remains to be seen. As other sources of supply come off the market in response to the low price, Saudi Arabia may well cut production—along with modest contributions from some other OPEC countries, and eventually establish a new price band within which oil prices can fluctuate. The potential for a surge in Iranian exports if sanctions are eased may challenge OPEC's ability to cooperate, however.

There is no shortage of speculation and conspiracy theories as to why the Saudis refused to take action. In a notable December 2014

interview with the *Middle East Economic Survey*, Saudi oil minister Ali Naimi said that the low cost producers in OPEC “deserve market share.” Potentially recalling the experience of the 1980s, he explained: “If I reduce [production], what happens to my market share? The price will go up and the Russians, the Brazilians, U.S. shale oil producers will take my share.” Aside from defending market share, others speculate the Saudis may have been motivated by a much broader agenda. Such theories include a desire to discipline fellow OPEC members; add to the pressure on its regional rival Iran; punish Russia and deter its support of Syria; or curtail the American shale revolution.

In reality, the Saudis probably had little choice. The magnitude of the oil price cut needed to boost prices may well have been in excess of two million barrels per day. The Saudis were unwilling to give up their market share through unilateral production cuts—but few if any fellow producers inside or outside OPEC were willing to join them in cutting output. Many OPEC members faced already

reduced supply levels, such as Libya and Iran, or a mix of budgetary pressures and aspirations to keep market share in Asia and North America.

From the Saudi standpoint, the worst outcome would have been to

unilaterally make a production cut that failed to stem the oil price slide; this would have risked revealing that the emperor, indeed, has no clothes and that the Saudis were unable to control the oil market.

Instead, rather than repeat the experience of losing market share in the 1980s, the Saudis preferred to let the market force production cuts elsewhere, as lower prices would make production uneconomic in countries with higher costs.

Sustained prices in excess of \$100 per barrel had not only slowed demand growth, but also gave momentum to a wave of higher cost supply from North America. Moreover, a lower oil price, combined with economic sanctions, would put the squeeze on Iran and Russia, which are added benefits from the Saudi point of view.

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In the media, this has been widely portrayed as a war on shale. The cover of *The Economist* proclaimed it “Sheiks vs. Shale.” Indeed, by March 2015, the U.S. rig count had fallen by half and capital expenditures reduced sharply. With U.S. oil prices in the \$40s and \$50s, production is likely to peak this spring, before rebounding in 2016. Still, while many believed shale production to be uneconomic at lower prices, it is evident that American supply can continue to grow—albeit not as quickly—with oil prices of \$60 or \$70. In response to lower prices, producers have focused on more productive plays, accelerated the already impressive productivity improvement rates for their wells, and pressured suppliers and service companies to bring the entire cost structure down.

The experience with shale gas production is instructive, even though there are important differences between gas and oil. Since 2007, American shale gas production increased by 20 billion cubic feet per day thanks to technology improvements, even as the rig count has fallen 80 percent since the start of the shale revolution. Today, many U.S. producers are drilling but not completing wells, waiting for the price to recover. This suggests American production could rebound quickly even if it falls in the latter half of 2015 in response to the low price.

There remains considerable uncertainty, of course, about the shape of the American shale supply curve and its key drivers. Several leading analysts project that tight oil production will peak before the end of the decade, although production has consistently exceeded growth projections in previous years. The tight oil boom has also been fueled by cheap debt and high leverage, leading to questions about the extent to which investors will continue providing finance to shale producers in a low-price

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environment—although all indications are that capital continues to remain available. At this point, U.S. oil production seems poised to continue growing annually, and the American shale sector will likely

emerge stronger in the next few years, following consolidation and efficiency improvements.

If correct, that means that as the market regains balance in the coming months, some of that reduced supply is likely to come not just from the U.S. but from higher cost producers around the world, including Canada, Brazil, the North Sea, Colombia, or Russia.

Moreover, America’s shale production can be ramped both up and down relatively quickly, given the shorter time required to bring a well into produc-

tion thanks to multi-well pad drilling and the sharp well decline rates in the first year of production. This means that less economic U.S. shale can be quickly brought back online when prices recover. The result may be that the United States reemerges as a new kind of swing supplier—that the so-called “call on OPEC” becomes the “call on shale,” as Citi’s Ed Morse has put it—and that the economics of American shale sets a soft floor under the world oil price.

Of course, tight oil cannot “swing” in the same way as OPEC can. First, tight oil production does not respond as quickly. While Saudi supply can be brought to the global market in weeks, it takes U.S. tight oil supply six months or longer to respond to price changes, as we have seen recently. If U.S. shale is to help balance the market, therefore, consumers and industry may be in for greater ups and downs in oil prices—not less volatility, as many analysts have predicted. Second, tight oil’s response to a low price is driven by a large number of private sector producers making economic decisions, rather than a unilateral government policy decision. Third, the role of tight oil as a sort of swing supply may well be temporary. It is surely too early to declare the death of OPEC.

Saudi Arabia remains the only country that produces significantly less than it economically can and, thus, retains any meaningful level of “spare capacity”—the

ability to boost sustainable output within 30 days. Moreover, even if tight oil production exceeds growth projections, with global demand projected to rise nearly a million barrels per day annually, more OPEC barrels will likely be critical to meet oil demand post-2020.

GEOPOLITICAL (IN)STABILITY

For consumer countries like the United States, Japan, and South Korea, as well as for European states, lower oil prices are a clear macroeconomic gain. The oil price drop is likely to boost America’s GDP growth by around 0.4 percentage points—perhaps twice that when spillover effects are considered. (Of course, in specific oil-producing locations like Texas or North Dakota, the net economic impact will be negative.)

Many other countries around the world, however, have come to rely on high oil prices to meet budgetary needs and maintain government spending programs that have been a key part of social bargains struck domestically and regionally. As the oil price falls, there is risk of economic collapse or instability that may have ripple effects more broadly. Let us examine six of the most geopolitically consequential.

SAUDI ARABIA

Saudi Arabia is an important regional power with considerable economic, political, and military influence across the Arab World. With oil

exports accounting for almost 90 percent of budget revenues and 43 percent of GDP, the Saudi economy is among those most affected by lower oil prices. However, the country has amassed a vast fiscal buffer over the years of high oil prices and currently has about \$740 billion in foreign reserves. This is roughly equivalent to the country's GDP and more than three times its projected spending for 2015.

While Saudi Arabia has a greater ability to draw on reserves and access foreign markets than many other countries, a prolonged oil price dip would require budgetary cutbacks that may affect domestic support for the ruling family, as well as Saudi support for efforts to counter regional threats from Yemen to ISIS to Syria.

RUSSIA

Russia has been severely harmed by the oil price collapse, with the impact compounded by Western sanctions. The health of the Russian economy crucially depends on the price of oil; hydrocarbon receipts account for about 75 percent of the country's total export revenues and a little more than 50 percent of the federal budget. As a combined result of sanctions and the oil price collapse, economic growth ground to a near-complete halt in 2014, about \$150 billion of capital fled Russia last year, the inflation rate shot up to an estimated 11.4 percent, and the ruble

lost nearly half of its value against the U.S. dollar between July 2014 and February 2015. As of January 2015, Russia has sizeable foreign reserves totaling \$376 billion, but the country is burning through these holdings fast. It has spent about \$100 billion since June 2014 to prop up the ruble and bail out Rosneft—Russia's largest state-owned oil and gas company.

Russia's GDP will likely contract by three percent in 2015, and at least another one percent in 2016, according to the IMF's January 2015 projections. Other analysts expect a steeper four to five percent GDP drop in 2015. The prospect of a deep multi-year recession is real. Whether this pressure has any impact on public support for President Vladimir Putin—currently at record levels—remains to be seen.

Russian crude production, on the other hand, is likely to suffer under the weight of low oil prices and Western sanctions targeting the country's financial and energy sectors. Without access to Western capital markets, equipment, and technology, Russian companies are less able to invest in future production, let alone maintain production at older fields. Overall, the IEA anticipates Russian production capacity to decrease by 560,000 barrels per day between 2014 and 2020, a volume equivalent to the total production of OPEC member Ecuador.

VENEZUELA

Despite holding the world's largest oil reserves, Venezuela has been suffering under gross economic mismanagement even during the years of sustained high oil prices. As oil prices tumbled in 2014, the country came closer to economic and political collapse. With oil accounting for about 96 percent of export revenues and 36 percent of GDP, the economy likely contracted by four percent in 2014 and may shrink by as much as seven percent in 2015, according to IMF estimates. The country's population is grappling with runaway inflation—at 64 percent in 2014—and faces chronic shortages of food and other basic goods. Further economic hardship may trigger social unrest and undermine political stability in OPEC's sixth largest producer.

Unlike most Gulf OPEC members, between 2008 and 2013 Venezuela amassed a large public debt, whilst failing to build significant foreign reserves to cushion against unexpected oil price shocks. PDVSA, the state-owned oil and gas company, also substantially increased its debt load to \$46 billion at the end of 2014. The risk of default is extremely high; the next large payment, totaling \$5 billion, is due in October 2015.

The country has already “mortgaged” more than half of its current crude production in the form of oil-for-loans payments to China, heavily subsidized

fuel at home, and subsidized oil shipments to Venezuela's political supporters across the Caribbean and Central America under the Petrocaribe program. Dwindling cash receipts force PDVSA to reduce upstream investments, which will further delay extra heavy oil projects in the country's Orinoco belt. The best Venezuela can hope for is another oil-for-financing deal with China—Beijing reportedly pledged another \$20 billion in “new investments” in the first quarter of 2015—or a production cut by OPEC's Arab members. But even a rapid oil price rebound would probably not solve Venezuela's immense economic problems.

IRAQ

Iraq is battling not one but two major disruptive forces: low oil prices abroad and the ongoing fight against the Islamic State (ISIS) on its home turf. The Iraqi economy is heavily dependent on oil revenues. Oil exports accounted for an estimated 45 percent of GDP and more than 80 percent of budget revenues in 2013. The size of the country's foreign reserve holdings is relatively modest—about a third of GDP—and the central government's budget will remain in a deep deficit for the third consecutive year in 2015.

After a decade of healthy growth, the Iraqi GDP contracted by 0.5 percent in 2014 according to the IMF—the first contraction since the 2003 invasion by the United States. ISIS still controls

large swaths of Iraqi territory—including Mosul, the second largest city—and presents a continuing threat to peace and stability in Iraq. Prime Minister Haider al-Abadi recently warned that falling oil revenues may hinder Iraq's ability to contain the ISIS insurgency.

Against this unfavorable backdrop, the oil production outlook in Iraq is cautiously optimistic. The oil price squeeze and the threat of ISIS appear to have injected a sense of pragmatism into the central government in Baghdad and the Kurdish Regional Government (KRG) in Erbil. The two parties reached a comprehensive oil export agreement in December 2014, under which the KRG agreed to hand over 250,000 barrels per day of crude from Kurdish fields and another 300,000 barrels per day of production from the disputed fields around Kirkuk to Iraq's state oil marketing authority, SOMO. The entire volume will be exported via the new Kurdish export pipeline to Turkey, with the KRG retaining the right to export any amount in excess of the agreed volume independently. In return, the central government agreed to reinstate payments totaling 17 percent of the national budget to the KRG, which were halted earlier in 2014 to punish the Kurdish autonomous region for its unauthorized exports of crude oil. The Iraqi central government also pledged another

\$1 billion to equip Kurdish Peshmerga forces fighting ISIS in northern Iraq.

The Kurdish deal came close to unraveling over disputed payments in early 2015, but, assuming it holds, it is expected to boost production in northern Iraq for 2015 and beyond. Iraqi exports in March 2015 reached three million barrels per day, a 35-year high. Developing Iraq's giant fields in the country's south continues to face immense logistical, financial, and bureaucratic hurdles. Nevertheless, the

The impact of the oil price drop on investment in renewables, efficiency, and carbon reduction may be more muted.

International Energy Agency (IEA) believes Iraq will be capable of increasing production to 4.7 million barrels per day by 2020—an increase of 1.1 million barrels per day from 2014 levels.

The downside risks to this optimistic outlook are substantial, however, given the security threat from ISIS and the fragility of the Baghdad-Erbil cooperation.

IRAN

The direct impact of the price drop on Iran has been more modest than for other oil exporters, because Tehran's oil exports have been subject to American sanctions since 2012, and the Iranian economy had already been severely weakened by earlier Western sanctions. Given Iran's balance of trade, the net effect was to lock up the vast majority of its oil revenues abroad; the American govern-

ment has estimated the total amount of restricted Iranian funds to be over \$100 billion. As such, Iran experienced some of the effects of the price drop two years ago that are only now becoming problems for other oil producing states, and has taken steps to address them. Upon his election in June 2013, President Hassan Rouhani called for reforms of national budgets and infrastructure priorities, in part as a response to concern over the economic impact of oil sanctions. But, ultimately, while he has rationalized some of Iran's economic decision-making—absent sanctions relief—his ability to restore the Iranian economy is modest.

The odds of sanctions relief that would allow Iran to export vastly more oil are much higher today, following the April 2nd, 2015 announcement of the details of a comprehensive agreement between Iran and the P5+1. Despite the important nuclear commitments and specific terms included in the agreement, numerous technical details remain to be worked out, however, before Iranian oil may flow back into the global market. Even if the many technical details about Iran's nuclear program can be finalized, difficult negotiations will still remain over the terms of verification and compliance, as well as the timing of sanctions relief. Shortly after the deal was announced, for example, Iranian Supreme Leader Ayatollah Ali Khamenei stated that all sanctions would need to be immediately lifted upon completion

of a deal in order for Iran to be able to sign—a demand which would presumably face stiff resistance from the United States and its allies. Iranian oil is unlikely to return to the market before 2016, even in a best case scenario.

NIGERIA

Although Nigeria's election went off more smoothly than many feared, the country remains in a frail state. Oil theft is rampant, Boko Haram controls large parts of the country, and widespread political violence remains possible post-election. The sharp drop in oil revenue from the price collapse leaves the government of President Muhammadu Buhari with a greatly depleted pool of reserves to maintain stability through patronage.

With oil accounting for 75 percent of government revenue, the economic cost of the price collapse has been substantial. The Nigerian currency, the naira, lost 20 percent of its value against the U.S. dollar from July 2014 to February 2015, and investors are increasingly wary about the ability of Africa's largest economy to stave off violence and meet its financial obligations.

OIL & THE GLOBAL CLIMATE AGENDA

Some fear that the 2014 oil price crash may also derail global efforts to curb the effects of climate change and undermine investments in renewable

energy, alternative transportation fuels, and efficiency. After all, the first experiments with alternative energy technologies in the aftermath of the oil shocks came to an inglorious end in the 1980s, when oil prices stabilized at comfortably low levels for nearly two decades.

There are important differences today, however, that suggest the impact of the oil price drop on investment in renewables, efficiency, and carbon reduction may be more muted.

When something is cheaper, people usually use more of it. Directionally, therefore, lower oil prices mean higher oil demand. How much higher is the matter of much debate amongst analysts. To the extent oil demand rises, emissions will rise as well. Some argue that structural shifts in recent years mean that the demand response to lower oil prices will be more muted this time around than it would have been in the past. In OECD countries, oil demand has long been flat or slightly declining in response to demographic shifts and increased vehicle efficiency. While consumers may opt for larger and less fuel efficient vehicles, policy measures—such as fuel economy standards and tax subsidies for electric vehicles—should also limit the impact of the oil price decline on oil usage, at least in developed countries.

The empirical evidence so far indicates that demand is still responsive to lower

oil prices, however. In the United States, refined petroleum demand in the first quarter of 2015 is up more than four percent year-on-year, and oil use has been rising sharply in other countries as well, although lower oil prices is likely not the only reason. Ultimately, the impact of lower prices on oil use and emissions also depends on how long prices are seen to remain at lower levels, as the short-term response to lower price is lower than the longer-term response.

Interest in investing in renewables, such as solar and wind, may be weakened, but the effect should be limited given that oil generally does not compete with renewable energy. Oil is predominantly used in the transportation sector, while solar and wind are used to generate electricity. Only five percent of global power generation is provided by oil. Moreover, the growth of renewables is being driven by aggressive policies like renewable energy targets, feed-in tariffs, and other subsidies in many countries, which are pushing the deployment of renewables beyond their ability to compete with fossil fuels based solely on price.

Nonetheless, low oil prices can affect renewable investment in at least three ways. First, oil is used in certain places to generate electricity, and lower prices may discourage a transition to lower carbon sources. For example, oil accounts for more than one third of

power generation in the Middle East, and more than half in Saudi Arabia; many Latin American countries use large volumes of oil in the power sector, as well. In such places, lower prices may on the margin discourage efforts to deploy more renewables and natural gas. Even where oil does compete, however, the economics of switching off oil still makes good sense at today's oil prices. Oil would need to drop into the \$20s before renewables might seriously be threatened in these regions.

Second, a lower oil price may undermine nuclear or renewables by the effect it has on natural gas prices—which compete directly with renewable energy sources. This effect cuts in both directions. On the one hand, lower oil production stemming from a lower price reduces so-called “associated” gas production—that is, gas that is produced as a by-product of drilling for oil. One quarter of Texas gas production, for example, comes from associated gas. As associated gas production falls, gas prices may be pushed up, which would help the competitiveness of renewables. On the other hand, around the world, the price of natural gas is often linked to the price of oil, so lower oil prices may depress the price of gas and thus reduce the competitiveness of renewables—although, as in the United States, policy in Europe and Asia will continue to support renewables. (Moreover, cheaper gas also challenges coal, which can have a positive climate impact.)

Third, unlike solar and wind, biofuels compete directly with oil, and lower oil prices weaken the economic incentives to invest in and use biofuels. Since the latest oil price crash, biofuel blending margins have dropped in markets from the U.S. to Indonesia to Brazil, making it more challenging to boost biofuel use above mandated levels, as well as to build support for increasing biofuel mandates.

Although lower oil prices mean more oil usage, there is one important aspect in which lower prices may have a beneficial effect on fossil fuel demand. Across much of the developing world, the current oil price slump offers a unique opportunity to scale back fossil fuel subsidies—which continue to provide a perverse incentive for fossil fuel use and increased carbon emissions.

According to the IEA's estimates, 40 mostly developing countries spent a total of \$550 billion on subsidizing fossil fuel use in 2013. More than half of this amount was used to keep fuel prices at artificially low levels. Policymakers in countries as diverse as Kuwait, Indonesia, Malaysia, Thailand, Morocco, Egypt, and India have taken steps in recent months to reduce fossil fuel subsidies, particularly on oil and oil product prices. India, which spent \$23 billion on fuel subsidies last year, may reduce its fuel subsidy bill by \$6.5 billion in 2015. Indonesia slashed fuel subsidies by 83

percent, saving as much as \$20 billion for the government in 2015. Malaysia decided to cut its own fuel subsidy bill by \$6 billion for 2015. China, meanwhile, imposed additional fuel consumption taxes at the end of last year, in an effort to fight urban air pollution and reduce carbon emissions.

Past efforts to roll back fuel subsidies have met with vast public opposition and often violent protests—as in Nigeria and Egypt—when people see their fuel bills rise. The public hostility may be more muted, however, if fuel prices don't go up but rather are kept from falling as much as they otherwise would have by the repeal of subsidies.

A vast behavioral economics literature on loss aversion demonstrates that people strongly prefer to avoid losses than acquire gains. This approach is more challenging in large petrostates, like GCC countries, where fuel prices are so far below market prices that any reform would necessitate a price hike, and also where memories of the Arab Spring remain fresh among the ruling elite. Still, the oil price collapse has given new momentum to reform efforts even in these countries.

If the oil price drop leads to reductions in fuel subsidies, the effect will offset some of the increase in fuel demand arising from lower prices in the

developing world, and perhaps lead to a net reduction in oil demand and emissions if those fuel subsidy reform efforts are maintained over time—even as the price of oil eventually rises again.

PAIN OR GAIN?

It is too early to write the history of the oil price collapse of 2014. Still, several implications are already evident. The United States has again emerged as a major world oil producer—not only as the primary driver of the oil price collapse, but also as a new market balancer, due to its greater responsiveness relative to conventional oil suppliers. Several petrostates will feel greater and greater economic pain, and face potential instability that could have broader regional and even global implications. Finally, the oil price plunge should remind policymakers of the importance of continuing to accelerate policies that facilitate a transition to lower carbon energy sources, and also provide a unique opportunity to implement fuel subsidy reforms that will both boost economic growth and reduce energy use and associated emissions.

By better understanding the key causes and consequences of the 2014 oil price collapse, decision-makers in both the public and private sectors can take the steps necessary to both manage the challenges and realize the opportunities on offer. ●