SPECIAL FOCUS

Putting the Recent Plunge in Oil Prices in Perspective

Special Focus: Putting the Recent Plunge in Oil Prices in Perspective

Oil prices fell sharply in the second half of 2014, bringing an end to a four-year period of high and stable prices and, perhaps, to the "commodity super-cycle" that began in the early part of 2000s (Figures F.1 and F.2). This section highlights three main aspects of the plunge in oil prices. First, although revisions of supply and demand expectations have played a key role during the course of the current episode of declining oil prices, such revisions are neither unique nor unusually large; what is unique is that these changing expectations unfolded together with a number of other key developments: change in OPEC's objectives, receding geopolitical risks, and U.S. dollar appreciation. Together, these forces have formed a "perfect storm" of conditions that are exerting strong downward pressure on prices. Second, low oil prices, if they persist, will push other commodity prices down, especially those of natural gas, fertilizers, and food commodities. Third, the 2014 plunge in oil prices has two key similarities with the 1985/86 episode. Both price collapses unfolded after the emergence of unconventional oil sources (biofuels, oil sands, and shale oil now, and production in Alaska, the North Sea, and the Gulf of Mexico then), and in both cases the decline was accompanied by OPEC abandoning supply management.

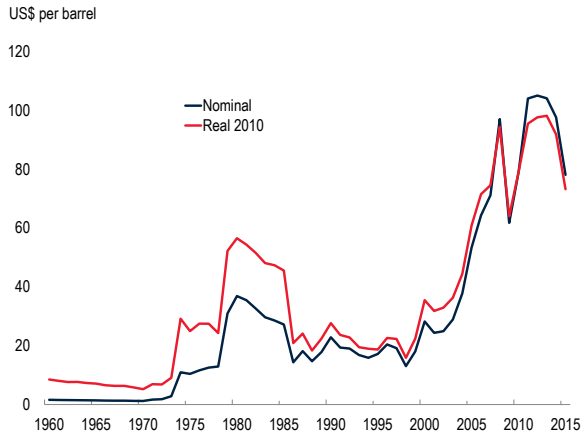
What are the drivers of the plunge in oil prices?

Revisions of expectations

Recent developments in global oil markets took place against the backdrop of longer-term strong supply growth, especially from unconventional oil in the United States, and to a lesser degree Canadian oil sands and the production of biofuels. During the second half of 2014, the 2014 oil production outlook for the United States was revised upwards, from 11.44 mb/d in July to 11.71 mb/d in December. The 2015 outlook was revised upwards as well by 0.52 mb/d during the same time period. Global oil demand forecasts, on the other hand, have been revised downwards repeatedly, consistent with the fragile recovery of the global economy, from 92.7 mb/d in July 2014 to 92.4 mb/d in December 2014. Likewise, the global demand outlook for 2015 was revised downward by 0.8 mb/d during the same period (IEA 2014a and 2014b).

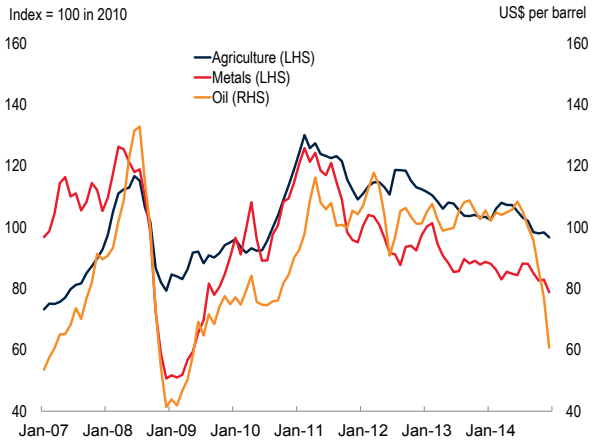
Yet, such revisions are neither unique to the 2014H2 period nor unusually large. During the four years of the U.S. shale oil boom (2011-14), the International Energy Agency (IEA) consistently underestimated U.S. oil production growth by almost 1 mb/d from the publication of the first outlook assessment (July of the previous year) to December of the current year, when output was known with certainty (Figure F.3). Likewise, the downward revisions to the 2015 global oil demand outlook (a cumulative 0.8 mb/d from July to December 2014), is not very different from the 0.7 and 0.4 mb/d revisions to the 2012 and 2013 global oil demand assessments (Figure F.4). Indeed, while the U.S. supply and global demand revisions between July and December were accompanied by a 40 percent decline in oil prices during the same period, similar adjustments in 2012 were associated with a 4.6 percent increase in oil prices while adjustments in 2011 were associated with a 3.4 percent decline in oil prices (Table F.1, last row). Thus, what makes the adjustments in

FIGURE F.1 Nominal and real oil prices



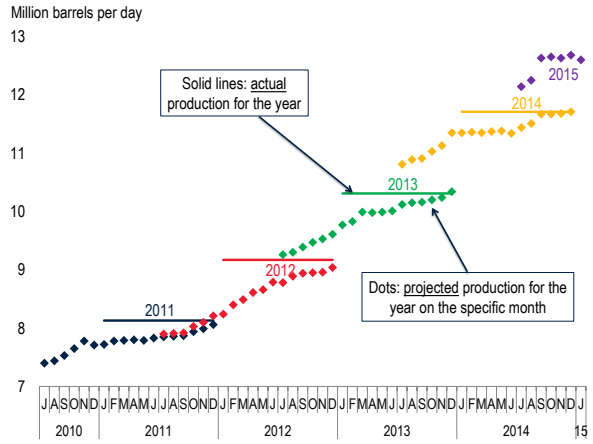
Source: World Bank.
Note: 2015 is projection as of January 20, 2015.

FIGURE F.2 Oil, agriculture, and metal prices



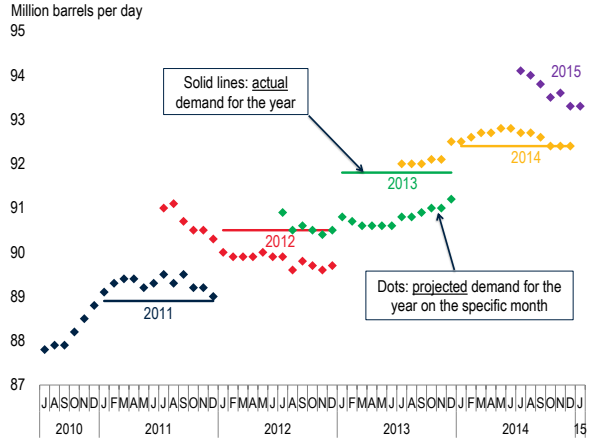
Source: World Bank.
Note: Last observation is December 2013.

FIGURE F.3 Projected and actual U.S. oil production



Source: International Energy Agency.

FIGURE F.4 Projected and actual global oil demand



Source: International Energy Agency

TABLE F.1 Revisions to U.S. oil production and global oil demand forecasts from July to December (percent)

	Revisions to:				Oil price change
	U.S. oil production		Global oil demand		
	Current year	Subsequent year	Current year	Subsequent year	Current year
2010	+4.9	+4.2	+1.0	+1.1	+20.7
2011	+2.7	+3.9	-0.6	-0.8	-3.4
2012	+3.0	+3.8	-0.2	-0.4	+4.6
2013	+2.2	+5.0	+0.4	+0.5	+0.2
2014	+2.4	+4.4	-0.3	-0.9	-39.2

Source: International Energy Agency and World Bank

2014H2 important, is that they unfolded alongside a number of other significant (predominantly supply-driven) forces in commodity markets, as discussed below.

OPEC's changing objectives

OPEC (especially its large producers) has traditionally acted as the global oil market's swing producer, using its spare capacity to adjust oil supply and stabilize prices within the desired price range (set to $100-110/bbl during 2011-14). This targeting of an oil price band dramatically reversed course on November 27, 2014, when OPEC decided to focus instead on preserving its market share by maintaining its production level of 30 mb/d. But even prior to the November decision, several OPEC members (Saudi Arabia and Iran in September, followed by Iraq in October), engaged in a series of discounts to various Asian oil importers, thus signaling OPEC's intentions to abandon price targeting. The change in policy also implies that OPEC will no longer act as the swing oil producer. Instead, the marginal cost (unconventional oil) producers may play this role (Kaletsky 2015).

Receding concerns on geopolitical tensions

In the second half of 2014, it became apparent that conflict in the Middle East and Eastern Europe weighed less heavily than expected on oil supply. Libya, despite internal conflict, added 0.5 mb/d of production in the third quarter of 2014 (Figure F.5). In Iraq, as the advance of ISIS stalled, it became apparent that oil output would not be disrupted. Markets placed considerable weight on Iraq's performance because it was expected to account for 60 percent of OPEC's additional capacity during 2015-19, according to the IEA. Iraq's oil output turned out to be remarkably stable, at 3.3 mb/d during 2014, the highest average since 1979, when it reached 3.5 mb/d. Finally, the sanctions and counter-sanctions imposed after June 2014 as a result of the Russia-Ukraine conflict have had little impact on European oil and natural gas markets.

Appreciation of the U.S. dollar

In the second half of 2014, the U.S. dollar appreciated by more than 10 percent against major currencies in trade-weighted nominal terms (Figure F.6). Typically, appreciation of the U.S. dollar (in which the majority of international commodity transactions are denominated) is negatively associated with the U.S. dollar prices of commodities, including oil (Frankel 2014; Zhang et al 2008; Akram 2009).

How will low oil prices impact the prices of other commodities?

Low oil prices have numerous implications, including redistribution of income from oil producers to consumers,

shifts in global growth and inflation, likely changes in monetary policy, and environmental implications, especially increased CO_2 emissions, depending on how much demand will increase due to lower prices (World Bank 2015). Low oil prices will exert downward price pressure on other commodity markets as well, in particular natural gas, fertilizers, and food commodities (mostly grains and oilseeds).

Natural gas

Low oil prices will translate into low natural gas prices, especially in Europe and Asia. U.S. natural gas and LNG (Japan) prices declined 25 and 15 percent, respectively, from June to December 2014. If low oil prices persist, the price of LNG, mostly destined to Asian markets, will be affected the most in the longer term because its pricing arrangements are linked to oil prices. Low oil prices will also put downward pressure on European natural gas prices, since they are partly linked to oil prices. U.S. natural gas prices will be affected the least (perhaps through some limited substitutability) because they are determined by domestic (U.S.) supply and demand conditions.

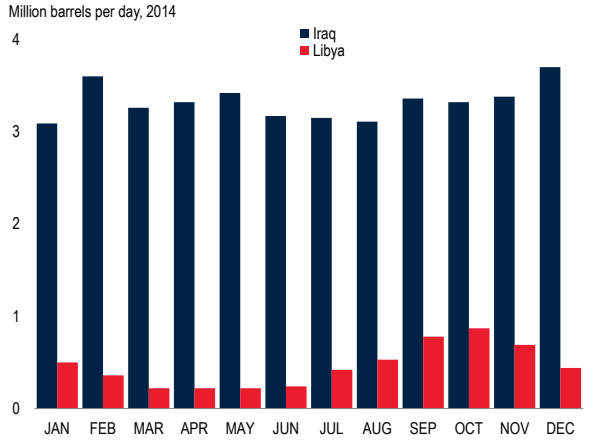
Fertilizers

Low natural gas prices will, in turn, put more downward pressure on fertilizer prices, especially the nitrogen-based ones, most of which use natural gas as a major component. Already, fertilizer prices are down 45 percent since 2011 and more than 50 percent lower since their all-time high in 2008. Following the psot-2005 collapse of natural gas prices in the United States due to the shale boom, many fertilizer companies began moving their fertilizer plants to the Unite States in order to capitalize on the "energy premium," a move that may be reversed if low oil (and, hence, natural gas) prices persist.

Grains and oilseeds

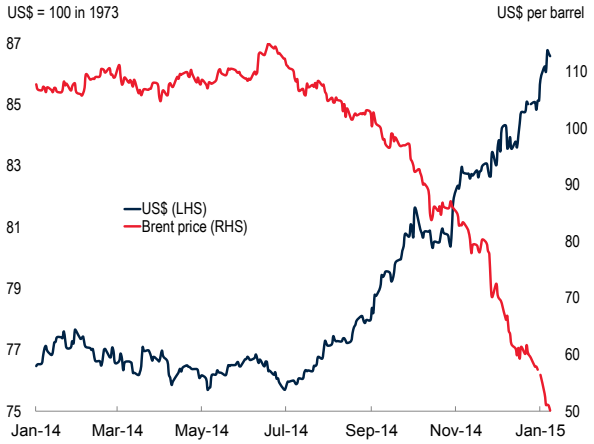
Lower oil prices will impact most agricultural crops (agriculture is an energy intensive sector, four to five time more energy intensive than manufacturing, Figure F.7). There are multiple channels though which low energy prices will impact agriculture, especially grains and oilseeds. A first channel reflects the fuel cost side, in which falling fuel prices reduce the cost of producing and transporting food commodities (link A, Figure F.8) and the cost of chemicals and fertilizers, some of which are crude oil byproducts or directly made from natural gas (links B/C). A second channel relates to policies favoring the production of biofuels, which are often driven by the policy objective of reducing dependence on imported crude oil (links D/F). In a third channel, lower oil prices render biofuel production less profitable, or even unprofitable (link G). While link G is largely irrelevant at low oil prices, links D/F are important and complex in terms of

FIGURE F.5 Iraqi and Libyan oil production in 2014



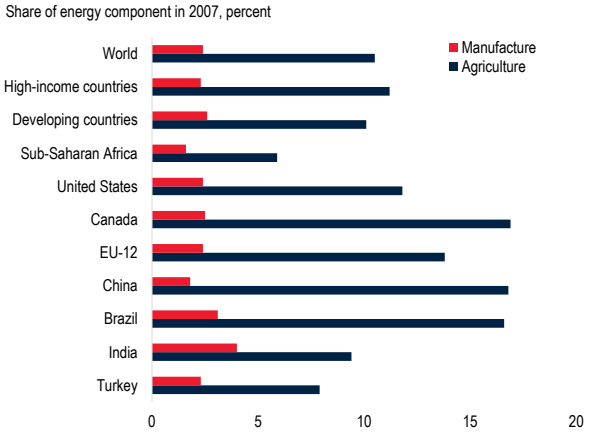
Source: International Energy Agency.

FIGURE F.6 U.S. dollar and oil prices



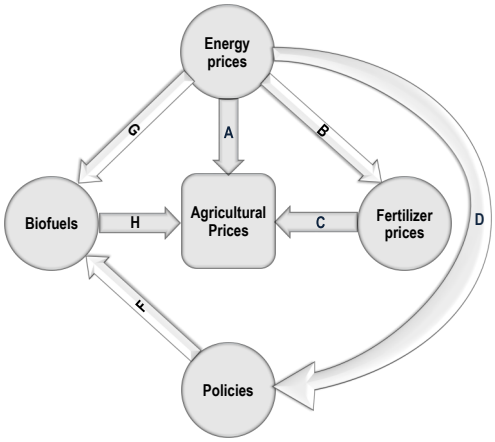
Source: FRED, ICE, and World Bank.
Note: Last observation is January 20, 2015.

FIGURE F.7 Energy intensities



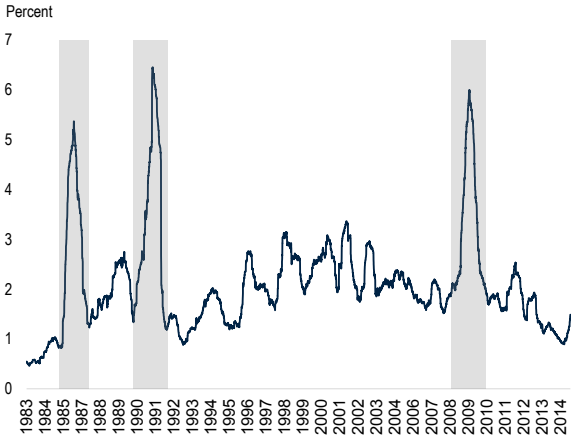
Source: World Bank.
Note: Calculations based on the GTAP database.

FIGURE F.8 Energy and agricultural markets



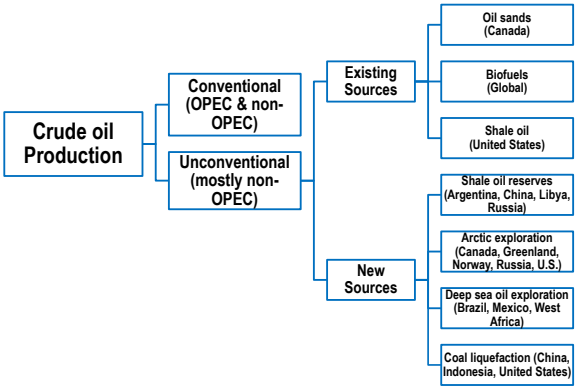
Source: Baffes (2013)
Note: A: Crude oil; B/C: Natural gas; D/F: Policy-driven; Biofuels G: Profitable biofuels

FIGURE F.9 Oil price volatility



Source: World Bank.
Note: Price volatility is the standard deviation of daily changes in prices (over a 125-day window).

FIGURE F.10 Conventional and unconventional sources of oil



Source: World Bank.

their impact on food commodities. Because most diversion of food commodities to biofuels is mandated, low oil prices (which will induce more consumption of oil) may, in fact, increase diversion of grains and oilseeds to the production of biofuels.

How does the current oil price decline compare with past episodes?

There have been only three occasions since 1984 (when oil futures contracts were introduced) when the price of oil dropped by 60 percent or more in any seven-month period. First, during 1985-86, when the West Texas Intermediate nearby futures contract (WTI was the world oil price barometer at the time) declined by 67 percent from $31.72/bbl (November 20, 1985) to 10.42/bbl (March 31, 1986). Second, in 2008, when Brent nearby futures contract (today's world price indicator) declined by 75 percent from $146.08/bbl (July 3, 2008) to $36.61/bbl (December 24, 2008). Third, during 2014-15, when the Brent nearby futures contract declined by 60 percent from $115.06/bbl (June 19, 2014) to 46.77/bbl (January 13, 2015).

Since the mid-1980s, oil prices have experienced three major spikes in volatility (Figure F.9). The first spike coincided with the 1985-86 oil price collapse, when Saudi OPEC abandoned price targeting in favor of increasing their share in the global oil market to prevent erosion of oil revenues. The second volatility spike occurred shortly before the first Gulf War, due to supply disruption concerns emanating from Iraq, Kuwait, and (possibly) Saudi Arabia. The third volatility spike took place alongside the oil price drop of the second half of 2008, reflecting concerns about the global economy, especially liquidity constrains associated with the financial crisis. Volatility in most commodity prices and main equity indices spiked as well in 2008.

2014 versus 2008: Differences in magnitude and the relation with other markets

The 2008 episode is different from the 2014 episode in a number of respects. First, the decline in 2014H2 was considerably sharper for oil than for other commodities whereas virtually all commodity prices declined by similar magnitudes in 2008. For example, while oil prices declined 45 percent from July to December 2014, the largest price declines among other commodity prices were half as much (iron ore fell by 27 percent, U.S. natural by and cotton by 25 percent each, rubber by 23 percent, and palm oil by 20 percent). Second, daily price volatility during 2014H2 was lower than the average volatility post-2000 while volatility spiked in 2008. Third, during the 2008 episode, oil returns were strongly correlated with daily future returns for most commodities traded in futures markets, while in the current episode, oil returns exhibit low correlation with those

of most other commodities. Fourth, daily oil price changes during the current decline are not correlated with daily changes in global equity indices, as they were in 2008 (Baffes and Kshirsagar 2015).

Taken together, these observations suggest that oil prices may not rebound as quickly in 2015 as they did in 2009. More fundamentally, the differences between the 2014 and 2008 episodes indicate that the current price decline is driven by expectations regarding fundamental drivers of the oil market, while the 2008 decline and attendant volatility was driven by the substantial uncertainty associated with the global financial crisis.

2014 versus 1985/86: Similarities in expansion of unconventional production and OPEC policy adjustment

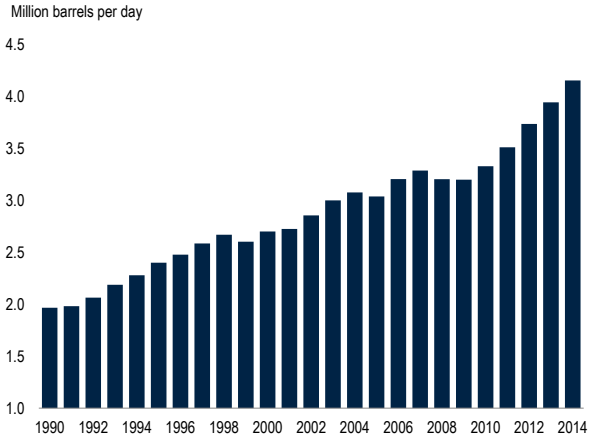
Oil market developments that led to the 2014 price collapse share two key similarities with the 1985/86 price collapse. On the technology front, there was a boom in unconventional oil production on both occasions. On the policy front, the drop in oil prices in both episodes coincided with OPEC's movement toward targeting market share rather than prices.

Although most of the discussion of unconventional oil supplies relates to the U.S. shale oil boom, unconventional oil production began more than a decade ago with the Canadian oil sands and the (mostly mandated) diversions of food crops to the production of biofuels. Furthermore, in addition to these sources, unconventional oil exploration has also included oil sands and shale oil reserves by countries other than the United States, oil reserves in the Arctic region, deep sea oil reserves, and coal liquefaction (Figure F.10).

Canadian oil sands. Despite the cost of extracting oil from the Canadian oil sands being perhaps the highest of any source of oil in the world (the cost is often used by the oil industry as the long-run marginal cost of oil production, estimated until recently between $80-90/bbl in 2014 real terms), Canada's oil output reached almost 4 mb/d in 2014, up from 3 mb/d one decade prior. Most of this growth came from oil sands (Figure F.11).

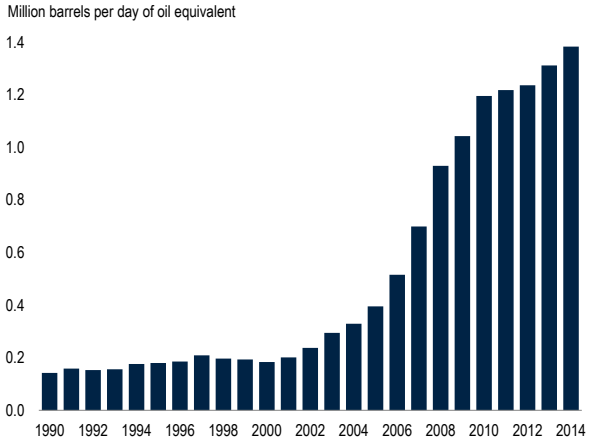
Biofuels. Biofuels account for almost 1.4 mb/d of oil equivalent, corresponding to 1.5 percent of global oil consumption (Figure F.12). The United States accounts for 44 percent of global biofuel production, mostly in the form of maize-based ethanol, followed by Brazil (24 percent share, mostly from sugarcane-based ethanol), and the European Union (17 percent share, mostly from edible oil-based biodiesel). Production of biofuels, which currently account for about 3 percent of global arable land, is largely policy-driven, and its profitability has been

FIGURE F.11 Canadian oil production



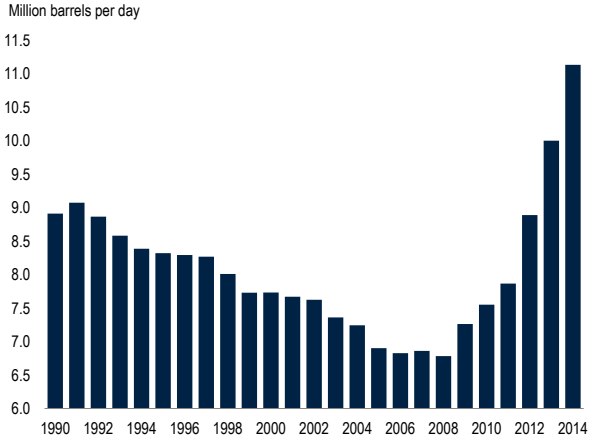
Source: BP Statistical Review, IEA, World Bank

FIGURE F.12 Global biofuels production



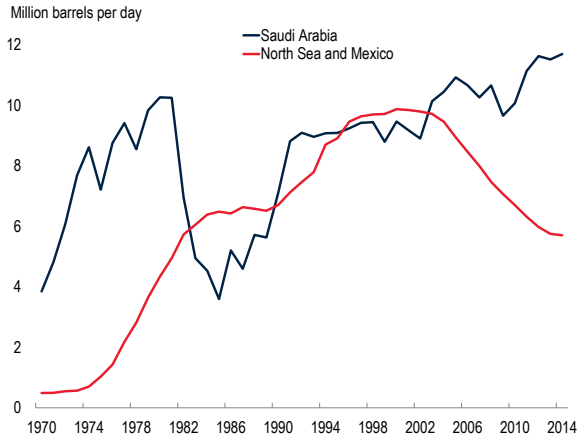
Source: BP Statistical Review, IEA, World Bank.

FIGURE F.13 U.S. oil production



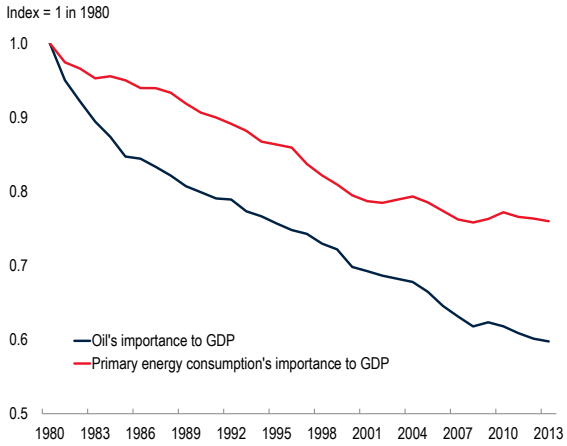
Source: BP Statistical Review, IEA, and World Bank

FIGURE F.14 Oil production: Saudi Arabia, North Sea, and Mexico



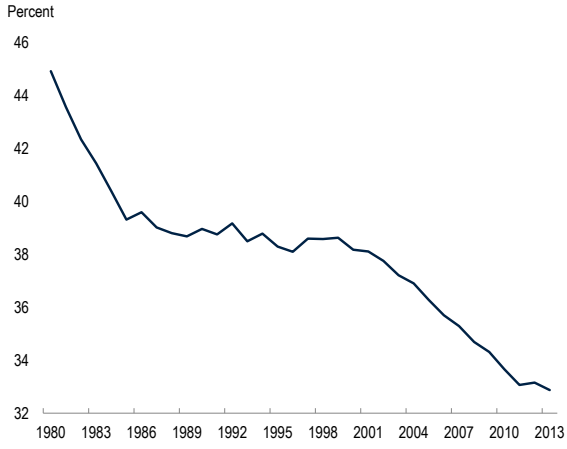
Source: BP Statistical Review, IEA, and World Bank

FIGURE F.15 Importance of oil and energy in GDP



Source: BP Statistical Review, IEA, and World Bank

FIGURE F.16 Share of oil in global energy consumption



Source: BP Statistical review and IEA

questioned, even at oil prices above $100/bbl (De Gorter et al. 2013).

U.S. shale oil. Although technologies to extract oil and natural gas trapped in tight rock formations (hydraulic fracturing and horizontal drilling) have existed for three decades, the post-2005 energy price boom made this type of production profitable. While many countries have large shale reserves, only the United States has developed them extensively: from 2008 to 2014, the U.S. added almost 4 mb/d to the global oil market, most from shale projects in the states of Texas and North Dakota (Figure F.13). Because of shale oil, U.S. production expanded to rival that of Saudi Arabia and Russia. Shale oil projects have relatively short life spans, typically 2.5 to 3 years (as opposed to oil sands and conventional oil projects which span 2-3 decades). With oil prices expected to be low in the medium term, while existing projects will stay in business (due to high sunk costs), fewer new projects will be undertaken (see the Energy section). Indeed, recent media reports indicate that some energy companies have already cancelled or put on hold projects.

In many respects, the recent unconventional oil boom resembles the unconventional oil supplies that were brought in to the market from North Sea and the Gulf of Mexico. Again, the technology to extract oil from the sea was available but the high oil prices of the 1970s made such technology profitable. Interestingly, during 1973-83, North Sea and the Gulf of Mexico together added some 6 mb/d to global markets as much as unconventional sources added to the global oil market during 2004-14 (Figure F.14).

OPEC's abandonment of price targeting. OPEC's latest decision to abandon price targeting has some parallels to its actions during the 1985/86 episode. Following the 1979 peak in oil prices, OPEC began reducing its supply to maintain high market prices. Upholding its price target necessitated the cartel slashing its oil supply over the following six years, from 30 mb/d in 1979 to 16 mb/d in 1985. However, despite such a drastic supply cut, real oil prices declined 20 percent during this period. In response, OPEC stopped targeting prices and reverted to supplying 30 mb/d over the next decade.

Partly because of this policy change, oil prices collapsed and remained low for almost two decades. Other factors also contributed to the prolonged period of low prices, however: a decline in the importance of oil in the global economy (Figure 15 and 16), an increase in global oil supply following the collapse of the USSR, and a series of financial crises in the late 1990s and early 2000s (World Bank 2009).

BOX 1 International agreements to "manage" commodity markets

Attempts to manage world commodity markets in order to achieve price objectives are not unique to the oil market. The 1970s commodity price boom brought renewed interest to "managing" markets, following earlier attempts after WWI and WWII. Numerous United Nations-backed International Commodity Agreements were put in place, often negotiated among producing and consuming nations in order to stabilize prices at levels deemed fair to both consumers and producers. International agreements covering coffee, cocoa, sugar, tin, and natural rubber were all in place during part of the final decades of the 20st century (Gilbert 1996). All of these agreements eventually collapsed (the last, covering rubber, ended when the East Asian financial crisis hit Indonesia, Malaysia, and Thailand, the three key natural rubber producing countries). The tin and coffee agreements provide important insights because of their long-lasting impacts in their respective markets and their similarities to recent developments in oil market, including OPEC's policy decision.

The International Tin Agreement

First negotiated in 1954 with the objective of maintaining tin prices within a desired range through the management of buffer stocks, the International Tin Agreement (ITA) collapsed in 1985 following several years of insufficient funds to maintain the stocks (Chandrasekhar 1989). The ITA had two long-lasting implications, however. First, because tin prices under the agreement were higher and more stable than in absence of the ITA, tin producers that were not members of the Agreement came into the market: Brazil, for example, increased its market share from 1 percent in the 1960s to 10 percent in the 1980s. Second, higher tin prices during the existence of the ITA encouraged the development of a substitute product, aluminum, which gained market share by capturing the growing demand from the beverage can market. Between the 1950s and 2000s, global tin output grew by 65 percent while that of aluminum grew by 125 percent.

The International Coffee Agreement

In 1962, coffee-producing countries accounting for 90 percent of global coffee output and almost all developed coffee-consuming countries signed the International Coffee Agreement (ICA) with the objective of stabilizing world coffee prices through mandatory export quotas. As did the ITA for tin, the ICA brought a new producer of coffee to the fore in global markets. During the course of successive ICAs (until 1989, when the final iteration collapsed), the USSR and the German Democratic Republic (not ICA members) provided Vietnam with technical and financial assistance to develop its coffee industry (Baffes, Lewin, and Varangis 2005). In 1970, Vietnam produced 39 thousand bags of coffee, just 0.7 percent of the 59 million bags of global production. By the early 2000s, Vietnam had overtaken Colombia as the world's second-largest coffee producer after Brazil; today it accounts for 20 percent of global coffee production.

Historical experience suggests that a policy of supply management at the global level in order to support prices tends to bring new suppliers and/or lead to the creation of substitute products. Such experience is not limited to oil but applies to other commodities as well (Box 1).

Conclusions

The recent oil price decline was the third largest during the past 30 years (when oil began trading in futures exchanges). This section presented three observations to put the recent plunge in a broader context.

- *A perfect storm.* Although revisions of supply and demand expectations played a key role during the 2014 oil price plunge, these revisions were neither unique nor unusually large. However, the recent episode was unique since the changes in expectations have coincided three other major developments: a significant shift in OPEC's objectives, receding geopolitical risks, and U.S. dollar appreciation. These factors together formed a "perfect storm" of conditions that exerted strong downward pressure on oil prices.

- *Significant implications for other commodities.* Low oil prices, if they persist, will push other commodity prices down, especially those of natural gas, fertilizers, and food commodities.

- *Differences and similarities.* The 2014 plunge in oil prices has two key similarities with the 1985/86 episode. Both episodes took place after the rapid expansion of supply from unconventional oil sources and were accompanied by OPEC abandoning supply management. But, the latest episode differs from the 2008 collapse in one respect: the 2008 decline was driven mostly by global macroeconomic concerns and liquidity problems, while the current decline appears to have been driven by sector-specific forces.

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