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Adding Fuel to the Fire

Cheap Oil during the COVID-19 Pandemic

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Abstract

The outbreak of COVID-19 and the wide-ranging measures needed to slow its advance triggered an unprecedented collapse in oil demand, a surge in oil inventories, and a record one-month decline in oil prices in March 2020. This paper examines the likely implications of the 2020 oil price plunge for emerging market and developing economies. It presents four main results. First, the record plunge in oil prices was predominantly driven by demand factors as wide-ranging measures to stem the pandemic precipitated an unprecedented collapse in oil demand, but the surge in oil inventories also exerted downward pressure on oil prices. Second, this latest oil price decline was preceded by six previous plunges over the past half-century, during which energy exporters and importers suffered similar initial output losses (about 0.5 percent) that were unwound within three years. Third, the current episode of low oil prices holds limited promise to boost the global economy amid widespread restrictions and narrow room for fiscal support in energy-exporting emerging market and developing economies. Fourth, many emerging market and developing economies entered the current public health crisis with precarious fiscal positions; current low oil prices are thus an opportunity to review energy-pricing policies, including remaining energy subsidies, to mobilize domestic resources.

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1. Introduction

Since March 2020, oil markets have been buffeted by an exceptional confluence of demand and supply shocks that have culminated in an unprecedented collapse in oil prices. The COVID-19 pandemic and the measures deployed to contain its spread—quarantines, travel restrictions, shutdowns of non-essential activities—have caused severe economic dislocations. Governments have responded with programs to mitigate personal hardship and disruptions to economic life, and central banks have cut policy rates and injected liquidity on an extraordinary scale. Many countries have nevertheless suffered deep economic contractions, with especially sharp reductions in travel and transportation—both heavily oil-intensive activities.

The collapse in energy demand came on the heels of delays of OPEC and the Russian Federation in extending a production agreement in early March. This was followed by outright production increases in some OPEC countries (World Bank 2020a). A new agreement between OPEC and non-OPEC producers to curb production was reached in early April; however, prices fell further after the announcement. Coupled with the collapse in global energy demand, global oil inventories have risen steeply and remaining storage capacity is limited (IEA 2020).

Oil prices have plummeted, recording their largest one-month fall on record in March 2020. By one measure, the European Brent spot price, the oil price fell by 85 percent between January 22, when the first human-to-human transmission of COVID-19 was announced, and its trough on April 21—more than at the height of the global financial crisis (70 percent from end-August to late-December 2008) and more than the plunge during the whole period of end-June 2014 to mid-January 2016 (77 percent).[1] The West Texas Intermediate oil price fell into negative territory on April 20. [2] Since then, Brent oil prices have regained some ground but, at around $30 per barrel on average in the first three weeks of May, remain less than half their January average and around the January 2016 trough of the oil price slide of 2014-16.

In the context of the current widespread and severe restrictions on economic activity to stem the spread of the pandemic, low oil prices are unlikely to provide much of a buffer for the global economy. Indeed, there are signs that low oil prices may even be compounding the damage being

[1] Another frequently used measure, the Dated Brent spot price, fell by 72 percent over this period, on par with the declines during these comparator periods for the global financial crisis and the 2014-16 price slide.
[2] This reflected an expiring futures contract and no physical oil traded at negative prices.

done by the pandemic by weakening the balance sheets of producers. However, high levels of inventories suggest that oil prices may remain low for some time, which may provide some initial support for the broader economic recovery once it gets underway.

Against this background, this paper examines the likely implications of the 2020 oil price plunge by putting it in a historical context and drawing lessons from the experience of emerging market and developing economy (EMDE) energy exporters and importers during the 2014-16 plunge (refer to Appendix 1 for country classification). Specifically, the paper addresses the following questions: First, what has been the source of the 2020 oil price collapse? Second, how does it compare with earlier episodes? Third, how will low oil prices likely affect the eventual recovery of EMDE energy exporters and importers?

To shed light on these questions, this paper uses three-pronged approach: an assessment of the drivers of the recent oil price decline using a structural vector autoregression model; an examination of previous oil market disruptions since 1970; and an estimation of the impact of previous oil price plunges on output using a local projections model. The paper reports four main findings.

Predominantly demand-driven oil price decline. The collapse in oil prices in March was the steepest one-month drop on record. A precipitous decline in oil consumption in the context of still-robust production has led to a rapid buildup in oil inventories, with remaining storage capacity close to capacity in June 2020. The oil price plunge mainly reflected a collapse in demand arising from the pandemic and the restrictions that were needed to stem its spread. Besides triggering a global recession, these restrictions severely disrupted travel and transport, which account for around two-thirds of oil demand. Oil demand is expected to decline by about 8 percent in 2020—an unprecedented plunge. Supply-side factors, in particular the initial delay in agreeing to limit production, added to downward pressures on oil prices.

Output losses in EMDEs. This latest oil price plunge was preceded by six previous plunges over the past half-century. During past demand-driven episodes, energy exporters and importers suffered similar initial output losses (about 0.5 percent) that were unwound within three years. In supply-driven oil price plunges, however, energy importers did not witness robust growth pickups but energy exporters witnessed similar initial output losses as in demand-driven plunges and less than one-third of these losses had been unwound three years later. This lasting impact of supply-driven oil price plunges may reflect a reassessment of long-term prospects for energy exporters. Energy-exporting EMDEs with lower debt, more flexible exchange rates, and more diversified export bases suffered smaller short-term output losses.

Limited promise to boost global economy. As long as widespread restrictions continue to constrain economic activity across the global economy, low oil prices are unlikely to provide meaningful support to global growth. If anything, the current episode of low oil prices holds less promise for a sustained boost to global growth than past episodes of low oil prices since energy exporters entered the current episode with eroded fiscal positions and foreign exchange buffers to support their economies, after having drawn on them to weather the previous oil price plunge of 2014-16. That said, when current pandemic-related restrictions ease, excess inventories and low oil prices could provide some initial support for the revival of global economic activity.

Need for policy action. Current low oil prices are an opportunity to review energy-pricing policies, including remaining energy subsidies. A carefully calibrated design, phasing, and communication of such reforms is critical for their success. For energy exporters, this most recent oil price decline is yet another reminder of the urgency to continue with reforms to diversify their economies. These include measures to strengthen competition, broaden fiscal revenue bases, and enhance fiscal and monetary policy frameworks.

This paper adds several novel contributions to the literature. First, it is the first comprehensive analysis of the potential impact of the 2020 oil price plunge on EMDEs and the global economy. Second, it places the current decline into historical context to allow an assessment of the severity of the plunge. Third, it draws policy lessons from previous episodes of sharp declines in oil prices to examine the implications of the current plunge for EMDEs.

The rest of the paper is organized as follows. First, it assesses the drivers of the recent oil price decline using a structural vector autoregression model to decompose recent price developments into demand and supply factors. Next, it compares the current episode with previous oil market disruptions over the past half-century. This is followed by an estimation of the impact of previous oil price plunges on output using a local projections model since 1970. The paper then proceeds to discuss energy policy reforms following the 2014-16 oil price plunge, including a review of diversification efforts and energy-pricing measures. The paper concludes with a summary of findings.

2. Drivers of the recent oil price plunge

This section reviews recent oil market developments and uses a structural vector autoregression model to decompose the price decline into demand and supply factors.

2.1 Oil market developments during the onset of the COVID-19 pandemic

By one measure, the European Brent spot price, crude oil prices fell by 85 percent between January 22, 2020 (the date the first recorded human-to-human COVID-19 infection was announced) and their trough of $9 per barrel on April 21, 2020 before recovering in May to less than half their January average (Figure 1).[3] The oil market has been hit by an unprecedented combination of demand and supply shocks. The pandemic, and the restrictions on business and personal activities imposed to stem its spread, have triggered a global recession, and a steep drop in the demand for oil (World Bank 2020b). Total oil demand fell by 5 percent in the first quarter of 2020 and is projected to decline 18 percent in the second quarter of 2020 (IEA 2020). This coincided with a delay in early March of OPEC and its partners (OPEC+) to agree to an extension of their production cuts (World Bank 2020a). Meanwhile, petroleum inventories have risen rapidly and are now close to capacity (IEA 2020).

2.2 Methodology and data

A structural vector autoregression (SVAR), as in Kilian and Murphy (2014), is used to decompose the oil price decline in 2020 into demand- and supply-driven factors. The SVAR includes the logarithms of global oil production, global oil prices, global industrial production, and OECD inventories. Three shocks are identified using a combination of sign restrictions on impact responses and on the impact price elasticity of oil demand.

Sign restrictions. The decomposition identifies a positive supply shock—such as would have been caused by the failure of the OPEC agreement in early March—as an event that lowers prices and at the same time raises both global oil output and industrial production. In contrast, a negative demand shock—such as would have been caused by travel restrictions or falling global growth—

[3] Another frequently used measure, the Dated Brent spot price, fell by 72 percent over this period, on par with the 70 percent decline during the global financial crisis (end-August to late December 2008) and the 76 percent decline during end-June 2014-mid-January 2016. In late-April, the West Texas Intermediate oil price (a U.S. oil price benchmark) contract for delivery in May temporarily fell below zero on concerns about near-full U.S. storage capacity; however, no physical oil was traded at negative prices.

is an event that lowers oil prices amid falling oil output and industrial production. A positive speculative demand shock (such as the residual in Figure 2.F) is identified as one that raises oil inventories, increases prices and oil production, and reduces industrial production.

Elasticity restrictions. Restrictions are imposed on the short-run price elasticity of oil demand. The impact price elasticity of demand is assumed to be non-positive; the median draw in the range -0.2 to -0.1 is used, in line with estimates of the elasticity since the 1980s in Baumeister and Peersman (2013).

Data. The exercise set uses monthly data from January 1980 to April 2020. Global industrial production is the production-weighted average of industrial production in 31 advanced economies and 47 EMDEs, in an unbalanced sample depending on data availability. Data for industrial production in April is estimated as the level predicted by the global manufacturing purchasing managers' index. Global oil production is from the International Energy Agency (IEA) from 1987-2020 and the U.S. Energy Information Administration (EIA) from 1980-86. Oil prices are the unweighted average of Brent, West Texas Intermediate, and Dubai crude oil prices from the World Bank's Pink Sheet, measured in U.S. dollars. OECD inventories use IEA data from 1991-2020 and EIA data from 1987-1990. In April 2020 and prior to 1987, percent changes in U.S. inventories, which account for about one-third of OECD inventories, are used to proxy for changes in OECD inventories.

2.3 Results

The oil price plunge in 2020 has been mostly demand-driven, although supply factors have also played a role. The SVAR decomposition suggests that two-thirds of the price decline in the six months ending in April 2020 has been due to falling demand.[4] The demand and supply factors surrounding the recent plunge in oil prices are discussed below.

Demand decline resulting from lockdowns. The single largest factor driving the collapse in oil prices has been the sharp reduction in oil demand arising from government restrictions to stem the

[4] In contrast, other research finds that only around one-third of the fall in oil prices can be attributed to demand conditions, while supply factors explain most of the remainder of the fall (Groen and Nattinger 2020). Instead of industrial production as a proxy for oil demand, these other models use asset prices which have considerably more resilience than real activity indicators (in part reflecting monetary policy measures). If anything, other factors, in particular the widespread anticipation of a delay in OPEC+ negotiations, point to an even greater role of demand than estimated here.

spread of the pandemic. Many countries have implemented wide-ranging travel bans, sharply reducing the number of flights. Stay-at-home orders and a widespread shift to remote working have caused the number of passenger journeys to plummet. For example, passenger journeys in China fell by three-fifths compared to their normal level in March, while subway journeys in New York fell by more than nine-tenths in April (Figure 2). There has also been a reduction in the volume of shipping, both for consumers (most notably cruises) and container shipping for industry, as a result of shrinking global trade. The unprecedented reduction in transport in many countries—which accounts for around two-thirds of demand for oil—has led to a sharp fall in fuel consumption.

Demand decline resulting from the economic downturn. The global recession currently unfolding, which is on track to be the steepest in the past eight decades, also reduces global consumption of oil.[5] Declines in economic growth can lead to sharp falls in oil prices, because of the high income elasticity of demand for oil. Over the past two decades, a 1 percentage-point decline in income growth in the United States or China has typically been associated with a 13 and 10 percent fall, respectively, in global oil prices after one year.

Supply fluctuations. Oil markets have also been buffeted by production decisions by OPEC and its partners. Following several years of rapid growth in U.S. shale oil production and amid falling global oil demand, the production agreement among OPEC+ partners failed to be renewed in early March.[6] This exacerbated the initial decline in prices and triggered a further 24 percent fall in prices the day after the announcement. In early April, OPEC and its partners announced a new agreement to cut production by a historically large 9.7 percent in May and June that would be unwound gradually. However, the size of the cuts was apparently insufficient to reassure markets that they would offset the decline in consumption, and oil prices fell further following the announcement.

[5] See Baffes, Kabundi, and Nagle (2020); Csereklyei, del Mar Rubio Varas, and Stern (2016); Gately and Huntington (2002); and World Bank (2018a).
[6] OPEC+ includes all OPEC countries, together with Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, Sudan, and South Sudan.

3. Comparison with previous periods of oil market disruptions

The preceding section estimated the contribution of supply and demand factors to the recent oil price decline. This section compares the current episode with previous oil market turmoil, including past global recessions and travel disruptions. The current episode of widespread economic weakness and travel disruptions has been associated with a considerably steeper oil price collapse than similar episodes in the past (Figure 3). For 2020 as a whole, oil demand is expected to drop by an unprecedented 8 percent— around twice as much as during any previous global recession or oil-specific demand slowdown (IEA 2020).

3.1 Global recessions

Prior to this year's event, there have been four global recessions over the past 70 years: 1975, 1982, 1991, and 2009 (Kose and Ohnsorge 2019; Kose, Sugawara, and Terrones 2020). In each of these episodes, there was a contraction in real per capita global output and broad-based weakness in multiple indicators of global economic activity.

During these recessions, oil prices (and other industrial commodity prices) fell. The sharpest declines occurred during the global financial crisis, when oil prices fell by nearly 60 percent over three months. In most of these recessions, oil prices remained below pre-recession levels for several years.

Oil consumption also typically fell during global recessions. The largest decline in oil consumption occurred in 1980-82, when consumption fell by a cumulative 9 percent from its peak in 1979. The supply-driven spike in oil prices in 1980, around the revolution in the Islamic Republic of Iran, contributed to the global recession in 1981-82, which further depressed oil consumption. In contrast, the two most recent recessions saw much smaller declines in oil demand. For the 2008-09 recession, this reflected the strong shift in global oil consumption towards China, which continued to grow robustly through the global financial crisis (Stocker et al. 2018).

3.2 Travel disruptions

Measures implemented in 2020 to limit the spread of the pandemic bear some similarities to the widespread travel disruptions in the aftermath of the terrorist attacks on the United States on September 11, 2001. U.S. airline passenger traffic fell by 30 percent in the immediate aftermath of the attacks and remained as much as 7 percent lower after two years (Ito and Lee 2005). The attacks also resulted in a sharp spike in uncertainty and prolonged the recession following the dot-com collapse in the United States, and hence the slowdown in global activity.

In the aftermath of the 9/11 attacks, oil prices fell sharply (by one-third over the following two months), while other commodity prices were largely unaffected. Travel disruption disproportionately affected oil consumption but heightened uncertainty and slowing growth also weighed on oil demand. However, the oil price decline was short-lived: within six months, oil prices had returned above their pre-attack levels. Oil consumption growth averaged close to zero in the three quarters following the attacks, down from an average of 1.5 percent (y/y) in the previous four quarters.

4. Implications of oil price plunges for the global economy

All else being equal, low oil prices might be expected to help boost global growth, including by stimulating energy-intensive activities such as travel and transportation. Moreover, by dampening inflation, lower prices would also give central banks more room to ease monetary policy (Baffes et al. 2015; Ratti and Vespigniani 2016).[7] However, these effects would vary across countries: Energy exporters in particular would suffer real income losses, which would dampen consumption and investment.

In practice, however, all of the oil price plunges since 1970 have been accompanied by global recessions, global slowdowns and, in some cases, widespread financial crises.[8] Three reasons may account for this. First, the source—many of the past oil price plunges were themselves responses to economic downturns rather than independent shocks that might have triggered upturns (Cashin, Mohaddes, and Raissi 2014; Kilian 2009; Peersman and Van Robays 2012). Second, the timing—during oil price plunges, the output losses in energy exporters materialized more quickly than output gains in energy importers, resulting in short-term global growth slowdowns (de Michelis, Ferreira, and Iacovelli, forthcoming). Third, asymmetries—uncertainty, frictions, and asymmetric

[7] Depending on the source of the fall in oil prices, it may also depress equity markets (Kang, Ratti, and Vespigniani 2016).

[8] The long-term benefits that may have ensued go beyond the scope of this section.

monetary policy responses can create asymmetries that increase the damage to energy exporters compared with the benefits to energy importers.[9]

4.1 Features of past oil price plunges

Since 1970, the global economy has witnessed seven oil price plunges when oil prices fell by 30 percent or more over a six-month period: 1985-86, 1990-91, 1998, 2001, 2008-09, 2014-16, and 2020. The previous oil price plunges in 1990-91, 1998, 2001, and 2008-09 were one-half to entirely (2008-09) demand-driven, whereas the oil price plunges of 1985-86 and 2014-16 were four-fifths and two-thirds supply-driven, respectively (Figure 2).[10] The duration of previous oil price plunge episodes varies—those associated with global slowdowns were short-lived (1998, 2001), with oil prices regaining their pre-plunge levels in less than four years. In contrast, oil price plunges around global recessions (1990-91, 2008-09) and largely supply-driven plunges (1985-86, 2014-16) were followed by more prolonged periods of low prices (Figure 4). Similarly, oil price plunges associated with global slowdowns (1998, 2001) were shallower than those around global recessions (2008-09, 1990-91) or those associated with largely supply-driven plunges (1985-86, 2014-16). The oil price plunge of 2014-16 was particularly protracted.

1985-86. The 1985-86 oil price slump arose from a supply shock as OPEC reverted to its production target of 30 mb/d in response to rising oil supply from the North Sea and Mexico and breaches of OPEC production agreements (Gately, Adelman, and Griffin 1986). The oil price plunge ushered in a period of weak growth and significant debt problems in some large EMDEs as well as slow growth in European countries, and, at the end of 1987, a significant downward correction in U.S. and global stock markets

1990-91. While the oil price decline of 1990-91 satisfy the definition employed here, it differed from other oil price plunges in being a reversal of a previous oil price spike triggered by the first Gulf War. Despite monetary policy loosening, global growth slowed in 1991 before recovering modestly in 1992-93, as a recession in Europe ran its course, the recovery in the United States

[9] See Hamilton (2011); Hoffman (2012); Jimenez-Rodriguez and Sanchez (2005); and Jo (2014).

[10] The 1990-91 plunge was almost equally demand- and supply-driven. It reflected a global recession as well as an unwinding of supply concerns triggered by Iraq's invasion of Kuwait. This episode differs from others in that it unwound a short-lived price spike at the beginning of the first Gulf War whereas other episodes followed extended periods of price increases or price stability.

remained hesitant amid financial strains in the savings and loans sector, and Japan entered a period of prolonged stagnation.

1998. The 1997 Asian financial crisis, set against a backdrop of a continued expansion of OPEC production until mid-1998, was accompanied by weakening oil demand and a sharp decline in oil prices (Fattouh 2007). Despite low oil prices, the global recovery remained tepid for most of 1998, partly as a result of the failure of a large asset management fund in the United States and financial stress in major emerging markets.

2001. The disruptions and uncertainty caused by the September 11 terrorist attacks in the United States intensified a growth slowdown already underway as the “dotcom” bubble deflated. Softening global activity and rising uncertainty triggered a sharp decline in oil prices. However, aggressive monetary policy easing by the Federal Reserve and other major central banks supported a rapid rebound in activity.

2008-09. A severe recession following the global financial crisis sent all commodity prices tumbling. The recovery from the global recession was sluggish as many countries faced a wide variety of legacy challenges and global potential growth slowed (Kilic, Kose, and Ohnsorge 2020; Kose and Ohnsorge 2019). However, starting in 2009, strong demand for oil and other commodities from China propelled a rebound in their prices.

2014-16. Between mid-2014 and early 2015, oil prices fell by more than 50 percent and then continued to fall until their trough in early 2016. The decline was triggered by a combination of surging U.S. shale oil production, receding geopolitical risks involving some key producers, shifts in policies by OPEC, and weakening global growth prospects (Baffes et al. 2015; Baumeister and Kilian 2016b; World Bank 2018a). Supply factors accounted for about two-thirds of the oil price decline (Figure 2; Baffes et al. 2015b).[11] It was accompanied by a period of slowing global potential growth (World Bank 2018c, 2019b).

4.2 Estimating the impact of past oil price plunges on output

Most of the past oil price plunges were triggered by weakening global growth, which contributed to the decline in oil prices, and were followed by slow recoveries (refer to Section 4.1 above).

[11] Other estimates put the share of supply factors at just under half (Baumeister and Hamilton 2019).

Although virtually all episodes of significant oil price declines since 1984 have been accompanied by monetary policy loosening in advanced economies, several were accompanied or followed by financial market strains.

Methodology. A local projections model is estimated for 155 EMDEs, of which 36 are energy exporters, for 1970-2018. The model estimates the response of real output, investment, and consumption to the seven oil price plunges described above over the following five years. It distinguishes between demand-driven (1998, 2001, 2008-09) and supply-driven oil price plunges (1985-86, 2014-16).

Model specification. The responses of real output, investment, consumption, and productivity growth—denoted by y_t—following oil price collapses are estimated using the local projections model of Jordà (2005). The model is given by the following equation:

$$y_{t+h,j} = \alpha_{(h),j} + \beta_{(h)} E_{t,j} + \sum_{s=1}^{p} \sum_{l=1}^{q} \gamma_{(h)} X_{t-s,j}^{l}$$
$$+ \sum_{s=1}^{p} \delta_{(h),s} y_{t-s,j} + u_{(h)t,j}$$

where $h = 0, \ldots, 5$ is the forecast horizon, $\alpha_{(h),j}$ is country j fixed effects, and $u_{(h)t,j}$ is an error term. The coefficient of interest $\beta(h)$ captures the dynamic multiplier effect (impulse response) of the dependent variable with respect to the event dummy variable $E_{t,j}$. $X_{t,j}^{l}$ represents a set of control variables with coefficients $\gamma_{(h)}$. The specification controls for lagged dependent variables $y_{t-s,j}$. The number of lags for each variable is denoted by p and varies from 1 to 3 for the estimation. While the supply shock is represented by a univariate model, the demand shock controls for lagged output and investment as critical macroeconomic determinants. Driscoll and Kraay (1998) standard errors are used to address cross-sectional and serial correlation. The model is estimated separately for all EMDEs, for energy-exporting EMDEs, and for other EMDEs, and for subgroups of EMDEs with fixed and floating exchange rates and with high and low government debt.

Definitions. Oil price collapses are defined as years in which oil prices fell by 30 percent or more over a six-month period: 1985-86, 1991, 1998, 2001, 2008-09, 2014-16. Largely supply-driven collapses occurred in 1985-86 and 2014-16 when OPEC abandoned production agreements in favor of raising market share; the other oil price collapses were largely demand-driven as recessions lowered energy demand (Baffes et al. 2015).

Data. Using annual data, the sample includes 155 EMDEs for 1970-2018. This includes 36 EMDEs that are energy exporting (oil, gas, or coal), defined as in Appendix 1, and 120 other EMDEs. Data on output, investment, consumption, and productivity are drawn from the World Bank *World Development Indicators*. The exchange rate classification follows the IMF's *Annual Report on Exchange Arrangements and Restrictions*. High (low) public debt is above (below) 70 percent of GDP for high-income EMDEs and 30 percent of GDP for upper-middle-income, lower-middle-income, and low-income EMDEs.

4.3 Empirical results from the local projections model

Demand-driven versus supply-driven oil price plunges. EMDE output evolved differently in demand-driven and supply-driven oil price plunges. In the first year of both supply- and demand-driven oil price plunges, EMDE output fell by about 0.5 and 0.3 percent, respectively (Figure 5). The recovery, however, differed: output recovered after demand-driven oil price plunges and, three years later, had returned to the baseline; after supply-driven oil price plunges, EMDE output did not recover and remained below the baseline three years later.[12]

Demand-driven plunges. The impact on energy exporters and importers were similar for demand-driven plunges. Previous demand-driven oil price plunges were associated with global recessions or slowdowns, which tended to be associated with an initial output decline in EMDEs (0.3 percent) in the year of the plunge that was recouped within three years. Output, investment, and consumption in energy exporters and other EMDEs recovered together with oil prices.

Supply-driven plunges. The impact from supply-driven oil price plunges left a lasting impact on EMDE energy exporters. Supply-driven oil price plunges were associated with initial output losses in energy exporters of somewhat larger magnitude than those associated with demand-driven plunges (0.5 percent in the first year). Almost three quarters of these output losses persisted into the third year. Three years after the shock, investment and consumption in energy exporters were still 1.4 and 0.6 percent, respectively, below baseline levels. These lasting losses may have

[12] Based on vector autoregression models, existing studies find wide ranges of impacts. A demand-driven 30 percent oil price decline reduces output by 0-5 percent over a year or two, an oil-specific demand decline reduces output by 0.3-4 percent over a year or two, and a supply-driven oil price decline reduces output by 0-15 percent over a year or two. These studies include Aastveit, Bjørland, and Thorsrud (2015); Baumeister and Hamilton (2019); Baumeister and Peersman (2013); Cashin, Mohaddes, and Raissi (2014); Killian (2009); Kilian and Murphy (2014); Mohaddes and Raissi (2019); and Peersman and Robays (2012).

reflected a reassessment of long-term growth prospects of energy exporters in supply-driven oil price drops. Meanwhile, growth gains in energy importers were gradual and delayed (de Michalis, Ferreira, and Iacovelli forthcoming).

Policies mattered. Energy-exporters tend to be particularly hard-hit by supply-driven oil price plunges, but even in those plunges, energy-exporting EMDEs with flexible exchange rates, lower debt, and more diversified export bases suffered smaller output losses than those with fixed exchange rates, higher debt, and less diversified export bases.[13]

5. Lessons from the 2014-16 oil price plunge and comparison with the 2020 episode

The 2014-16 oil price plunge was followed by a sharp global growth decline. The oil price plunge of 2020 is similarly unlikely, by itself, to trigger a global growth rebound because of its demand-driven nature and the disruptions that it may cause in energy-exporting EMDEs.

5.1 The 2014-16 oil price plunge

In late 2014, the 50 percent decline in oil prices between June and November 2014 was expected to lift global GDP by around 0.3-0.7 percent (Arezki and Blanchard 2014). The cheaper cost of a critical input into global production was expected to raise global activity, and the transfer of income and wealth from energy-exporting economies with higher savings rates to energy-importing economies, with higher propensities to spend, was also expected to boost global demand (Baffes et al. 2015; World Bank 2015a). While lower oil prices were expected to depress investment in the oil industry, this was expected to be more than offset by the boost to consumption and energy-intensive sectors (transportation, manufacturing, and agriculture).

However, the expected "shot in the arm" to global growth was slow to materialize. Instead, in 2016, global growth slowed to a near-post-crisis low of 2.6 percent. Global growth only picked up in 2017-18 once considerable policy stimulus was put in place in major economies. The disappointing short-term growth trajectory reflected several factors as outlined below.

[13] In demand-driven plunges, similar patterns emerged but differences were less pronounced and there was wide heterogeneity between countries.

Impact on energy exporters, and policy response. The impact of the oil price plunge of 2014-16 on commodity exporters was severe. Growth slowed in more than 70 percent of energy-exporting EMDEs in 2015 and 2016, with many facing declining consumption and investment (Figure 6). Since energy-exporting countries are generally less diversified than other commodity exporters, they are particularly vulnerable to oil price declines (Aslam et al. 2016).

Many EMDE energy exporters, relying heavily on hydrocarbon revenues, were forced to tighten fiscal policies to realign spending with revenues, despite rising economic slack and diminishing long-term growth prospects.[14] Some were able to at least partially mitigate exchange rate and fiscal pressures by drawing on sovereign wealth funds (World Bank 2015a).

Fiscal policy tightening was often compounded by monetary policy tightening, and exchange rate market intervention to support currencies or currency pegs. As foreign reserves eroded, several countries eventually adopted more flexible exchange rate regimes as part of the adjustment to low oil prices. A small number of countries with severe liquidity pressures resorted to unconventional measures (Sommer et al. 2016).

Adverse spillovers from the slowdown in energy exporters. Headwinds in Russia and the Gulf Cooperation Council (GCC) economies reduced within-region flows of trade, remittances, foreign direct investment, and official grants (World Bank 2015a, 2016c). Energy-exporting low-income countries (Chad, South Sudan) were hit particularly hard, as the effect of the oil price shock was exacerbated by conflict and deteriorating security conditions.

Impact on energy importers, and policy response. Energy-importing EMDEs and advanced economies experienced a stalled recovery in 2015-16. In part, this also reflected China's energy mix and rebalancing needs (Figure 7). China is the second-largest oil importer in the world, but the share of oil in its overall energy consumption is the lowest among G20 economies. Regulated fuel costs and a low energy and transportation weight in consumer baskets limit real income gains for consumers from lower oil prices (World Bank 2015a). The oil price plunge also coincided with

[14] See Danforth, Medas, and Salins (2016) and World Bank (2016a, 2016b, 2017a). The effects of the price shock were also exacerbated by idiosyncratic factors, including sanctions on Russia and conflict and geopolitical tensions in the Middle East and North Africa region.

a policy-guided near halving of investment growth, which tends to be resource-intensive, to ease growth to a more sustainable level.[15]

In the United States, the boost to private consumption from lower oil prices was partly offset in the short run by a sharper-than-expected contraction in capital spending in the energy sector (Baumeister and Kilian 2016a). This investment is highly price elastic (Bjørnland, Nordvik, and Rohrer 2017; Cakir Melek 2018; Newell and Prest 2019): mining investment halved in the two years that followed the mid-2014 oil price plunge, lowering growth by 0.2 percentage point in both 2015 and 2016.

Additionally, the impact also reflects EMDE energy importers' lower sensitivity to oil price shocks. Activity in energy-importing EMDEs is less responsive to oil price shocks than that in major advanced economies (Aastveit, Bjørnland, and Thorsrud 2014; Caldara, Cavallo, and Iacoviello 2019). This reflects less oil-intensive energy mixes, less energy-intensive consumption, and energy price controls that limit the pass-through of world prices to domestic retail prices. In addition, many countries seized the opportunity to lower energy subsidies (Section 6). While this improved fiscal and external positions, it dampened the benefit to activity in energy-importing EMDEs.

A number of non-oil commodity exporters and commodity importers raised monetary policy rates during 2015–16 to stem currency depreciation. Others reacted to above-target inflation. In some cases, fiscal deteriorations amid slow growth reduced government revenues and required spending cuts.

5.2 The 2020 oil price plunge

Low oil prices are likely to provide, at best, temporary initial support to growth once restrictions to economic activity are lifted and until excess inventories are unwound. In the very short term, restrictions to stem the pandemic are likely to close off the main channel for low oil prices to benefit growth, by limiting transport and other energy-intensive activities. However, even once these restrictions are lifted and energy demand recovers, the current demand-driven oil price plunge is likely to be associated with deep and lasting output losses.

[15] See Huidrom, Kose, and Ohnsorge (2017); Kang and Liao (2016); and World Bank (2016a).

More than in previous demand-driven oil price plunges, the adverse impacts on energy exporters—regardless of whether they are advanced economies or EMDEs—may outweigh benefits to activity in energy importers.[16] Adverse effects are likely to be compounded by new headwinds, including elevated macro-financial vulnerabilities that were less relevant in previous oil price plunges, or even a second wave of infections. That said, there might be a short window early in the recovery when still-high inventories depress prices and support activity.

Implications of the demand-driven nature of oil price plunge. In contrast to the oil price plunge of 2014-16, the 2020 episode has been mainly driven by a collapse in energy demand resulting from restrictions to stem the spread of the pandemic and the global recession (Figure 8). Once the global recovery is underway, and excess inventories are unwound, oil prices would be expected to increase again in tandem with global growth.

Coincidence with other shocks. The public health crisis, a collapse in global trade and tourism, and an unprecedented capital outflows from EMDEs have put economic and financial pressures on energy exporters and importers alike (Figure 8). The number of confirmed infections has soared in energy-exporting EMDEs, as well as energy-importing EMDEs, and the effect of the sharp loss in consumer and investor confidence may linger long after the pandemic has subsided.

Exacerbating the downturn is the collapse in global trade. Global manufacturing activity, tourism, and trade have plunged amid closures of non-essential services, shops, factories, and public spaces; stay-at-home orders travel restrictions; and a high degree of risk aversion of consumers (World Bank 2020b). Likewise, the flight to safety has resulted in a sharp tightening of financial conditions in EMDEs. Global equity markets have fallen sharply, with extreme volatility. EMDE currencies have weakened substantially against the U.S. dollar despite foreign exchange market interventions by central banks. Yield spreads on EMDE bond issues have risen steeply.

Obstacles to policy effectiveness in EMDEs. Many central banks and governments have engaged in large-scale monetary and fiscal stimulus to support their economies amid the pandemic (World Bank 2020b). However, these may not reach the most vulnerable groups. This is of particular concern for economies with widespread informality. Large sections of their population do not have bank accounts, which would usually provide a means for delivering direct cash support quickly

[16] The 2014-16 oil price plunge is a reminder that this will also be a challenge, although to a lesser extent, in energy importing economies with sizable energy sectors.

(World Bank 2020b). By the same token, many people are outside the formal social benefit and tax system, and would not benefit from tax deferments and cuts, or from higher regular social benefits.

Macro-financial vulnerabilities in energy exporters. During the oil price plunge of 2014-16, energy exporters with highly concentrated export and revenues bases, weak fiscal positions, and fixed exchange rates witnessed considerably steeper growth slowdowns. In today's context, these effects are likely to be more pronounced since there has been limited progress in export diversification, and fiscal positions are weaker than they were before the 2014-16 oil price plunge.

In 2014-16, growth in energy exporters with a higher degree of economic diversification (for example, Bahrain, Ghana, Malaysia, Qatar), and a floating exchange rate regime (for example, Albania, Russia), recovered more quickly from the fall in oil prices than in those with low diversification and fixed exchange rates. Fiscal balances also fared better in energy-exporting EMDEs with more flexible exchange rate regimes, in part because real exchange rate depreciation mitigated revenue declines and spurred needed adjustment within the private sector. Growth remained stronger in energy exporters with larger foreign reserves and low historical inflation volatility (Grigoli, Herman, and Swiston 2017; World Bank 2016a). The need for fiscal adjustment was greater in energy-exporting EMDEs that lacked the necessary buffers (Husain et al. 2015; World Bank 2015b). Energy-exporting EMDEs with higher reliance on oil-related revenues faced a more pronounced deterioration in fiscal balances than in those economies that managed to diversify government revenue away from oil before 2014.

Energy exporters remain highly reliant on commodity exports and have more precarious fiscal positions (Figure 9). In 2019, the energy sector continued to account for 12 percent of government revenues in the average energy-exporting EMDE. Government debt in energy-exporting EMDEs had risen to 50 percent of GDP in 2019 from 27 percent of GDP in 2013, and the fiscal balance has turned from near-balance in 2013 to a deficit of 2.7 percent of GDP in 2019 (IMF 2017a; World Bank 2017a). As a result, even after the public health crisis subsides, the need to shore up public finances is likely to weigh on their recovery.

6. Policy reforms following the 2014-16 oil price plunge

The 2014-16 oil price plunge forced many energy exporters into procyclical fiscal tightening that deepened their downturns. Many energy exporters recognized an urgent need to render both their economies and their public finances more resilient, and embarked on reforms to encourage diversification, strengthen non-oil revenues, and cut poorly targeted subsidies (Stocker et al. 2018; Figure 10). Energy-importing EMDEs also seized the opportunity of low oil prices to cut energy subsidies. Current low oil prices may provide a window of opportunity to put in place mechanisms that permanently eliminate energy subsidies.

6.1 Reforms in energy exporters

Energy exporters initiated economic diversification programs, energy subsidy reforms, and measures to strengthen non-energy government revenues.

Diversification programs. Before the current plunge in oil prices, hydrocarbon sector activity represented more than one-third of GDP in a number of countries in Central Asia, Sub-Saharan Africa, and, in particular, the Middle East. Oil production represented the majority of government revenue and exports in most energy-exporting EMDEs in 2013. This suggests an untapped potential for greater diversification of exports and government revenues, which would bolster long-term growth prospects and improve these economies' resilience to external shocks (Hesse 2008; IMF 2016; Lederman and Maloney 2007).

Following the 2014-16 oil price collapse, several large energy-exporting EMDEs laid out medium- to long-term plans to reduce their reliance on the energy sector. As part of Saudi Arabia's 2016 Vision 2030 plan, the National Transformation Program targeted an increase in non-oil commodity exports and non-oil government revenues (Kingdom of Saudi Arabia 2016; World Bank 2016c). Saudi Arabia's fiscal non-oil revenues improved from 7.7 percent of GDP in 2016 to 10 percent of GDP in 2019. Nigeria identified several sectors to promote greater diversification of export earnings and government revenues (Nigeria Ministry of Budget and National Planning 2017). Kazakhstan's "100 Concrete Steps" program, adopted in 2015, aimed to diversify the economy and improve competitiveness and transparency. By the start of 2020, Kazakhstan has completed more than half of these 100 steps, including efforts to improve governance. However, efforts to boost industrialization have encountered challenges, while plans to increase private land ownership have been delayed.

Efforts to encourage diversification have continued and include: reducing labor market rigidities (for example, Saudi Arabia, Oman, Qatar), supporting foreign and private investment (for example, Saudi Arabia), expanding infrastructure investment (for example, Malaysia), improving the business environment (for example, Algeria, Brunei Darussalam, the GCC countries, Kazakhstan, Nigeria, Russia), expanding deeper trade integration within the Eurasian Economic Union (for example, Russia), and strategic investment plans in renewables energy (Azerbaijan, the GCC countries). However, in some cases, the structural reform agenda has faced legislative or implementation delays (for example, Algeria, Kazakhstan).

Energy subsidy reform. The sharp reduction in government revenues among energy-exporting EMDEs led to an increased emphasis on reducing energy subsidies to restore fiscal space, discourage wasteful energy consumption, and reallocate spending to programs that better target the poor (IMF 2017b). Between mid-2014 and end-2016, more than half of energy-exporting EMDEs reformed energy subsidies, including countries in the Middle East and North Africa, Sub-Saharan Africa, East Asia, Latin America, and Central Asia.[17] A number of energy exporters have also reduced utility subsidies although, during the COVID-19 pandemic, subsidies were raised again in some countries (for example, Gabon, Indonesia, Oman, Saudi Arabia, United Arab Emirates).

In some cases, subsidy reform was a significant break from past policy (Krane and Hung 2016; World Bank 2017b). Encouragingly, the design and implementation of recent energy subsidy reforms have been superior to past efforts, which were poorly phased and hampered by insufficient communication to the public about the rationale for reform (Asamoah, Hanedar, and Shang 2017; Clements et al. 2013). In many cases, recent reforms have also helpfully included measures to mitigate the impact on the poor and to strengthen social safety nets (for example, Algeria, Angola, Saudi Arabia). More recently, Nigeria announced plans to eliminate energy subsidies. However,

[17] Energy subsidies were reformed between mid-2014 and late 2017 in Algeria, Bahrain, Cameroon, Ecuador, Gabon, Ghana, the Islamic Republic of Iran, Iraq, Kazakhstan, Kuwait, Malaysia, Nigeria, Oman, Qatar, Saudi Arabia, Sudan, Trinidad and Tobago, Turkmenistan, the United Arab Emirates, and Yemen. Reforms in Angola, Indonesia, and Nigeria, were, however, not sustained once oil prices rose.

revenue-enhancing energy price reforms have remained absent in some countries (for example, Cameroon).

Fiscal reforms. Several countries have implemented tax reforms to compensate for the loss of government revenues and to insulate themselves from future oil price fluctuations (World Bank 2018c). This has included the introduction of taxes on goods and services or value-added taxes (for example, Bahrain, Malaysia, Saudi Arabia, the United Arab Emirates), as well as raising existing VAT or excise tax rates (Bahrain, Colombia, Oman, Saudi Arabia, United Arab Emirates). Russia has implemented a fiscal rule that targets a primary deficit of 0.5 percent of GDP at the benchmark oil price of $40 per barrel (in 2017 U.S. dollars). Any excess fiscal resources that are generated from higher oil prices are saved in the National Welfare Fund. The assets from this fund have already helped Russia support its economy and extend benefits to vulnerable households during the recent pandemic. However implementation of fiscal reforms has stalled in some cases (for example, Kuwait, Oman, Qatar), while exemptions have limited revenue growth in some others (Malaysia).

6.2 Reforms in energy importers

Energy subsidy reform. Like energy-exporting EMDEs, energy-importing EMDEs took advantage of declining oil prices to begin dismantling energy subsidies, which tend to disproportionately benefit those with higher incomes. In addition, they can crowd out public investment and encourage more intensive use of fossil fuels (Arze del Granado, Coady, and Gillingham 2012). Several countries have implemented such reforms in response to the 2014-16 oil price plunge (for example, China, the Arab Republic of Egypt, Mexico, Morocco, Tunisia), but slippages in implementation have occurred in some cases (for example, Egypt, Mexico).[18] In response to the COVID-19 pandemic, some governments have provided fuel price discounts to some sectors (for example, Egypt) or increased subsidies to vulnerable households (for example, Guatemala, Montenegro, Ukraine).

Other reforms. Other reforms have aimed to raise revenues, with some countries increasing taxes on energy or energy-dependent sectors such as transportation (for example, Bangladesh, China, Egypt, Mozambique, Rwanda, South Africa, Vietnam; IEA 2015; IMF 2016; Kojima 2016). These

[18] Mexico has a diversified export base and, hence, is classified as an energy importer.

steps also included measures to avoid energy subsidies reemerging if oil prices rebound—automatic pricing mechanisms or full energy price liberalization have been common (for example, China, Côte d'Ivoire, India, Jordan, Madagascar, Mozambique, Mexico, Thailand, Ukraine; Asamoah, Hanedar, and Shang 2017; Beylis and Cunha 2017).[19]

6.3 Remaining challenges

Some of these policies have yet to bear fruit. Notwithstanding fiscal and energy subsidy reforms in energy exporters, fiscal break-even prices—the oil prices at which government budgets are balanced—in almost all energy-exporting EMDEs exceed current prices, often by considerable margins. Energy subsidies still represented an average of 4 percent of GDP as of 2018 among energy-exporting EMDEs, many of which implemented reforms 2014-16 (Figure 10). In 2019, the share of commodity exports in total goods exports remained as high now as in 2013, before the last oil price plunge. The recent oil price plunge may provide further momentum to proceed with planned reforms and deepen them once the immediate health crisis subsides.

Energy importers, in contrast, could take advantage of lower energy prices to lower subsidies—which averaged over 2.5 percent of GDP in 2018—and utilize these resources to finance urgent health care needs. In energy exporters and importers alike, there is an opportunity to put in place reforms now that are non-binding in the short term but address long-standing inefficiencies and fiscal costs in the long term.

Fiscal space generated by subsidy reforms. Replacing energy subsidies with expanded and better-targeted social safety nets, coupled with structural reforms, can improve fiscal positions while supporting low-income households.[20] Policies to reduce subsidies can help promote growth because fiscal savings generated by lower subsidies can fund productivity-enhancing education and infrastructure. For example, in Egypt, fiscal savings from the energy subsidy reforms were redirected towards social spending (ESMAP 2017b). These policies can also foster low-carbon transition and promote green energy (Monasterolo and Raberto 2019; Mundaca 2017). For energy-

[19] In Mozambique, the elimination of fuel subsidies, the introduction of an automatic fuel price adjustment, and increased tariffs on electricity and public transportation, contributed to the 2 percentage points of GDP narrowing of the primary fiscal balance between 2016 and 2018.
[20] For details, see Coady et al. (2017, 2019); Guénette (2020); Stocker et al. (2018); and World Bank (2014, 2015a, 2015b).

exporting EMDEs, eliminating costly energy subsidies could help offset the collapse in revenue from oil extraction given that oil prices are well below their fiscal breakeven points.

Increasing the chances of success of subsidy reform. Energy subsidy reform raises formidable political-economy challenges (Inchauste and Victor 2017). The different prongs of reforms, however, need to be carefully sequenced and communicated to avoid delays, social unrest or reversals, as has been the experience in some client countries (for example, Ecuador; Worley, Pasquier, and Canpolat 2018). Reforms may prove more lasting if a few principles are observed in their implementation.

- **Entrenching reform:** Reforms formally embedded in legislation may be more likely to be enforced and sustained once oil prices rise again.
- **Transparency:** Reforms are more likely to be sustained if price setting can be de-politicized (Inchauste and Victor 2017). This can be achieved with a transparent formula for setting energy prices.
- **Frequent price adjustments:** A formula with more frequent price adjustments can help avoid larger and more disruptive price changes, especially once oil prices return to more normal levels.
- **Tax design for price stability:** A transparent formula for frequent price adjustments can be accompanied by combination of fixed and variable taxes that can smooth price volatility, such as in the case of Chile.
- **Supporting reforms:** Subsidy cuts that are accompanied by cuts in the cost of other household public services, such as school or public transport fees, or increases in other social benefits can help build public support for reform. In India, for example, the removal of price controls was accompanied by targeted cash transfers and in Brazil by targeted assistance to low-income households for energy conservation (Deichmann and Zhang 2013). Such supporting reforms need to be accompanied by improved capacity to implement benefit programs (Inchauste and Victor 2017).
- **Public awareness:** Awareness campaign can highlight the benefits of subsidy reforms, in terms of giving greater room for higher-priority spending, and thus raise public support for reform (El-Katiri and Fattouh 2017).

Role of competition, legal and regulatory frameworks. Improving the macroeconomic framework and competitive environment can be more effective in improving the financial positions of both consumers and producers than energy subsidies. Carefully designed and properly enforced antitrust laws and consumer protection legislation are essential components of institutional frameworks that support market mechanisms. A sound legal and regulatory framework favoring competitive markets provides a more effective response to many of the problems that subsidies attempt to address. For example, the removal of price controls and barriers to entry in the transportation sector significantly increased competition and lowered transportation costs in Rwanda (Teravaninthorn and Raballand 2009). Even in the case where incumbent firms maintained outsized market shares, the presence of competition and the potential for new entrants significantly lowered their markups.

Energy pricing reform. Even in EMDEs where energy subsidies have been eliminated, the current low oil prices provide an opportunity to introduce carbon pricing and other energy taxation that will discourage inefficient consumption as global oil prices rise again. As a cost-effective instrument for meeting climate targets, 57 initiatives (including 28 emission trading systems) were implemented at the national and subnational level in 2019, covering about 20 percent of global green-house gas emissions (World Bank 2019a). Existing carbon pricing is considered insufficient to meet climate targets, so policymakers should seize the current opportunity of exceptionally low energy prices to put in place pricing formulas now that encourage more energy-efficient growth once the recovery gathers momentum (World Bank 2019a). Finally, support measures for energy-intensive industries during the current pandemic could be made contingent on improvements in fuel efficiency.

7. Conclusion

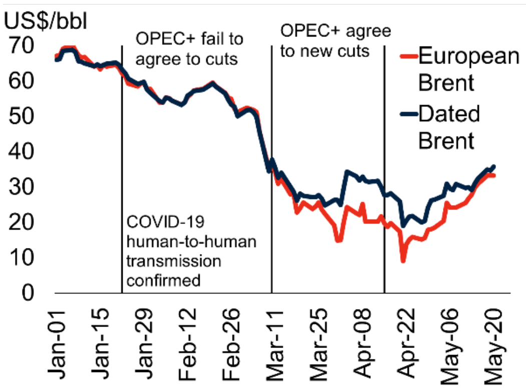
The restrictions imposed to stem the pandemic and the global recession triggered by the outbreak of the COVID-19 pandemic have been accompanied by an unprecedented collapse in oil demand and prices. Unfortunately, the price decline is unlikely to provide much of an immediate buffer for global growth, because of the impact of mitigation measures that are constraining energy-intensive activities and because energy-exporting EMDEs have less fiscal and monetary policy room to counter the impact on their economies. That said, there might be a short window early in a recovery when still-high inventories depress prices and support activity.

Currently, responding to the health emergency and its impact on economic activity remains the immediate priority. In both energy exporters and importers, support measures could focus on boosting health infrastructure and capacity, in addition to protecting employment and social safety nets. To alleviate the burden on fiscal balance sheets, energy exporters and importers with high debt levels may want to preemptively identify priority expenditures that need to be safeguarded if financing shrinks, as well as lower-priority, poorly targeted, or inefficient spending programs that can be delayed or suspended. Additional liquidity could be injected in economies with low and stable inflation to enable banks to extend credit to firms and households, and to prevent widespread insolvency.

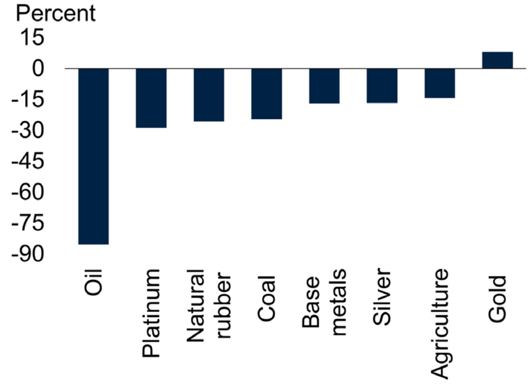
The economic damage of the pandemic could be long lasting, as it will take considerable time to repair the disruptions to labor markets, value chains, and balance sheets, and to restore consumers' confidence in the safety of retail, leisure, and workspaces (World Bank 2020b). Economic and financial weaknesses in energy exporters are especially likely to pose difficulties. This highlights the importance of ensuring that necessary fiscal support during the pandemic be accompanied by credible commitments to restore fiscal sustainability once it subsides. For the energy exporters, this will require pressing ahead with the reform programs that many launched after the price plunge of 2014-16 (Section 6). Some energy-exporting EMDEs have successfully diversified their economies after implementing measures to stimulate non-energy exports, as part of a broad program of reforms to improve the business environment, education, and skills acquisition (for example, Malaysia, Mexico; Callen et al. 2014). For the energy-importing EMDEs, the plunge in oil prices is an opportunity to revisit energy pricing and make lasting fiscal room for higher-priority spending to reignite long-term growth prospects (World Bank 2020b).

Figure 1. Oil price decline

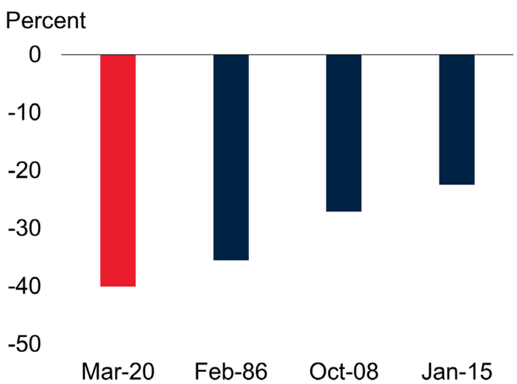
A. Spot oil prices



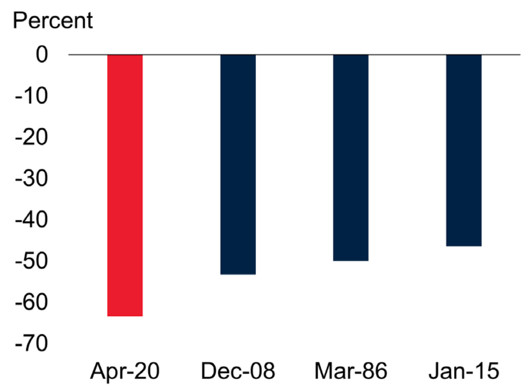
B. Commodity price changes during January 22-April 21, 2020



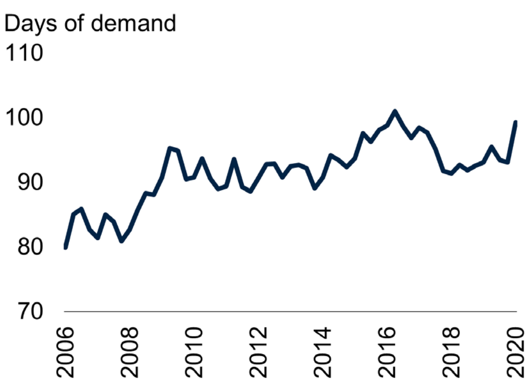
C. Largest one-month declines in oil prices since 1970



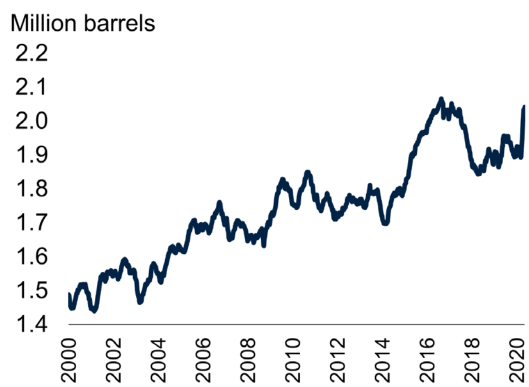
D. Largest cumulative three-month declines in oil prices since 1970



E. OECD oil inventories



F. U.S. oil inventories



Source: Bloomberg; Energy Information Administration; Haver Analytics; International Energy Agency; Thomson Reuters; World Bank.

Note: Oil price refers to Brent oil prices.

A. January 22, 2020 is the date the first human-to-human COVID-19 transmission was announced. Last observation is May 20, 2020. Data is from Bloomberg and U.S. Energy Information Administration.

B. "Base metals" is an unweighted average for aluminum, copper, lead, nickel, tin, and zinc. "Agriculture" shows an unweighted average for corn, rice, and wheat. "Oil price" refers to European Brent spot oil price. Figure shows the change in commodity prices between January 22, 2020, and April 21, 2020, which was the trough in Brent prices.

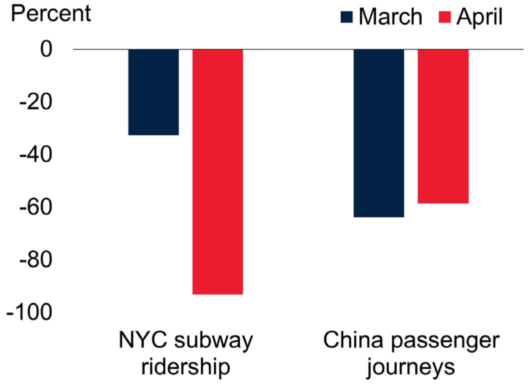
C.D. Figure shows the largest declines in oil prices since 1970. Dates on the horizontal axis indicate the date in which the decline occurred. Months with consecutive declines are omitted.

E. Days of demand represent the level of OECD oil inventories at the end of the quarter (government and industry) divided by average daily OECD oil demand. Last observation is 2020 Q1.

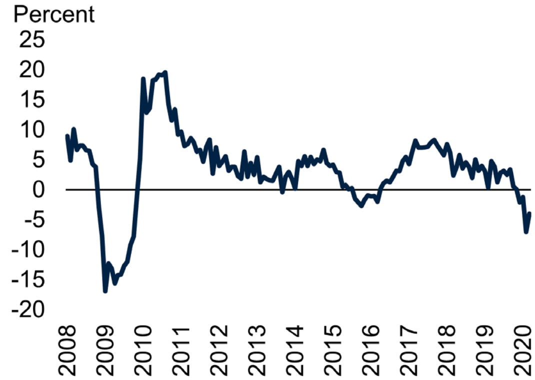
F. Last observation is May 15, 2020.

Figure 2. Drivers of the 2020 oil price plunge

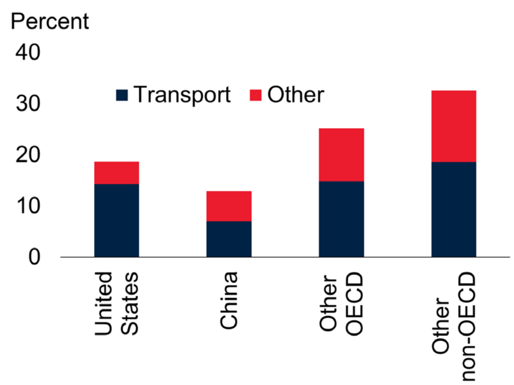
A. Change in transport demand



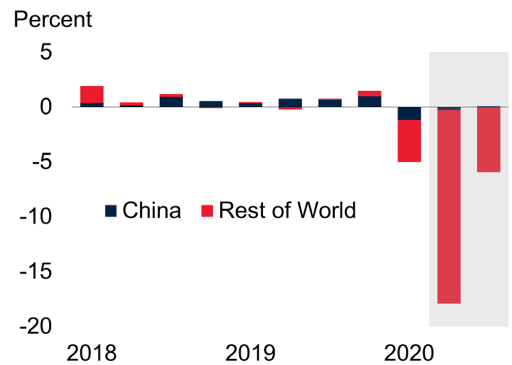
B. Container shipping throughput volume growth



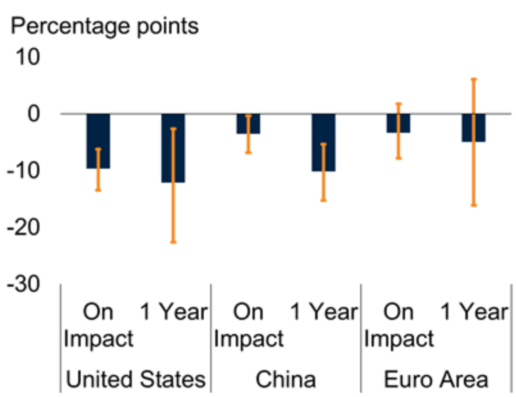
C. Final oil consumption, by country and sector



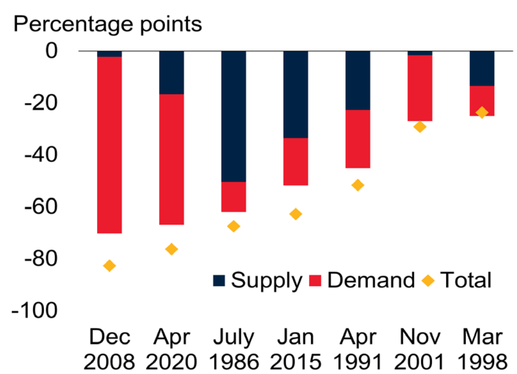
D. Global oil demand growth



E. Impact of a 1 percentage point growth decline in major economies on oil prices



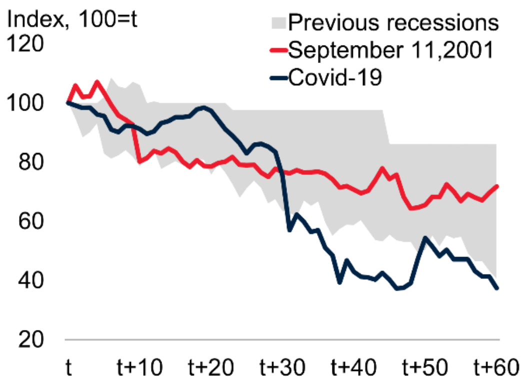
F. Contribution to largest oil price declines since 1970



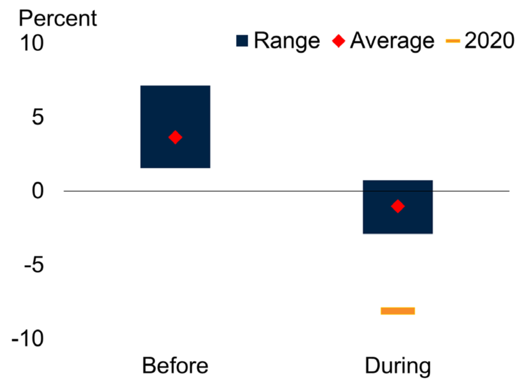
Source: Bloomberg; Institute of Shipping Economics and Logistics; International Energy Agency; New York Metropolitan Transportation Authority; Ministry of Transport of China; World Bank.
A. "NYC subway ridership" is the sum of entries into each station in New York's Metropolitan Transportation Authority network, which serves a population of 15.3 million people across a 5,000-square-mile travel area surrounding New York City, including Long Island, southeastern New York State, and Connecticut. "China passenger journeys" include all daily passenger journeys in China.
B. Year-on-year growth. Last observation is March 2020.
C. Percent of global oil consumption.
D. Shaded area shows IEA estimates for year-on-year demand growth in 2020Q2 and 2020Q3.
E. Based on a Bayesian vector autoregressive estimation. Cumulative response to a 1-percentage-point decline on oil prices on impact or after four quarters. Orange whiskers reflect the 16th-84th percentile confidence bands. The model includes U.S. growth, Euro Area growth, 10-year U.S. government bond interest rate, VIX volatility index, China's growth, oil price, and commodity-importing or commodity-exporting EMDE growth over 2000Q1 to 2019Q2. The model has four lags. Aggregate growth rates calculated using GDP weights at 2010 prices and market exchange rates.
F. Chart shows the contribution to explained six-month log changes (in percent) in oil prices. Decomposition based on structural vector autoregression estimation. For each of the seven episodes, only the month with the deepest six-month oil price plunge is shown (consecutive months are not shown). The gap between the total price decline and the contributions of demand and supply represents speculative demand factor.

Figure 3. Oil markets during past recessions and travel disruptions

A. Oil price



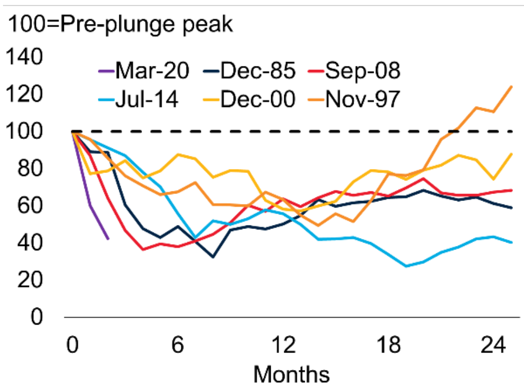
B. Oil consumption growth around recessions



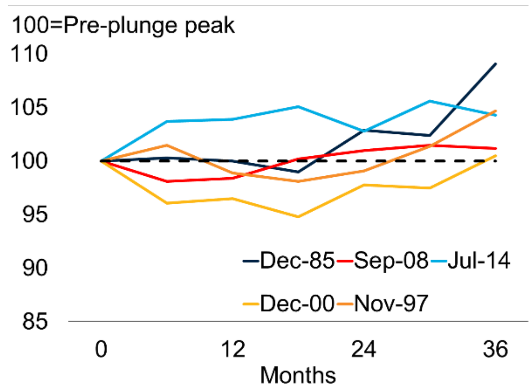
Source: Bloomberg; BP Statistical Review; International Energy Agency; World Bank.
A. The y-axis is a price index, with "100=t" indicating prices at the start of the events. The x-axis shows the passage of time (in days). Start dates for the two events are the first trading day before a major event occurred: September 10, 2001, for 9/11; and January 22, 2020, for COVID-19. Swath shows the four global recessions: 1974-75, 1981-82, 1990-91, and 2008-09. For the first two recessions, daily data were unavailable, so monthly percent changes were taken (assuming each month lasts 22 working days).
B. Dates of recessions are taken from Kose, Sugawara, and Terrones (2020). The four recessions included are: 1974-75; 1981-82; 1990-91; and 2008-09."Before" shows average annual growth rates in commodity consumption over the three years prior to the recession. "During" shows average annual growth rates of recession years. Note that in 1980 a global slowdown occurred with similar negative growth rates in consumption; as such the "Before" period covers 1977-79.

Figure 4. Oil market developments during past oil price plunges

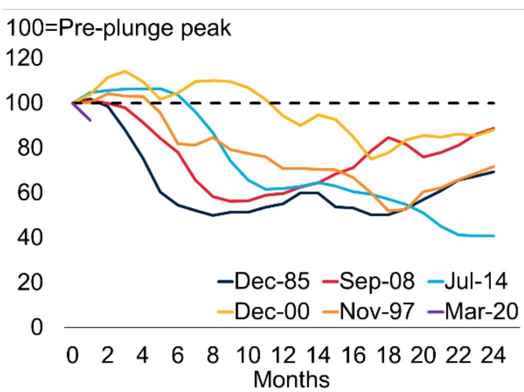
A. Global oil price



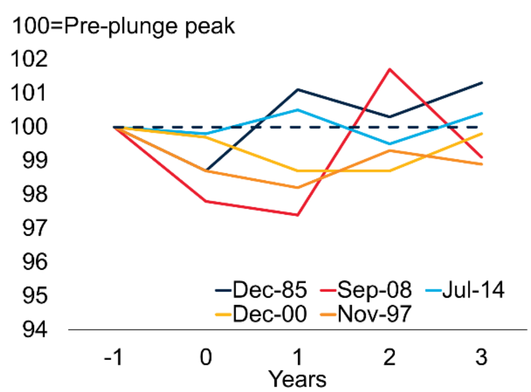
B. Global oil production



C. Global rig count



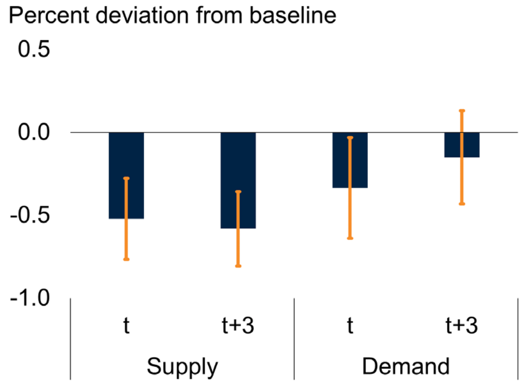
D. Oil demand growth



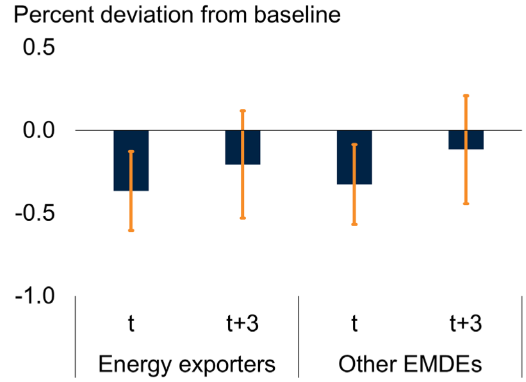
Source: Baker Hughes; Energy Information Administration; International Energy Agency; World Bank.
Note: Horizontal axis shows months (A-C) or years (D) from pre-plunge peak in t = 0. Plunges begin (t = 1) in March 2020, July 2014, September 2008, December 2000, November 1997, and November 1990, and December 1985. All oil prices scaled such that 100 = pre-plunge peak.
D. Refers to annual growth in refined petroleum consumption, scaled such that 100 = pre-plunge growth (1989, 1996, 1999, 2007, 2013).

Figure 5. Macroeconomic developments in EMDEs during past oil price plunges

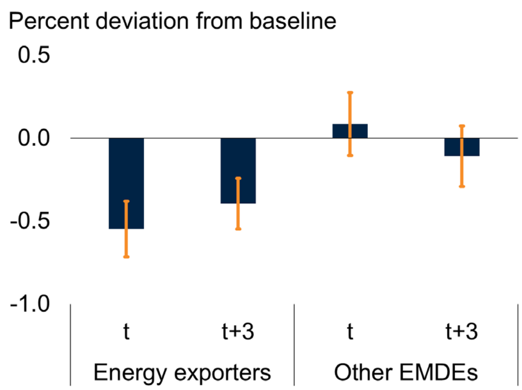
A. Cumulative impulse response of output, by type of oil price plunge



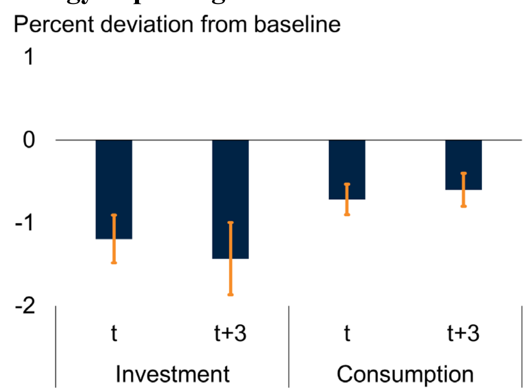
B. Cumulative impulse response of output to demand-driven oil price plunges



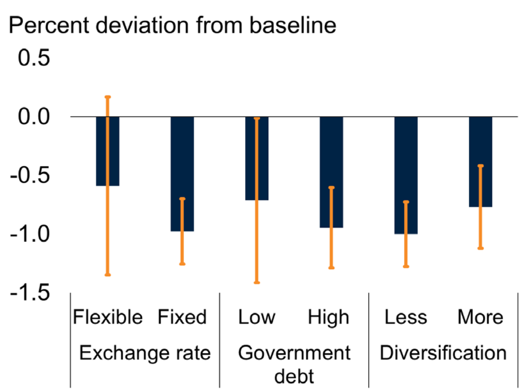
C. Cumulative impulse response of output to supply-driven oil price plunges



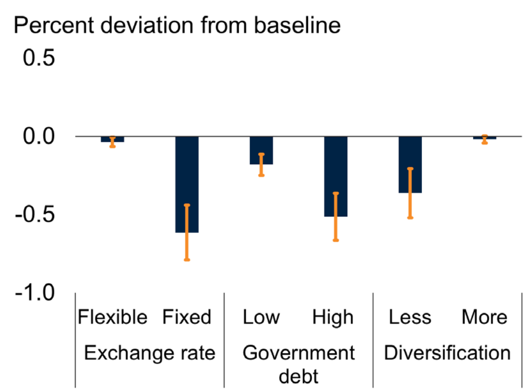
D. Supply-driven oil price plunges: Cumulative investment and consumption responses in energy-exporting EMDEs



E. Demand-driven oil price-plunges: Cumulative output responses of energy-exporting EMDEs



F. Supply-driven oil price plunges: Cumulative output responses of energy-exporting EMDEs



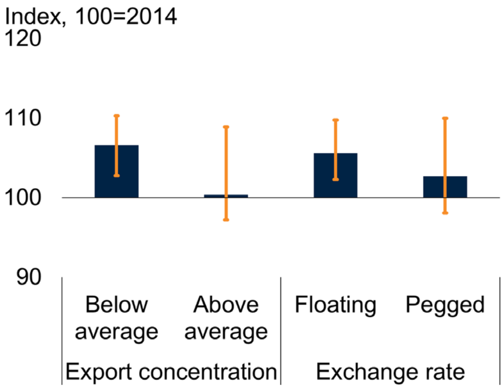
Source: Haver Analytics; International Monetary Fund; World Bank.

Note: Cumulative impulse responses of real output (A, B, C, E, F), real investment (D), and consumption (D) in EMDEs (A, B, C) or in energy-exporting EMDEs (D, E, F) in response to an oil price plunge, based on a local projections model estimated for 155 EMDEs, of which 36 are energy exporters (oil, gas, or coal), for 1970-2018. Numbers on the horizontal axes indicate years since the oil price plunge, which occurs at t=0. Oil price plunges of more than 30 percent over seven months occurred in 1985-86 (supply-driven), 1990-91 (demand-driven), 1998 (demand-driven), 2001 (demand-driven), 2008-09 (demand-driven), and 2014-16 (supply-driven).

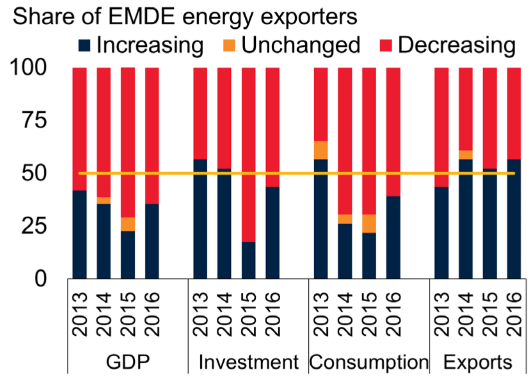
E.F. Output declines in the year following the oil price plunge. High (low) debt is government debt above (below) 30 percent of GDP for upper-middle and lower-middle income economies and 70 percent of GDP for high-income economies. Fixed exchange rates are as defined in IMF's *Annual Report on Exchange Arrangements and Restrictions*.

Figure 6. Impact of 2014-16 oil price plunge on energy exporters

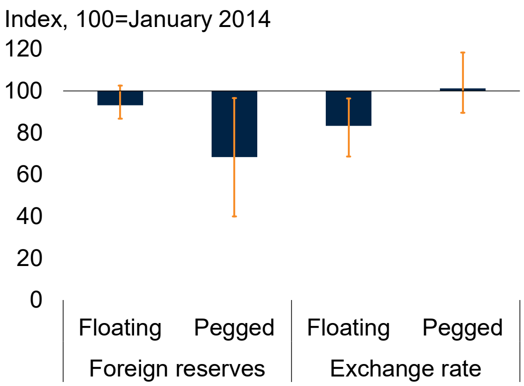
A. Cumulative output increase for energy-exporting EMDEs, 2014-16



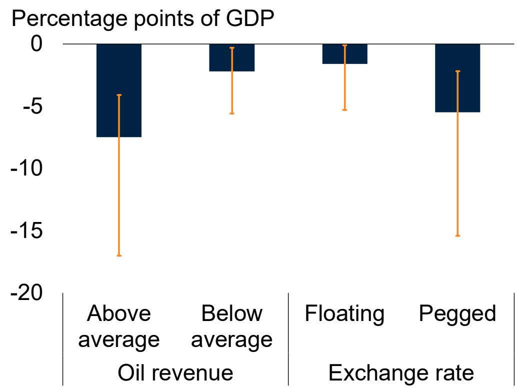
B. Share of energy-exporting EMDEs with increasing/decreasing growth



C. Foreign exchange reserves and nominal effective exchange rate appreciation of energy exporters, 2014-16



D. Change in fiscal balance in energy exporters, 2014-16



Source: Bank for International Settlements; Haver Analytics; International Monetary Fund; United Nations Conference on Trade and Development (UNCTAD); World Bank.

A.C.D. Unweighted averages. Whiskers indicate minimum-maximum ranges.

A. "Above average concentration" and "below average concentration" groups are defined by countries above or below the sample average for export concentration in 2016. Concentration index measures the degree of product concentration, where values closer to 1 indicate a country's exports are highly concentrated on a few products. The average for the sample is 0.6, where 1 is the most concentrated. Exchange rate classification is based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions database, in which countries are ranked 0 (no separate legal tender) to 10 (free float). "Pegged" refers to countries with either a hard or soft peg, which is denoted by a ranking of 1 to 6, while "floating" denotes those with rankings of 7 to 10 and includes countries with horizontal bands and other managed arrangements. Sample includes 34 (exchange rate) or 34 (concentration) energy-exporting EMDEs.

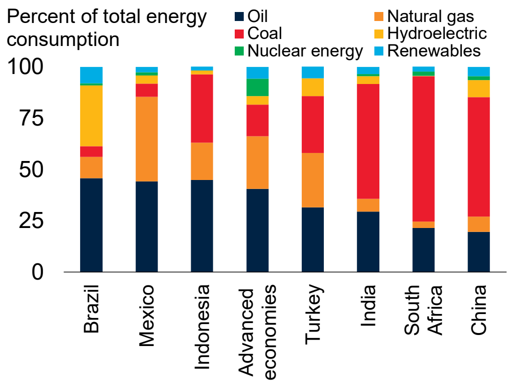
B. Aggregate growth rates calculated using GDP weights at 2010 prices and market exchange rates. Increasing/decreasing growth are changes of at least 0.1 percentage point from the previous year. Countries with a slower pace of contraction from one year to the next are included in the increasing growth category.

C. Nominal effective exchange rate and foreign reserve levels indexed to 100 in January 2014. Change in official reserve assets from 2014 to 2016. Last observation is December 2016.

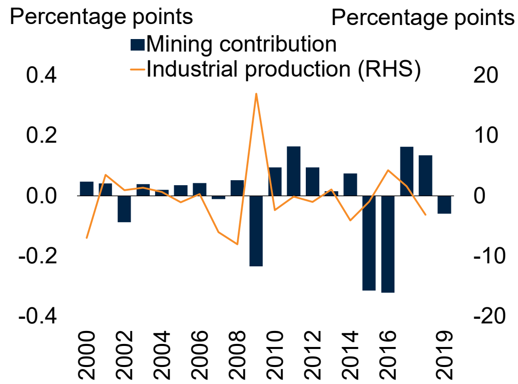
D. Sample includes 28 oil-exporting EMDEs (excludes Albania, Brunei Darussalam, Ghana, Libya, Myanmar, South Sudan, and Turkmenistan). Change in overall fiscal balance is measured from 2014-16. "Above average" and "below average" oil revenue groups are defined by countries above or below the sample average of oil revenues as a share of GDP based on 2014 data.

Figure 7. Impact of 2014-16 oil price plunge on the largest energy importers

A. Consumption of fuels, 2018



B. Contribution of mining investment to U.S. GDP growth and U.S. industrial production growth



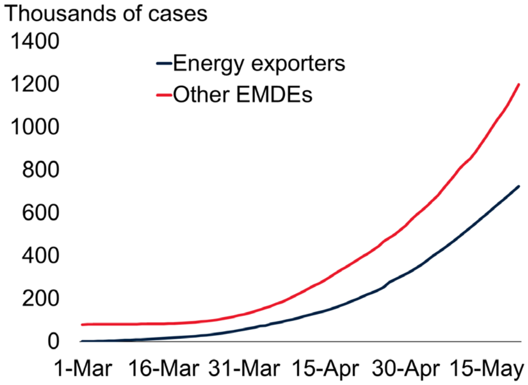
Source: BP Statistical Review; Federal Reserve Bank of St. Louis; U.S. Bureau of Economic Analysis; World Bank.

A. Oil consumption is measured in million tonnes; other fuels in million tonnes of oil equivalent. Renewables are based on gross generation from renewable sources including wind, geothermal, solar, biomass, and waste, but not accounting for cross-border electricity supply.

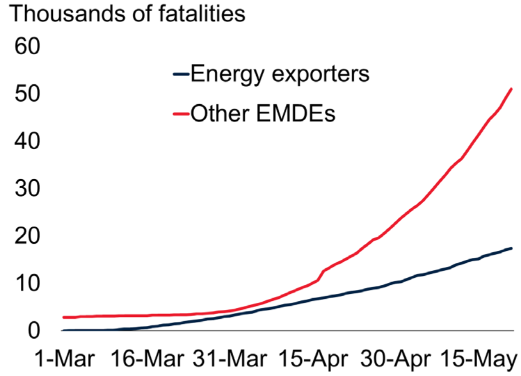
B. Mining investment is real private fixed investment of nonresidential structures for mining exploration, shafts, and wells.

Figure 8. Pandemic and mitigation measures in EMDE energy exporters

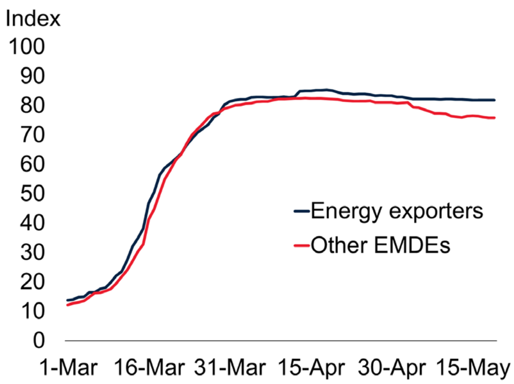
A. Number of reported infections in EMDEs



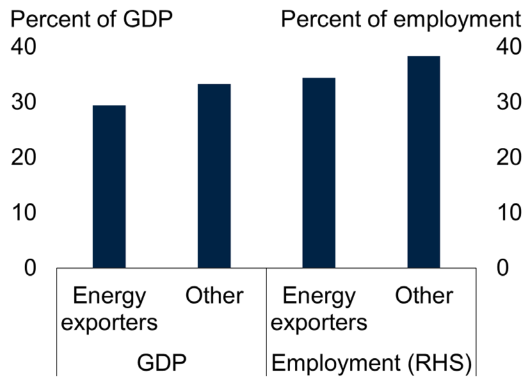
B. Number of COVID-19-related fatalities in EMDEs



C. Stringency of mitigation measures



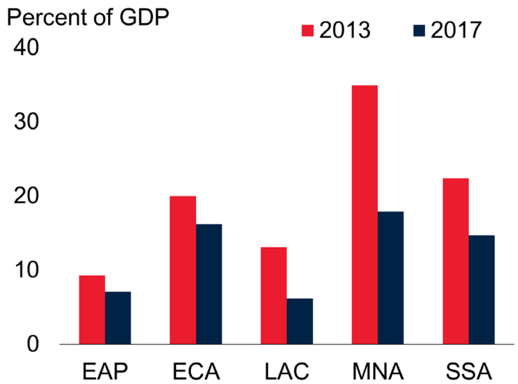
D. Share of informal economy in EMDEs



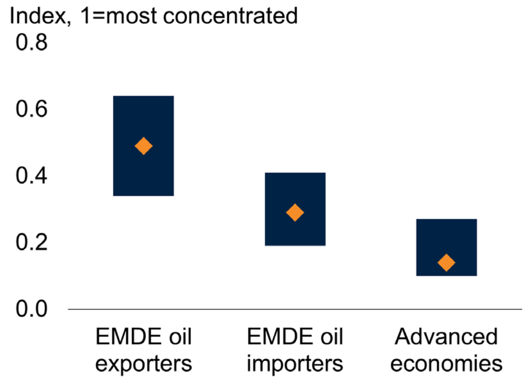
Source: European Centre for Disease Prevention and Control (ECDC); OurWorldInData.org; Oxford COVID-19 Government Response Tracker; World Bank.
A.B. Daily data. Last observation May 21, 2020.
C. The Oxford COVID-19 Government Response Tracker collects publicly available information on 11 indicators of government response including school closures, public events cancellations, and public information campaigns, as well as fiscal and monetary measures and emergency investment in health care. The index ranges between 0 and 100 where higher indicates more stringent measures. Aggregate growth rates calculated using GDP weight at 2010 prices and market exchange rates. To correct for data gaps, data is extended with the most recent observation. Sample includes 121 EMDEs, of which 33 are energy exporters.
D. 2016 data used for share of GDP; 2014 data used for share of employment.

Figure 9. EMDE energy exporters' vulnerabilities: 2014-16 and 2019

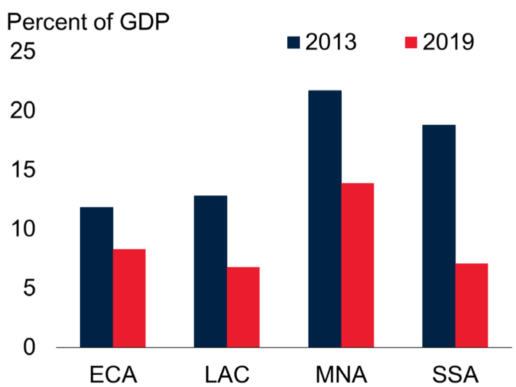
A. Resource sector activity in energy-exporting EMDEs



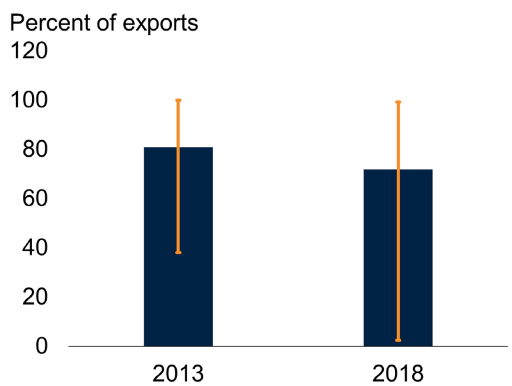
B. Export concentration



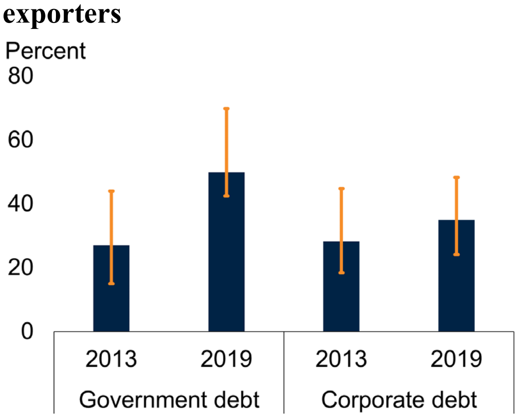
C. Share of energy revenues in government revenues of energy-exporting EMDEs



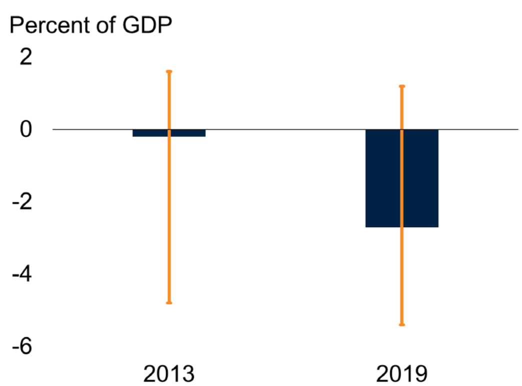
D. Commodity export share of energy exporters



E. Government and corporate debt of energy exporters



F. Fiscal balance of energy exporters



Source: Haver Analytics; International Monetary Fund; United Nations Conference on Trade and Development (UNCTAD); World Bank.

A.C. EAP=East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MNA = Middle East and North Africa, and SSA = Sub-Saharan Africa.

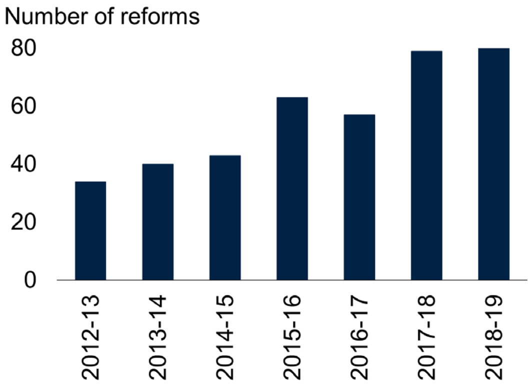
A. Regional aggregates are medians. Sample includes 34 energy-exporting EMDEs. Chart shows resource rents in percent of GDP.

B. Orange diamonds denote the median and blue bars represent the interquartile range of individual country groups. Sample includes 33 energy-exporting EMDEs (excludes South Sudan), 118 energy-importing EMDEs, and 35

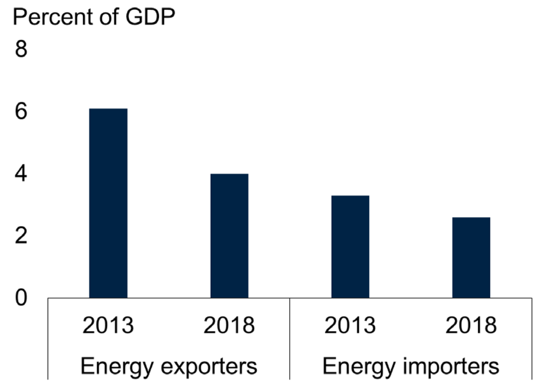
advanced economies. Concentration index measures the degree of product concentration, where values closer to 1 indicate a country's exports are highly concentrated on a few products.
C. Regional aggregates are medians. Sample includes 24 energy-exporting EMDEs (Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Cameroon, Chad, Colombia, Republic of Congo, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kazakhstan, Kuwait, Nigeria, Oman, Qatar, Russia, Saudi Arabia, Sudan, Trinidad and Tobago, and the United Arab Emirates).
D. Blue bars show share of commodities in total goods exports. Orange whiskers show the minimum-maximum range.
E.F. Blue bars show unweighted averages. Orange whiskers show the interquartile range.

Figure 10. Reforms since 2014

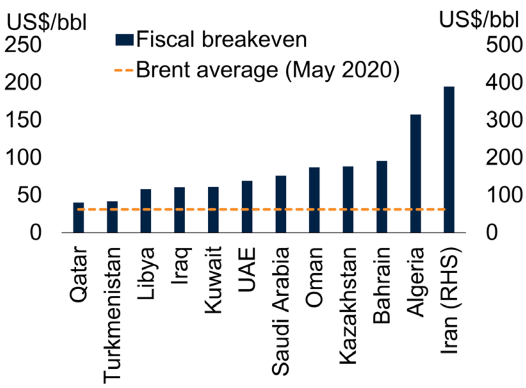
A. Number of reforms in energy exporters



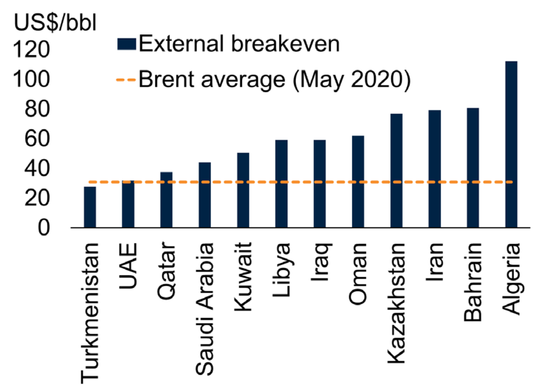
B. Energy subsidies



C. Fiscal breakeven prices for selected energy exporters, 2020



D. External breakeven prices for selected energy exporters, 2020



Source: International Energy Agency; International Monetary Fund; World Bank Doing Business.
A. Sample includes 35 energy-exporting EMDEs.
B. Sample includes 25 energy-exporting EMDEs and 14 energy-importing EMDEs.
C.D. Breakeven prices refer to the oil price at which either the fiscal balance or the current account balance is zero in 2020. Dashed line indicates the average of daily Brent oil prices from May 1, 2020, to May 29, 2020.

Appendix 1. Country classification

EMDE energy exporters[1]	EMDE non-energy commodity exporters[2]	EMDE commodity importers[3]
Albania	Argentina	Afghanistan
Algeria	Armenia	Antigua and Barbuda
Angola	Belize	Bahamas, The
Azerbaijan	Benin	Bangladesh
Bahrain	Botswana	Barbados
Bolivia	Brazil	Belarus
Brunei Darussalam	Burkina Faso	Bhutan
Cameroon	Burundi	Bosnia and Herzegovina
Chad	Central African Republic	Bulgaria
Colombia	Chile	Cabo Verde
Congo, Rep.	Congo, Dem. Rep.	Cambodia
Ecuador	Costa Rica	China
Equatorial Guinea	Côte d'Ivoire	Comoros
Gabon	Ethiopia	Croatia
Ghana	Gambia, The	Djibouti
Indonesia	Guatemala	Dominica
Iran, Islamic Rep.	Guinea	Dominican Republic
Iraq	Guinea-Bissau	Egypt, Arab Rep.
Kazakhstan	Guyana	El Salvador
Kuwait	Honduras	Eritrea
Libya	Kenya	Eswatini
Malaysia	Kosovo	Fiji
Myanmar	Kyrgyz Republic	Georgia
Nigeria	Lao PDR	Grenada
Oman	Liberia	Haiti
Qatar	Madagascar	Hungary
Russia	Malawi	India
Saudi Arabia	Mali	Jamaica
South Sudan	Mauritania	Jordan
Sudan	Mongolia	Kiribati
Timor-Leste	Morocco	Lebanon
Trinidad and Tobago	Mozambique	Lesotho
Turkmenistan	Namibia	Maldives
United Arab Emirates	Nicaragua	Marshall Islands
Venezuela, RB	Niger	Mauritius
Yemen, Rep.	Papua New Guinea	Mexico
	Paraguay	Micronesia, Fed. Sts.
	Peru	Moldova
	Rwanda	Montenegro
	São Tomé and Príncipe	Nauru
	Senegal	Nepal
	Sierra Leone	North Macedonia
	South Africa	Pakistan
	Suriname	Palau
	Tajikistan	Panama
	Tanzania	Philippines
	Togo	Poland
	Uganda	Romania
	Ukraine	Samoa
	Uruguay	Serbia
	Uzbekistan	Seychelles
	West Bank and Gaza	Solomon Islands
	Zambia	Somalia
	Zimbabwe	Sri Lanka
		St. Kitts and Nevis
		St. Lucia
		St. Vincent and the Grenadines
		Syrian Arab Republic
		Thailand
		Tonga
		Tunisia
		Turkey
		Tuvalu
		Vanuatu
		Vietnam

1 A country is classified as energy exporter when, on average in 2012–14, exports of crude oil and natural gas accounted for 20 percent or more of total exports. Countries for which this threshold is met as a result of re-exports are excluded. Countries that are primarily exporters of natural gas are included in this category, as the price of natural gas is tightly connected to crude oil. When data are not available, judgment is used.
2 A country is classified as non-energy commodity exporter when, on average in 2012–14, either (i) total commodities exports accounted for 30 percent or more

of total exports; or (ii) exports of any single commodity other than oil and gas accounted for 20 percent or more of total exports. Countries for which these thresholds are met as a result of re-exports are excluded. When data are not available, judgment is used. This taxonomy results in the classification of some well-diversified economies as importers, even if they are exporters of certain commodities.

3 Commodity importers are EMDE economies that are not classified as commodity exporters.

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