

Oil Prices and the Global Economy: Is It Different This Time Around?

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Arab Oil Exporters: Coping with a New Global Oil Order

Arab Fund for Economic and Social Development

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Motivation

- ▶ The recent plunge in oil prices has, however, brought into question the generally accepted view that lower oil prices are good for the US and the global economy.
- ▶ It has been argued that near-zero interest rates in most industrialized economies, and the fact that the US has started to export crude oil, have altered the **traditional channels** through which the benefit of lower oil prices gets transmitted to the real economy (Obstfeld et al. 2016).
- ▶ Moreover, it has been suggested that the **positive correlation** between oil prices and equity markets in the past few years provides evidence of a slowdown in global economic activity, as a softening of global aggregate demand has reduced firms' profits and demand for oil (Bernanke 2016).
- ▶ Therefore, it is argued that the decline in oil prices this time around is not good news for the US economy, and by implication for the rest of the industrialized global economy.

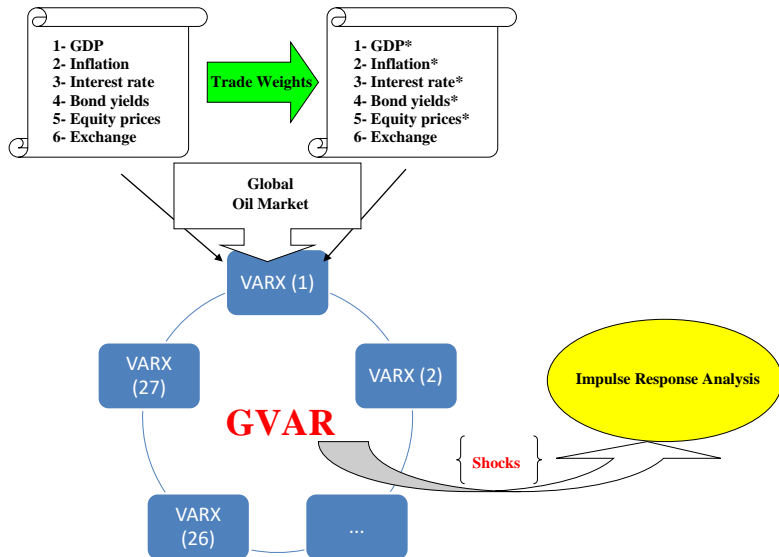
Motivation

- ▶ But the net overall outcome for the global economy is far more complicated and depends on domestic political economy considerations and the **feedback effects** of oil price changes on global energy demand, interest rates, financial markets and world trade.
- ▶ Given that there are many channels through which oil prices can affect economic activity (both real and financial) in the US and elsewhere, one could for instance use the GVAR modelling approach to capture the complicated patterns of global economic interactions; taking into account not only the **direct exposure** of countries to the shocks but also the **indirect effects through secondary or tertiary channels**.
- ▶ The GVAR is a multi-country framework which links country-specific models in a coherent manner using time series and panel data techniques and has been used in bank stress testing, the analysis of China's emergence on the rest of world economy, international transmission of real and financial shocks, and forecasting.

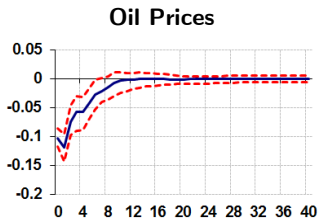
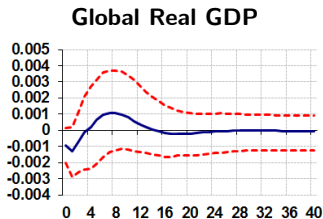
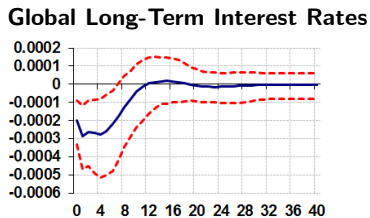
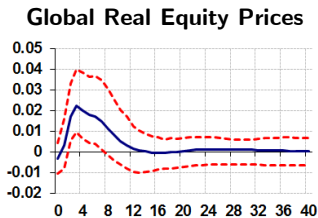
Analyzing the Oil Market Using a Multi-Country Model

- ▶ Firstly, the **disaggregated nature** of the GVAR-Oil model allows one to identify *country-specific* shocks and answer counterfactual questions regarding the possible macroeconomic effects of oil supply disruptions in specific geographical areas on the global economy.
 - ▶ This is in contrast to most of the literature that focuses on the identification of *global* supply shocks, rather than shocks to a specific country or region.
- ▶ Secondly, it allows one to deal with inherent **heterogeneities** that exist across countries.
 - ▶ For instance, in terms of oil reserves and production capacities.
- ▶ Thirdly, it allows one to take into account the **economic interlinkages and spillovers** that exist between different regions.
 - ▶ Thereby enabling a study of the global economy in a coherent manner as opposed to undertaking *country-by-country analysis*.

Analyzing the Oil Market Using a Multi-Country Model



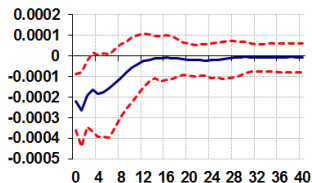
Effects of Lower Oil Prices on the Global Economy



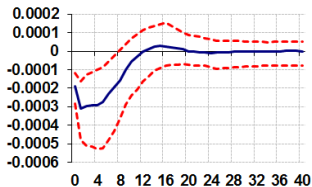
Notes: Figures show median impulse responses to a one-standard-deviation decrease in oil prices, with 95 percent bootstrapped confidence bounds. The horizon is quarterly.

Effects of Lower Oil Prices on Long-Term Interest Rates

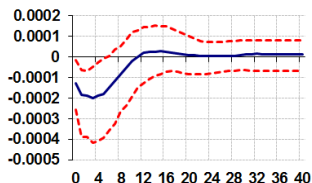
United States



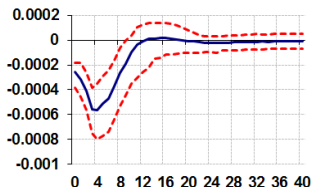
Euro Area



United Kingdom



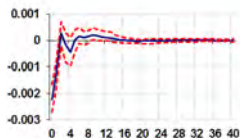
Japan



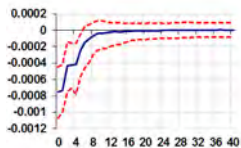
Notes: Figures show median impulse responses to a one-standard-deviation decrease in oil prices, with 95 percent bootstrapped confidence bounds. The horizon is quarterly.

Effects of Lower Oil Prices on Inflation

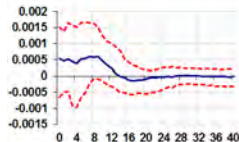
United States



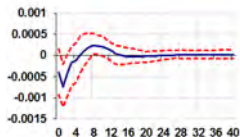
Euro Area



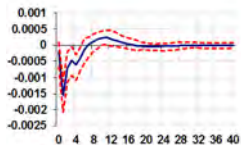
China



United Kingdom



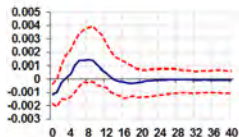
Japan



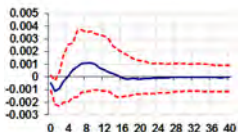
Notes: Figures show median impulse responses to a one-standard-deviation decrease in oil prices, with 95 percent bootstrapped confidence bounds. The horizon is quarterly.

Effects of Lower Oil Prices on Real GDP

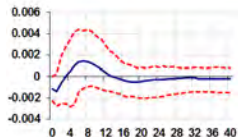
United States



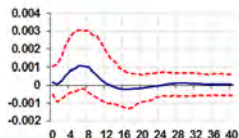
Euro Area



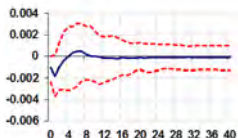
China



United Kingdom



Japan



Notes: Figures show median impulse responses to a one-standard-deviation decrease in oil prices, with 95 percent bootstrapped confidence bounds. The horizon is quarterly.

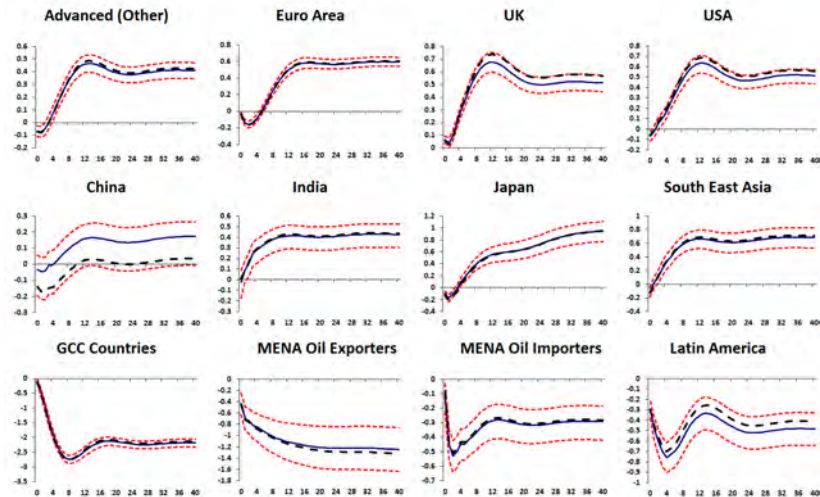
Analyzing the Oil Market Using a Multi-Country Model

- ▶ We find that the fall in oil prices tends to lower interest rates and inflation in most countries, and increase global real equity prices, with these effects showing up relatively quickly, typically within two quarters.
- ▶ However, the positive real output effects, both at the global level and at the country levels, take longer to materialize following an oil price fall, with the positive median impulse responses generally manifesting themselves in the medium-term, around four quarters after a negative oil price shock.
- ▶ Thus the empirical evidence based on the GVAR-Oil model supports the view that an oil price fall is good news for the US, the other major economies, as well as for the global economy.

Focusing on the Impacts of the U.S. Oil Supply Revolution (Mohaddes and Raissi, 2016)

- ▶ The results indicate that while oil importers typically face a long-lived rise in economic activity (ranging between 0.04% and 0.95%) in response to a U.S. supply-driven fall in oil prices, the impact is negative for energy-exporters (being on average -2.14% for the GCC, -1.32% for other MENA oil exporters, and -0.41% for Latin America), **mainly because lower oil prices weakens domestic demand as well as external and fiscal balances in these countries.**
- ▶ Negative growth effects (albeit smaller) are also observed for energy-importers which have strong economic ties with oil exporters, through spillover effects.
- ▶ In particular, for most oil-importers in the MENA region, gains from lower oil prices are offset by a decline in external demand/financing by MENA oil-exporters given strong linkages between the two groups through trade, remittances, tourism, foreign direct investment and grants. These economies on average experience a fall in real output of about 0.28%. For this group, **low pass-through from global oil prices to domestic fuel prices limits the impact on disposable incomes of consumers and profit-margins of firms**, and thereby contains the positive effect on economic growth in these countries.

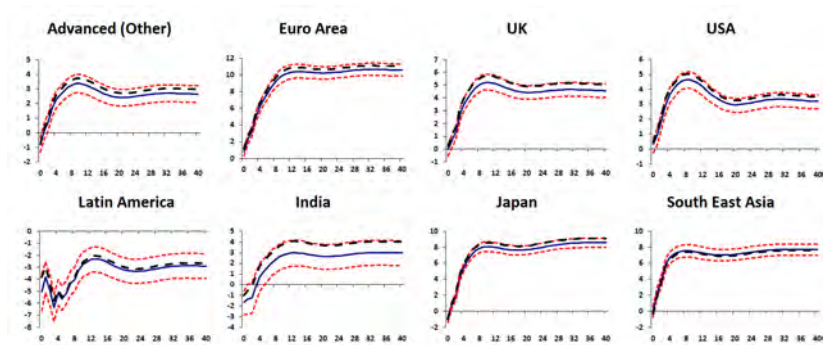
Impact of the U.S. Oil Supply Revolution on Real Output



Source: Mohaddes and Raissi (2016).

Notes: Figures are median (blue solid) and median target (black long-dashed) impulse responses to a one standard deviation fall in the price of oil, equivalent to an annualized drop of 51% in year 1 and 45% in year 2, together with the 5th and 95th percentile error bands. The impact is in percentage points and the horizon is quarterly.

Impact of the U.S. Oil Supply Revolution on Equity Markets



Source: Mohaddes and Raissi (2016).

Notes: Figures are median (blue solid) and median target (black long-dashed) impulse responses to a one standard deviation fall in the price of oil, equivalent to an annualized drop of 51% in year 1 and 45% in year 2, together with the 5th and 95th percentile error bands. The impact is in percentage points and the horizon is quarterly.

Analyzing Oil Price Changes Using Monthly Data

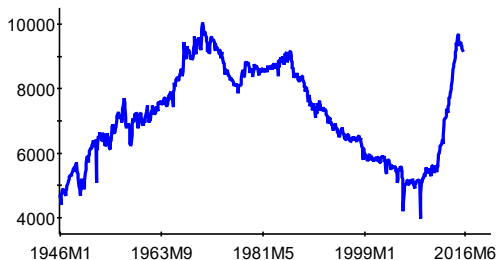
- ▶ To evaluate the effects of recent falls in oil prices, we need to investigate the output-oil price relationship over a number of sub-periods, **including the episode of oil boom and bust since 2008**.
- ▶ Unfortunately, however, quarterly macro series that exist are not sufficiently long for a reliable analysis of output-oil price relationship over different sub-periods, particularly the post-2008 crisis period.
- ▶ We cannot therefore make use of the GVAR-Oil model, but instead we consider bivariate relationships between oil prices, equity prices and dividends (as a proxy for real economic activity).

Analyzing Oil Price Changes Using Monthly Data

- ▶ In what follows we shall mainly focus on the effects of lower oil prices on the US economy for three reasons:
- ▶ Firstly, the US economy has not been dependent on oil imports as much as other industrialized economies, with oil production having first peaked in 1971 (before the shale oil revolution).
 - ▶ The US started to export crude oil in January 2016 after a 40-year ban.
- ▶ Secondly, the US oil and gas sector attracted significant investment over the past decade, including small firms issuing large amounts of debt (estimated over \$350 billion just between 2010 and 2014).
 - ▶ As a result, the losses for US investors in equity and bond markets have been substantial following the recent fall in oil prices, with valuations of US energy companies falling dramatically and the number of gas and oil companies in the US filing for bankruptcy soaring, which could have indirect effects on the US economy through secondary or tertiary channels.

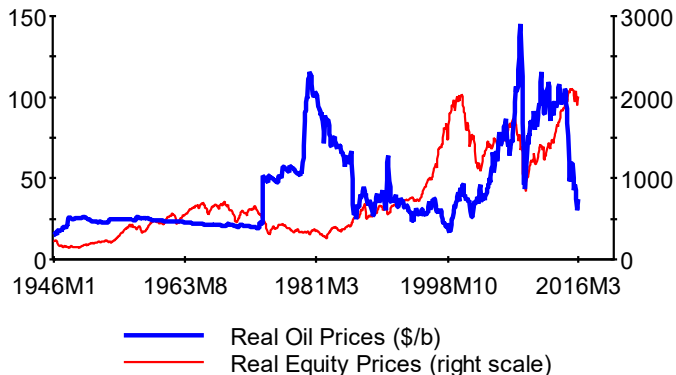
Analyzing Oil Price Changes Using Monthly Data

- ▶ Thirdly, thanks to advances in hydraulic fracturing and directional drilling, oil production has significantly expanded in the US over the past 10 years.
 - ▶ US oil production has risen from 5 million barrels per day (b/d) in January 2008 to 9.2 million b/d in January 2016, around 84% increase.



Data sources: United States Energy Information Administration (EIA).

Real Oil Prices and Real US Equity Prices (S&P 500), 1946M1-2016M3



Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA)

Correlations between Changes in Real Oil Prices, Equity Prices and Dividends

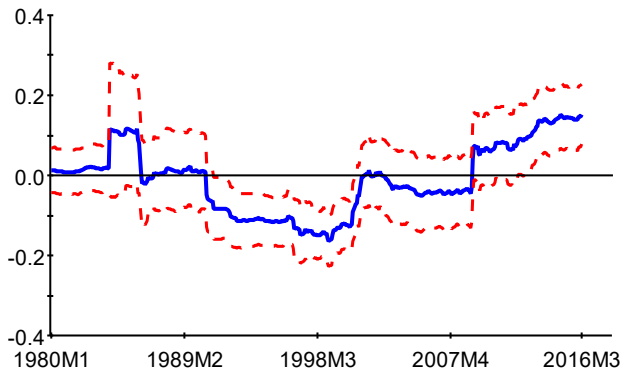
Period	Real Oil and Equity Prices	Real Oil Prices and Dividends
<i>Full Period</i>		
1946M2–2016M3	0.008 (0.035)	-0.105 (0.034)
<i>Sub-Periods</i>		
1960M1–1980M12	0.018 (0.063)	-0.071 (0.063)
1981M1–2000M12	-0.139 (0.064)	-0.163 (0.064)
2001M1–2016M3	0.199 (0.073)	-0.252 (0.072)
<i>Sub-Sub-Periods</i>		
2001M1–2007M12	-0.144 (0.109)	-0.088 (0.110)
2008M1–2016M3	0.404 (0.093)	-0.329 (0.096)

Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Has the Relationship Between Real Oil and Equity Prices been Stable Over Time?

- ▶ To conduct a more robust statistical analysis we use rolling regressions of the rate of change of real equity prices on the rate of change of real oil prices, estimated with 10-year windows.
- ▶ The coefficients were not statistically different from zero before 1990, became negative in 1991 and initially falling (being statistically significant from 1991 to 2001), and then eventually rising and becoming positive since the 2008 financial crisis (being statistically significant from 2012).
- ▶ It is then perhaps not surprising that there is no consensus in the literature on the relationship between oil and equity prices (Jones and Kaul 1996 and Wei 2003).
- ▶ Overall, the empirical evidence suggests that the relationship between real oil and stock prices is **not stable over time**. As such, the recent perverse relationship between equity returns and oil price changes should not be taken as evidence that lower oil prices are bad for the real economy.

Rolling Estimates of the Effects of Changes in Oil Prices on Equity Prices



Notes: Rolling estimates of the coefficient of the rate of change of real oil prices and its two standard error bands. Dependant variable is the rate of change of real US equity prices (S&P 500). The window size is 120 months.

Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Has the Relationship Between Real Oil and Equity Prices been Stable Over Time?

- ▶ A significantly positive relationship between oil and equity prices has emerged since the global financial crisis in 2008, which has been discussed extensively by the media as well as by prominent economists.
 - ▶ See Bernanke's blog at Brookings on February 2016 and Obstfeld et al.'s IMF blog on March 2016.
- ▶ The question is why is this the case?
- ▶ Firstly, while markets are generally efficient and therefore equity prices reflect the fundamentals, there are also episodes when real equity prices do not reflect the state of the economy.
- ▶ In such periods any evidence of a perverse relationship between real equity and oil prices could be due to the disconnect between equity markets and economic fundamentals and **not necessarily any breaks in the relationship between oil prices and the real economy.**

Has the Relationship Between Real Oil and Equity Prices been Stable Over Time?

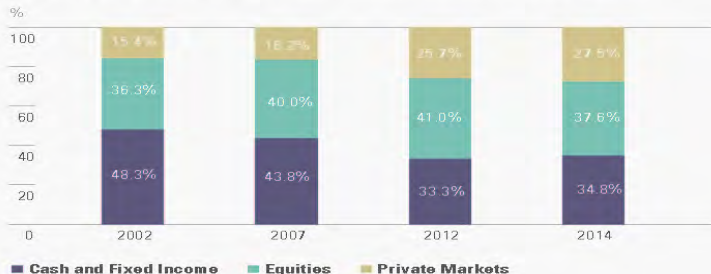
- ▶ Secondly, Sovereign Wealth Funds (SWFs) accumulated large assets during the most recent oil boom (2002-2008) and they have come to play a major role in reserve management of oil revenues.
- ▶ The prominent examples are:
 - ▶ Norway's Government Pension Fund (\$830),
 - ▶ Abu Dhabi Investment Authority (\$773),
 - ▶ Saudi Arabia's Fund (SAMA) (\$685),
 - ▶ Kuwait Investment Authority (\$592),
 - ▶ Qatar Investment Authority (\$256).

With the exception of Norway all figures refer to June 2015.

SWF Portfolio Allocation

On average 65% of SWF assets are held in public and private equities (61% Norway; 72% SAMA; 65% Kuwait; 68% Qatar; 62% Abu Dhabi—figures based on 2014).

Figure 4: Average SWF Asset Allocation, 2002–2014



Source: SSGA research using Sovereign Wealth Centre data set. Allocations are as of the date indicated, are subject to change, and should not be relied upon as current thereafter.

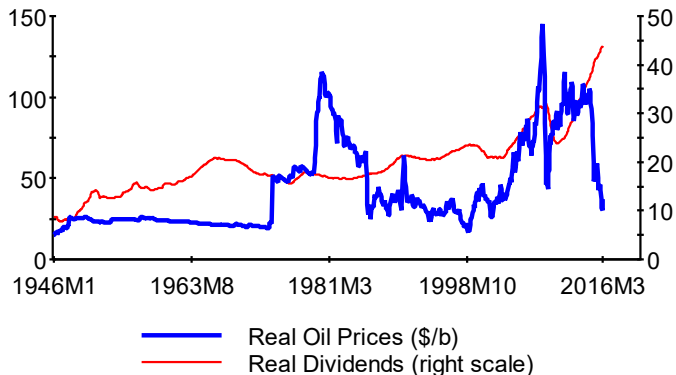
Has the Relationship Between Real Oil and Equity Prices been Stable Over Time?

- ▶ During periods of rising oil prices, these funds are topped up with equity purchases.
- ▶ However, when oil prices are falling most major oil exporters withdraw money from the funds in order to maintain, for instance, their welfare expenditure.
- ▶ The equity transactions of SWFs in turn induce an **unintended positive correlation** between oil and equity prices.
- ▶ Whilst it is true that such effects might not be that large, they could trigger larger effects due to known market over-reactions. See also Blanchard (2016).

Are Lower Oil Prices Beneficial for the US and the World Economy?

- ▶ Ideally we need to consider how oil prices and real activity are related (as opposed to equity markets).
- ▶ However, quarterly GDP series that exist are not sufficiently long for a reliable analysis of output-oil price relationship over different sub-periods, particularly the post-2008 crisis period.
- ▶ While a number of investigators have used monthly measures of US manufacturing output, this is not sufficiently representative of an economy such as that of the US.
- ▶ Instead we use real dividends on S&P 500 as a proxy for economic activity.
 - ▶ In the long run there has to be a relationship between real dividends and the economic climate.

Real Oil Prices and Real Dividends (S&P 500), 1946M1-2016M3



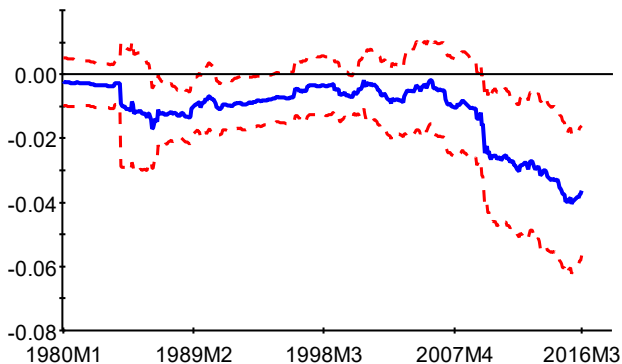
Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Correlations between Changes in Real Oil Prices, Equity Prices and Dividends

Period	Real Oil and Equity Prices	Real Oil Prices and Dividends
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Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Rolling Estimates of the Effects of Changes in Oil Prices on Real Dividends



Notes: Rolling estimates of the coefficient of the rate of change of real oil prices and its two standard error bands based. Dependant variable is the rate of change of real dividends (S&P 500). The window size is 120 months.

Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Are Lower Oil Prices Beneficial for the US and the World Economy?

- ▶ The coefficient of real oil price changes on dividends have been negative over the whole sample period, and statistically significantly negative for most of the period.
 - ▶ The **beneficial effects of lower oil prices on dividends have become even much stronger** over the more recent episodes, with the rolling estimates becoming particularly large and statistically significant post 2009.
- ▶ The rolling estimates give a clear indication of the **changing nature** of the relationships between oil prices, equity prices, and dividends, but do not allow for **changing dynamics** between these variables.
- ▶ Therefore, to check the robustness of the results to the dynamics of adjustments between oil price changes and the economy, we also estimated ARDL models, one with the rate of change of real equity and oil prices and another with the rate of change of real dividends and oil prices.

Estimates of the Long-run Coefficients of Real Oil Prices based on Various ARDL Regressions and Sub-samples

	1970M1 2016M4	1970M1 1989M12	1990M1 2007M12	2008M1 2016M4
(a) ARDL Model with Real Equity Prices				
Oil Price Coefficient	-0.159** (0.073)	-0.176* (0.100)	-0.185*** (0.039)	0.202* (0.118)
ARDL Order	(6, 12)	(2, 12)	(1, 1)	(4, 4)
(b) ARDL Model with Real Dividends				
Oil Price Coefficient	-0.016 (0.017)	-0.046*** (0.014)	-0.092** (0.043)	-0.111** (0.048)
ARDL Order	(1, 3)	(2, 1)	(5, 0)	(1, 0)

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Estimates of the Long-run Coefficients of Real Oil Prices based on Various ARDL Regressions and Sub-samples

	1970M1 2016M4	1970M1 1989M12	1990M1 2007M12	2008M1 2016M4
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(c) ARDL Model with Industrial Production

Oil Price Coefficient	-0.053** (0.025)	-0.084*** (0.029)	-0.019 (0.014)	-0.098 (0.075)
ARDL Order	(12, 11)	(2, 11)	(3, 3)	(12, 10)

(d) ARDL Model with Manufacturing Production

Oil Price Coefficient	-0.075*** (0.027)	-0.116*** (0.036)	-0.022 (0.017)	-0.067 (0.063)
ARDL Order	(3, 11)	(2, 11)	(3, 3)	(12, 8)

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

Data sources: Robert Shiller's online database, Federal Reserve Economic Data (FRED), and United States Energy Information Administration (EIA).

Are Lower Oil Prices Beneficial for the US and the World Economy?

To summarize:

- ▶ There is no stable relationship between real oil prices and equity returns over the last 71 years
 - ▶ The perverse response of equity markets to oil price changes should not be taken as evidence that lower oil prices are no longer beneficial for the US and the world economy.
- ▶ In fact, using relatively long time series on dividends and oil prices we show that, as in previous episodes of falling oil prices, lower oil prices improve profit opportunities and dividends in the oil importing economies which is overall good for the world economy.
 - ▶ This supports the findings from the GVAR-Oil model.
- ▶ However, due to uncertainties over the Brexit negotiations, economic and trade policies under the new US administration, the threat of terrorism, and the surge in financial market volatility (to mention but a few), it is likely that there will be a delay in the materialization of any economic benefits of lower oil prices for the global economy as a whole.

Are Lower Oil Prices Beneficial for the US and the World Economy?

- ▶ Nevertheless, the fall in oil prices has hit the major oil exporters the hardest.
 - ▶ It is not surprising therefore that the fall in oil prices has forced oil exporters to cut back on their welfare programs, withdraw from their oil funds, and attempt to diversify their economies.
- ▶ At the world level, however, we would expect the increase in spending by oil importers to exceed the decline in expenditure by oil exporters (given their different marginal propensities to consume/invest), and so eventually lower oil prices should also be beneficial for the world economy.
 - ▶ This was also clearly illustrated within the GVAR-Oil framework
- ▶ This in turn implies that demand for energy is going to start to rise, which will put upward pressure on oil prices in the medium term, and the equilibrating process starts to take place.

Strong Oil Demand and Supply Growth in 2015

- ▶ Overall, despite falling oil prices, oil production has continued to rise world-wide, with OPEC and non-OPEC contributing to the rise, almost equally in 2015.



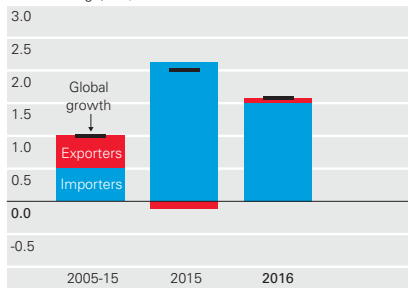
Strong Oil Demand Growth in 2016

- ▶ As with all markets, lower oil prices will eventually lead to higher demand and lower supplies.

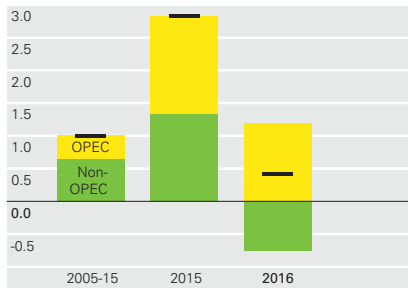
Oil market in 2015 and 2016

Consumption

Annual change, Mb/d



Production



Do Global Oil Supplies Respond to Lower Oil Prices?

- ▶ There is an important analogy between the Ricardian theory of rent on agricultural land and modelling of oil prices.
- ▶ Ricardo (1817) observed that rent rises as land of lower quality are brought under cultivation in conditions of rising demand for agricultural products. In the same way, profit from productive oil fields rise as costlier fields are brought into production.
- ▶ With significant heterogeneity of breakeven production costs across fields in different parts of the world, as well as across different types of oil fields within a given region, it is not surprising that it is the production of the high cost unconventional oil that is first to be negatively affected by lower oil prices.

Concluding Remarks

- ▶ As with all markets, lower oil prices will eventually lead to higher demand and lower supplies.
- ▶ The beneficial income effects of lower oil prices will show up in higher oil demand by oil importers including the US, while the loss of revenues by oil exporters will act in the opposite direction, but the net effect is likely to be positive.
- ▶ This means that oil markets equilibrate, but very slowly.
- ▶ Oil prices are likely to fluctuate within a wide range, the ceiling being the marginal cost for US shale oil producers (around \$60 per barrel).
- ▶ This episodic process gets further accentuated by new reserve discoveries, technological advances in oil production and alternative energy sources.

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Is cheap oil really good for the global economy?

Kamiar Mohaddes and M Hashem Pesaran

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The old view is largely correct, say two experts



Are low oil prices good for the world economy?

A decade ago that question would have been met with an unbridled “yes” from most investors, who were used to seeing stock markets rise when energy prices fell, or struggle when oil got too hot.

But in recent years oil prices and equity markets have started to move in tandem, leading prominent