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## 2014 oil plunge: Causes and impacts on renewable energy



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## ABSTRACT

Following four years of relative stability at around \$106 per barrel (bbl), oil prices have declined sharply since June 2014 and are expected to remain low for a considerable period of time. There are multiple factors which are being considered behind the plunge in the price of oil since June 2014. Most observers have conjectured that domestic oil boom in the United States and Iraq is the major cause for the falling oil prices. Some have suggested that a major shock to oil price expectations occurred after the November 2014 meeting of OPEC, when they did not cut production despite the steady increase in non-OPEC oil production.

In this paper, first we analyzed the effect of various factors on the oil prices and then we studied impacts of the falling oil prices on non-hydro renewable energy. We compare the recent decline in oil prices with previous episodes up to 1996. We show that the demand and supply formula cannot be implemented to the current oil plunge.

The study shows that so far the recent plunge in oil prices has produced no major impact on renewable energy sector. We found that renewable energies, such as solar and wind, are increasingly becoming cost competitive with fossil fuel energy. However the oil price crash could hurt the short-term outlook for certain specific clean energy technologies such as bio-fuel and electric vehicles that do compete with oil-based transportation. While long term low oil prices may threaten renewable energies, climate policies have the potential to act as a counterweight, encouraging long-term, low carbon, investment.

## 1. Introduction

Global oil prices have fallen sharply over the past two years, resulting in one of the most dramatic declines in the price of oil in recent history. The collapse of oil prices from around \$114 in June 2014 to \$28 in February 2016, has led to a large body of literature analyzing the causes of this steep oil price drop and its macroeconomic implications. However, most of this literature is mainly written by international organizations (see, for instance, the IMF blog by Arezki et al. [1]), investment banks (such as Goldman Sachs Global Investment Research division's report on "The New Oil Order" [2]), various (energy) economists, and of course mostly internal reports by oil and gas companies. Most of the written work is speculative and some of it downright conspiratorial. There are yet only a handful of papers, which apply the rigorous and quantitative analysis of the recent oil price shock. Most notably, Baumeister et al. [3] argue that demand factors were most important in explaining the behavior of oil prices,

while the Studies [4–6] argue that supply (rather than demand) factors played the largest role. Baumeister et al., 2015 [3] used the reduced-form representation of the structural oil market model developed in Kilian et al., 2014 [7] and argued that, out of a \$49 fall in the Brent oil price, \$11 of this decline was due to adverse demand shocks in the first half of 2014, \$16 to (positive) oil supply shocks that occurred prior to July 2014, while the remaining part was due to a "shock to oil price expectations in July 2014 that lowered the demand for oil inventories and a shock to the demand for oil associated with an unexpectedly weakening economy in December 2014, which lowered the price of oil by an additional \$9 and \$13, respectively". Fantazzini et al., 2016 [8] suggested that there was a negative bubble in oil prices in 2014/15, which decreased them beyond the level justified by economic fundamentals. A negative financial bubble is a situation where the increasing pessimism fuelled by short positions lead investors to run away from the market, which spirals downwards in a self-fulfilling process. Similarly, Arezki et al., 2014 [1] suggested that unexpected lower

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demand between June and December 2014 could account for only 20–35% of the price decline, while Hamilton et al., 2014 [9] found that only two-fifths of the fall in oil prices were due to weak global demand.

Various potential factors which could have influenced the oil price decline are discussed in an extensive World Bank policy research note by Baffes et al., 2014 [4]. They found out that supply shocks roughly accounted for twice as much as demand shocks in explaining the fall in oil prices. An alternative explanation is put forward by Tokic et al., 2015 [10] who suggested that the 2014 oil price collapse was partially an irrational over-reaction to the falling Euro versus the dollar. This is consistent with Donahue et al., 2016 [11] who stated that a stronger dollar, coupled with a slowing global economy, was one of many reasons for the recent falling oil prices.

The report issued by Bank of International Settlements, Switzerland [12] shows that production and consumption alone are not sufficient for a fully satisfactory explanation of the collapse in oil prices. In this regard, the report advanced the idea that “if financial constraints keep production levels high and result in increased hedging of future production, the addition to oil sales would magnify price declines. In the extreme, a downward-sloping supply response of increased current and future sales of oil could amplify the initial decline in the oil price and force further deleveraging”. On the other hand the work done by Behar et al. 2016 [13] shows that although the relative importance of each factor is difficult to pin down, OPEC’s renouncement of price support and rapid expansion of oil supply from unconventional sources appear to have played a crucial role since mid-2014.

Similarly Tokic et al., 2015 [10] suggested that the oil price collapse 2014/2015 could have been caused by the increased leverage of oil firms (the debt of oil and gas sector increased from \$1 trillion in 2006 to \$2.5 trillion in 2014): the increasing need to keep high production levels and to hedge future production to satisfy financial constraints could have easily amplified the initial price decline due to economic fundamentals. Therefore, a revised and more effective regulatory framework should include not only oil traders/speculators, but all market participants including oil producers. The design of this revised framework is definitively an important avenue of future research.

In this paper, we extend the literature in a number of respects. We have discussed the various other possible causes of the recent oil plunge including disparities of recent oil plunge with the previous ones and its impacts on renewable energy sector.

Clearly, this sharp oil plunge is an issue of highest national and international importance that needs to be addressed properly based on empirical facts and historical knowledge. Many policymakers have been pondering the question of what caused this sudden decline, the severity of which surprised even industry experts, and whether the decline is likely to continue [1]. Although sustained declines in the price of oil have occurred before, notably in 1986 and in late 2008, a natural question is whether this oil price decline is different and, if so, how. Considering the past events of such sharp drop in prices synchronized with considerable variations in inflation, the causes, and outcomes of and OPEC’s policy reactions to the recent episode of crude oil prices have triggered an intensive debate. The main aim of this study is to improve the theory of recent oil plunge by analyzing different scenarios based on event study and get more accurate oil price analysis results closer to reality. This study presents an evaluation of the recent plunge in oil prices to address four main questions that have been the focus of recent discussions:

- How does the recent plunge in oil prices associate with previous episodes?
- What causes a sharp drop in oil prices?
- What are the connections between renewable & Oil prices
- How falling oil prices could affect the Renewable Energy

We address the above questions to use event base study methodology by examining the various parameters affecting which affect the oil

prices over the period January 1996 through February 2016.

The rest of the paper is structured as follows. Section 2 highlights the historical perspective of oil prices decline from 1998 to 2008. Section 3 describes the indicators of global activity and their ability to capture the demand for oil. Section 4 investigates the role of the major influencers. Section 5 assesses the impacts of low oil prices on renewable energy. Section 6 concludes.

## 2. Historical perspective of decline in oil prices: 1998–2008

In contrast to the previous three episodes of oil prices decline, the recent oil plunge differs in several ways. The first one, in 1998, was mostly associated with a dwindling demand in the wake of the Asian crisis of 1997, and steady increase in OPEC production to mid-1998 [14]. In spite of poor oil prices, the global economic recovery remained sluggish during most of 1998, partly because of financial stress in the US and major emerging markets. It gained momentum only in 1999–2000, as growth in the US, Euro Zone and a number of large developing economies recovered. One of the key difference of 1998 oil price decline to recent drop was that 1998 oil prices decline occurred from a normal oil price level (roughly \$30 in current dollars), meaning it very quickly approached marginal cost levels.

Again in 2001 the disturbances and insecurity triggered by 9/11 terrorist attacks, strengthened slowdown the slowdown in growth already underway as the “dotcom” bubble deflated. Softening global economic activity and growing uncertainty were the major drivers behind the sharp drop in the prices of crude oil around that time. However, aggressive financial policy facilitating by the Federal Reserve and other major central banks bolstered a rapid recovery in activity, while low oil prices might have provided some further support.

Similarly, in 2008, a steep decline in global demand sent all commodity prices dipping during the Great Recession of 2008–09. The recent drop in oil prices is significantly steeper than the fall in the price of other commodities, whereas almost all commodities prices dropped by similar rates in 2008–09.

In many ways, the recent shale oil boom resembles the extension of oil supplies from the North Sea and the Gulf of Mexico offshore fields in 1970s and early 1980s. The technology to produce oil from offshore fields was even available in 1950s but the high prices of oil in 1970s made the use of such technology cost-effective. During 1973–83, the Gulf of Mexico and the North Sea collectively enhanced the global oil market by some 6 million barrel per day — as much as by unconventional oil sources i.e. US shale oil and Canada sand oil supplied to the global oil market during 2007–2014.

## 3. Global oil demand and supply

More than any other sector of the market, the energy sector, and in particular oil, is influenced by two main aspects: the supply/demand mechanism and market expectations, being the sector mostly based on futures contracts. Demand for oil is related to economic activity, so the higher the economic activity and the higher oil demand, and to seasonal aspects, it spikes for example during winter time. On the other hand, supply is determined by weather, which can affect production, and by geopolitical issues.

A first question is whether there have been important changes in global oil production since June 2014. Unexpected changes in oil production traditionally have been considered important in explaining oil price fluctuations [15]. Arezki et al. [1] found surprise increases in global oil production as one of the main causes of the decline in the price of oil. However, it is often difficult to have a clear understanding of the total supply of oil, since many of the world’s large suppliers are not transparent about what they produce.

Fig. 1 shows world total liquid supply and consumption since 1996. Empirical estimates suggest that the supply factors have played a somewhat larger role than demand factors in driving the drop in the

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