



Recent hikes in oil-equity market correlations: Transitory or permanent?



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ABSTRACT

This paper empirically examines the long-run behavior of eight oil-equity correlations based on the ADCC (asymmetric dynamic conditional correlation) model and a novel decomposing approach. We select equity price indexes from three developed countries (the US, the UK and Germany) and five BRICS member countries (Brazil, Russia, India, China and South Africa) and consider ten economic/financial events for investigation. Seven correlations exhibit a positively sloped trend, and one exhibits a horizontal trend. All of these trends have undergone one or two structural breaks, which moved the corresponding correlations to their highest-ever evolutionary paths. These structural breaks are associated with one or more of the ten episodes considered, and a common event impacting all eight of the correlation trends is detected to be the 2008 adverse oil shock. The broken trends explain why the correlations were low in the early years and high in the recent years. Our findings indicate that recent hikes in the oil-equity correlations are a long-run phenomenon.

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1. Introduction

It is now an indisputable observation that correlations between oil and equity markets are considerably higher than many years ago. What remains disputable, however, is whether the high correlations observed recently will be temporary or will revert to their historically low levels in the near future. A web page article, for example, asserts that “the correlation shift is not permanent. When supply shocks abate, and when (macro) demand shocks intensify, the correlation will tack again.”² In our view, nevertheless, without serious studies, either an affirmative or a negative stand taken on this question would be groundless and therefore unconvincing. Thus, this paper attempts to address the question by providing a time-series econometric study of the trends of correlations between the crude oil index and the equity indexes from eight countries. Because a correlation trend may well have been broken by some dramatic economic/financial events, we also take them into account while performing empirical tests for structural breaks in a correlation.

The literature on the dependence between crude oil and stock prices is abundant. Some studies have suggested that stock prices and oil prices move in opposite directions. Jones and Kaul (1996) find that the negative responses of international stock prices to oil price shocks can be explained by current and future changes in real cash flows or changes in expected returns. Sadorsky (1999) documents that high oil prices can significantly depress stock market activities in the U.S. Nandha and Faff (2007) examine the adverse effects of oil price shocks on stock market returns using global industry indexes. Their results indicate that oil price changes have a negative impact on equity returns in all industries with the exception of the mining and the oil and gas sectors. Chen (2010), employing a Markov Regime Switching model, finds that a higher oil price leads to a higher probability of bearish stock markets.

However, other studies show that negative oil–stock relationships are not as significant as one would generally expect. For example, Arouri and Nguyen (2010) examine the short-term links between oil and stock prices and conclude that the responses of stock prices to oil price shocks differ greatly depending on the sectors of activity. Kilian and Park (2009) note that the impacts of oil price shocks on stock prices vary significantly across the different sources of oil price changes. More recently, Wang et al. (2013) demonstrate that the responses of stock price changes to oil price shocks also depend on the net position of a country in the world oil market.

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² <http://seekingalpha.com/article/257115-the-stock-market-and-oil>.

Relevant to our investigation, several studies have reported that correlation in oil and equity price movements change over time. Miller and Ratti (2009) analyze the long-run relationship between the world price of crude oil and international stock market indexes over 1971 to 2008. Their findings support the conjecture of changes in the comovements between real oil prices and real stock prices in the last decade. Filis et al. (2011) provide evidence in support of time-varying correlations between stock market prices and oil prices for oil-importing and oil-exporting countries. Tang and Xiong (2010) note that the increasing presence of index investors will precipitate a fundamental process of financialization among commodities markets, through which commodity prices (including oil prices) become more correlated with financial asset prices. Sadorsky (2012) tests the volatility dynamics between oil prices and the stock prices of clean energy and technology companies. Silvennoinen and Thorp (2013), Daskalaki and Skiadopoulos (2011) and Büyükhahin and Robe (2011) suggest that return correlations between commodity futures (including oil) and equities have increased substantially and persistently during and since the recent subprime crisis.

However, the above-cited studies treat changes in correlations as short-run fluctuations without an “anchor.” Instead, we explore the possibility that changes in correlations may well be short-run fluctuations *but anchored by a long-run, broken trend*. In addition, the existing studies also fail to offer a clue as to whether an economic event should cause an upward or a downward break in the trend. This leaves us with another void to fill. To these two ends, we disentangle the long-run trend from short-term fluctuations in a conditional correlation series.

Our approach is motivated by several empirical studies in applied macroeconomics. Empirical macroeconomics suggests that an economic time series (e.g., employment or GDP per capita) may comprise a secular component and a cyclical component. The former represents the long-run trend of the series, while the latter the short-run fluctuations of the series around its trend. Furthermore, only cataclysmic shocks can cause structural breaks in the trend component, while small and frequent shocks are the sources of the fluctuation component. The literature on testing the secular and cyclical components in macroeconomic variables is also abundant. Take as an example the seminal study by Perron (1989) that investigates 14 economic variables. The author shows, for example, that the real GNP of the US experienced a break in its trend function in 1973 (in the sample period of 1945–1985), and the common stock price series had a break in its trend in 1929 (in the sample period of 1870–1970). The oil price shock was responsible for the former, whereas the Great Depression for the latter, all being *large* shocks in the sense that they caused breaks in the trends. Other shocks to the two series over the sample periods were *small*, as (i) they only moved the series away from their trends, and (ii) after they were gone, the series reverted to their trends. Throughout this paper, therefore, we refer to trend-breaking changes as “permanent,” and fluctuations around a trend as “transitory.”

In the basic similar spirit, we decompose a correlation series for careful anatomy. This approach enables us to provide insights into the question of whether recent hikes in oil–equity correlations are due to (i) changes of their trends or (ii) upward deviations from their unchanged trends or (iii) changes of their trends as well as upward deviations from their trends. If the results favor (i) or (iii), one would be able to question the view that despite the fact that oil–equity correlations have become stronger, oil commodities still provide alternative investments for portfolio diversification because a trend component is considered to be secular. If the results are in line with (ii), the diversification benefits of oil-commodity exposures as a long-term notion would still be a valid guide for strategic portfolio allocation between oil price indexes and other asset classes such as equity indexes.

To the best of our knowledge, this paper is the first to extract a long-run trend from a time-varying correlation series, which differentiates our study from any prior work on the oil–equity correlation. For this purpose, we employ the asymmetric dynamic conditional correlation (ADCC) model to generate a correlation series. An advantage of this

model is that it does not smooth out fluctuations while also preserving trends. This serves our purpose to anatomize the secular and cyclical components of a correlation series.

In our sample, there are eight equity markets, including five BRICS member countries (Brazil, Russia, India, China and South Africa) and three developed countries (the US, the UK and Germany). We select these eight national equity markets for empirical investigation based on the following considerations. First, BRICS member countries together well represent newly industrialized markets, as they are distinguished by their large, fast-growing economies and significant influence on the regional and global economy. As of 2013, the five BRICS countries have almost 3 billion people in terms of population, with a combined nominal GDP of US\$16.039 trillion and an estimated US\$4 trillion in combined foreign reserves. Among them, four are within the top 10 countries in the world as measured by PPP-adjusted nominal GDP: China (number 2), India (number 4), Russia (number 6) and Brazil (number 8) (Kearney, 2012). Meanwhile, it is obvious that the three selected developed countries well represent industrialized countries according to the sizes of their economies: the US (number 1), Germany (number 4) and the UK (number 6).

Second, all the eight countries, save South Africa, are among the top 14 biggest oil-consuming countries in the world: the US is number 1, China number 2, Russia number 3, India number 5, Germany number 6, Brazil number 7 and the UK number 14. This is not surprising, given that the sizes or the fast growth rates of these economies need to be sustained by rising oil consumption. This fact is especially relevant for studying the correlations that involve the oil price index and testing whether oil price shocks have broken their trends and in what directions.

Third, apart from oil price shocks, other economic/financial episodes also interest us in detecting structural breaks in oil–equity correlations. For this purpose, an important consideration points to financial integration. For example, the 2008 financial crisis, originating from the US, seems to have spread swiftly to Europe and North America due to a high degree of financial integration among these economies. Other economies, especially emerging markets, however, are relatively less integrated with the US. Even countries in our sample, from Europe, North America, Asia and Africa, clearly have different degrees of financial integration with the US. Such diversity presumably would provide us with an ideal laboratory for examining and comparing the impacts, if any, of other economic/financial shocks on their equity correlations with the oil market.

While probing into the question of which historical event might have broken an oil–equity correlation trend, we predetermine ten possible such dramatic events that broke out during our sample period, to be detailed in Section 2.1. As alluded to above, of particular note here is whether the adverse oil price shock in late 2008 has had a larger scale of impact than any other economic event on the oil–equity correlations. This question stems from a visual inspection of Fig. 1, where the time-series data of the oil price index (WTI) is plotted. One can observe two turning points of the index in 2008: a “peak” followed by a “valley.” As Hamilton (2009) rightly notes, the post-peak dip (after the first turning point) was the consequence of a short-run cure provided by a collapse in the world economy, while the post-valley surge (after the second turning point) is fundamentally a long-run problem due to excess energy demand and stagnant oil production in the world. We thus consider the first and the second turning points as the dates of two possible oil-price shocks, with the former being favorable and the latter being adverse. However, we conjecture that the adverse shock has had a permanent, trend-breaking impact on each oil–equity correlation under our investigation, particularly on those involving the US or China or Germany, as they are the three largest oil-consuming nations in our sample.

The remainder of the paper is organized as follows. Section 2 describes the methodology used. Section 3 conducts an empirical analysis and presents the results. Section 4 further discusses the results and draws their financial and policy implications. Section 5 offers brief conclusions.

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