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Oil price and stock returns of consumers and producers of crude oil



Dinh Hoang Bach Phan*, Susan Sunila Sharma, Paresh Kumar Narayan

Centre for Economics and Financial Econometrics Research, Deakin University, Australia

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ABSTRACT

In this paper we investigate how differently stock returns of oil producers and oil consumers are affected from oil price changes. We find that stock returns of oil producers are affected positively by oil price changes regardless of whether oil price is increasing or decreasing. For oil consumers, oil price changes do not affect all consumer sub-sectors and where it does, this effect is heterogeneous. We find that oil price returns have an asymmetric effect on stock returns for most sub-sectors. We devise simple trading strategies and find that while both consumers and producers of oil can make statistically significant profits, investors in oil producer sectors make relatively more profits than investors in oil consumer sectors.

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1. Introduction

There is a large volume of studies that examines the relationship between oil price returns and stock returns (see, *inter alia*, Arouri, 2011; Park and Ratti, 2008; Miller and Ratti, 2009). There are several strands of this literature. One strand examines the effect of crude oil price changes on aggregate stock market returns and fails to find conclusive evidence of the role of the oil price changes on stock returns. Some (see, for instance, Driesprong et al., 2008; Park and Ratti, 2008; Miller and Ratti, 2009) discover that crude oil price changes have a negative effect on stock returns; some studies (see for instance, Chen et al., 1986; Huang et al., 1996; Wei, 2003) document no statistically significant effect of the crude oil price changes on stock returns; while a recent study by Narayan and Sharma (2011) finds mixed evidence in that the returns of sectors related to oil, such as transport and energy, respond positively to oil price changes, while the rest of the sectors respond negatively.¹

The second strand of the literature, motivated by the gradual diffusion hypothesis proposed by Hong and Stein (1999) and Hong et al. (2007), which perceives that stock returns underreact to oil price news, examines the lagged effect of crude oil price on stock returns; see Driesprong et al. (2008) and Jones and Kaul (1996). Jones and Kaul (1996) find a statistically significant effect caused by the lagged crude oil price changes on stock returns of the equity markets in the US, Canada, and Japan. The results from these studies generally suggest evidence supporting the gradual diffusion hypothesis.

* Corresponding author at: Economics and Financial Econometrics Research, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125, Australia. Tel.: +61 401393843.

E-mail address: dphan@deakin.edu.au (D.H.B. Phan).

¹ The heterogeneous response of stock returns among sectors to oil price changes is also found in Gogineni (2010), Arouri (2011), and Fan and Jahan-Parvar (2012).

The third strand of the literature examines whether oil prices have an asymmetric effect on stock returns. Beginning with [Mork \(1989\)](#), who showed that an oil price increase has a higher influence on macro economy variables compared to an oil price decrease, several studies have confirmed the asymmetric effect of crude oil price changes on the stock market; see, *inter alia*, [Arouri \(2011\)](#), [Kilian \(2008\)](#) and [Sadorsky \(1999\)](#).

Our study contributes to the oil price–stock returns literature by recognising that the oil market is composed of consumers of oil and producers of oil. The specific hypotheses we examine are discussed in the next section.

Briefly, foreshadowing the main results, we find there is a statistically significant and positive contemporaneous effect of oil price changes on the stock returns of the oil producer sector. The results hold when we consider the two producer sub-sectors – petroleum and CONGEP. Second, we find there is a statistically significant and negative effect of oil price changes on the stock returns of the crude oil consumer sector (aggregate), and, except for the construction sub-sector, the results hold for the other three consumer sub-sectors. Results from firm-level analysis reveal that there is a statistically significant and positive effect of oil price changes on stock returns for 78–85% of firms belonging to the producer sector. On the other hand, between 10 and 55% of firms belonging to the consumer sector are negatively and significantly affected by the oil price changes. Third, our results also reveal that there is an asymmetric effect of oil price changes on the stock returns of the aggregate consumer sector but not for the corresponding producer sector. At a disaggregate level, we find strong evidence of an asymmetric effect of oil price changes on stock returns. Fourth, we discover strong size effects: oil prices matter more to large firms compared to small firms. Finally, we estimate the economic significance of the relationship between oil price changes and stock returns for the two aggregate sectors and their various sub-sectors using a simple trading strategy. Our main finding from this exercise is that: (a) while both consumer and producer sectors and most of their sub-sectors are profitable, investors in the producer-based sector are able to make more profits compared to investors in the consumer sector; and (b) while it is true that investors in both sectors can make profits, this profit is heterogeneous – that is, in some sub-sectors investors can make relatively more profits compared to other sub-sectors.

Each of our five findings contributes to the existing literature in the following ways. Our first two findings that oil prices affect consumers and producers of oil complement existing studies which show a statistically meaningful relationship between oil price and the stock market. However, our findings are different in the following way. We show that the effect of oil price returns has a different effect depending on whether one is interested on oil consumers or oil producers. Our findings merely highlight the fact that a consumer–producer disaggregation is imperative in understanding the importance of oil prices on stock returns. Our third finding that positive oil prices changes and negative oil price changes have different effects on stock returns suggests clear evidence that the oil price–stock returns relationship is characterised by asymmetric effects. This finding corroborates evidence of a nonlinear relationship in the oil and stock markets documented in [Narayan and Sharma \(2011\)](#). Moreover, purely from the oil consumer and producer points of view, our evidence here implies that future research should not ignore asymmetric or nonlinear relationships between oil price changes and stock returns. There may also be a need to consider nonlinear models for estimating the oil price–stock return relationship depending on data frequency used. Our fourth finding relates to size effects. That we document size effects is nothing new. Our findings here are consistent with those reported by [Narayan and Sharma \(2011, 2014\)](#). We, though, add to these studies by showing that size effects are also present when the effect of oil price is considered on consumers of oil and producers of oil. Our final finding that oil price contains information useful for devising profitable trading strategies contributes to the literature that investigates economic significance of oil prices for the stock market. In this regard, our findings corroborate those of [Driesprong et al. \(2008\)](#) and [Narayan and Sharma \(2014\)](#). However, we go a step further by showing that while it is true that stock markets are profitable on the basis of information contained in oil prices, it is the producers of oil that benefit most compared to consumers of oil. This finding also emphasises the need for applied research to consider a disaggregation between producers and consumers of oil because clearly when oil prices change the resulting effect on consumers and producers is heterogeneous. This needs to be respected in empirical research.

The remainder of this paper is organised as follows. In Section 2, we discuss each of our hypotheses. Section 3 presents the methodology and the data. In Section 4, we discuss the results of the relationship between oil price changes and stock returns for both oil producers and consumers that make up the US market. Here we also propose and implement a simple trading strategy to demonstrate the economic significance of the relationship between oil price changes and stock returns for the producer and consumer sectors and their sub-sectors. In the final section, we provide concluding remarks.

2. Hypotheses development

In this section, our objective is to propose and motivate the hypotheses we test in this paper. In particular, we have five hypotheses as follows:

Hypothesis 1. Oil price changes affect stock returns of crude oil producers and consumers differently.

Unlike the papers that focus on the aggregate market ([Driesprong et al., 2008](#); [Park and Ratti, 2008](#); [Miller and Ratti, 2009](#)), we examine the effect of crude oil price changes on the stock returns of the sectors, sub-sectors, and firms belonging to the crude oil supply chain. Consumers of oil and producers of oil should be impacted negatively and positively, respectively. Conceptually, an increase in the oil price is expected to have a positive effect on the revenue of the oil producer. Producers of oil, therefore, benefit from a rise in price because the demand for oil is price inelastic. By comparison, a rise in oil price is costly to consumers. Typically, the rise in oil price is passed on to consumers either directly (through a rise in petroleum

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