Dynamic spillovers of oil price shocks and economic policy uncertainty

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ABSTRACT

This study examines the dynamic relationship between changes in oil prices and the economic policy uncertainty index for a sample of both net oil-exporting and net oil-importing countries over the period 1997:01–2013:06. To achieve that, an extension of the Diebold and Yilmaz (2009, 2012) dynamic spillover index based on structural decomposition is employed. The results reveal that economic policy uncertainty (oil price shocks) responds negatively to aggregate demand oil price shocks (economic policy uncertainty shocks). Furthermore, during the Great Recession of 2007–2009, total spillovers increase considerably, reaching unprecedented heights. Moreover, in net terms, economic policy uncertainty becomes the dominant transmitter of shocks between 1997 and 2009, while in the post-2009 period there is a significant role for supply-side and oil specific demand shocks, as net transmitters of spillover effects. These results are important for policy makers, as well as, investors interested in the oil market.

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1. Introduction

This paper addresses an important question, which has recently emerged in the economic literature; that is, the relationship between oil prices and the economic policy uncertainty index. In particular, the aim of this paper is to examine spillovers between Brent crude oil prices and the Baker et al. (2013) economic policy uncertainty index (EPU). To achieve that, we extend the spillover index approach by Diebold and Yilmaz (2009, 2012), using structural decomposition rather than Cholesky decomposition (Diebold and Yilmaz, 2009) or generalised forecast error variance decomposition (Diebold and Yilmaz, 2012). Furthermore, in order to generate more informative results, we disentangle oil price shocks according to their origin (i.e. supply-side shocks, aggregate demand shocks and oil specific demand shocks), as in Kilian and Park (2009), and we then investigate the spillover effects between these disaggregated shocks and the economic policy uncertainty

indices. It is worth noting that disentangling oil price shocks is important to increase our understanding regarding the effects of oil prices. In fact, several authors have documented the significance of disentangling oil price shocks in order to assess their true impact on the economy (see, among others, Baumeister and Peersman, 2013; Degiannakis et al., 2014; Filis et al., 2011; Kilian and Lewis, 2011; Kilian and Park, 2009; Lippi and Nobili, 2012).

The economic policy-related uncertainty index of Baker et al. (2013) is constructed based on three underlying components. The first component quantifies newspaper coverage of policy-related economic uncertainty (specifically, the index of search results for articles containing terms related to economic policy uncertainty). The second US-specific component reflects the number of federal tax code provisions set to expire in future years, giving a measure of the level of uncertainty regarding the path that the federal tax code will take in the future. Finally, the third component measures fiscal and monetary policy uncertainty. In particular, the authors use forecaster disagreement over federal and state/local government purchases as the measure of fiscal policy uncertainty, while forecast disagreement over future inflation is used as the proxy for monetary policy uncertainty. Thus, the EPU index brings together economic policy uncertainty related to public views and economic policy making. In this regard, this paper complements previous

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research relating to the effects of oil price shocks on growth and financial markets as it focuses on the relationship between oil and economic policy issues. The countries under investigation are the US, Canada, China, India, and the aggregate Europe, which represent a sizeable-portion of the global economy. In addition, we also consider individual European countries (the UK, Germany, France, Italy and Spain) to further investigate the possibility that spillover effects exhibit a heterogeneous pattern across European countries. This is important as the countries which constitute Europe are diverse in terms of the nature of their economic policy uncertainty. The study uses monthly data over the period 1997:01–2013:06. Although it would be informative to include more European countries in our sample, we are constrained by the data availability of the Baker et al. (2013) economic policy uncertainty indices.

Focusing on spillover effects, this study builds on the work of Kang and Ratti (2013) who examine the causal effects of oil price shocks on the economic policy uncertainty index in the US. They find that positive aggregate demand shocks exercise a significant negative effect on policy uncertainty, whereas oil specific demand shocks have the opposite effect. Furthermore, supply-side shocks do not seem to exert any effect.

In order to examine these spillover effects between oil prices (or their shocks) and the economic policy uncertainty index, first we need to explain their relationship. We start our analysis with the investigation of the effects of oil prices on economic policy. Since the seminal paper by Hamilton (1983), mounting empirical evidence indicates that oil prices exercise a strong negative influence on the economy. More specifically, past evidence suggests that there are significant effects of oil prices on industrial production and inflation (see, inter alia, Balke et al., 2010; Du et al., 2010; Filis, 2010; Filis and Chatziantoniou, 2013; Peter Ferderer, 1997; Tang et al., 2010). Furthermore, authors such as Rahman and Serletis (2011), Elder and Serletis (2010), Cologni and Manera (2008), Cunado and Pérez de Gracia (2005), Lee et al. (1995) and Hamilton (1983) confirm that the US economic activity has been significantly affected by rises in oil prices, as well as, by the uncertainty about future oil price changes. Along a similar vein, Montoro (2012) and Natal (2012) also establish the link between increased inflation and low production output given an oil price increase. As it is understood, this trade-off raises the concerns of and creates pressure to policymakers with regard to choosing the most appropriate response towards these oil price effects. A much earlier study by Gelb (1988) provides a more direct relationship between oil prices and economic policy, by showing that increased oil prices cause a rise in federal government purchases. Furthermore, a recent study by El Anshasy and Bradley (2012) which focuses on net oil-exporting economies suggests that higher oil prices increase the government size, which it turn, raises concerns regarding its efficient operation.

We further our analysis by focusing on the effects of economic policy on oil prices. Economic policy decisions have an immediate effect on economic activity. For example, Bloom (2009) emphasises the effects of economic policy uncertainty on the business cycle. Antonakakis et al. (2013) find that aggregate demand oil price shocks and US recessions affect negatively the dynamic correlations of stock market returns, implied volatility and the economic policy uncertainty index. Furthermore, uncertainty pertaining to economic policy decisions, regardless of its origin (i.e. whether the uncertainty originates in potential fiscal or monetary policy decisions), discourages firms' investing activity not only because firms are uncertain about future aggregate demand but also because it puts upward pressure on financing costs (see, among others, Byrne and Davis, 2004; Fernández-Villaverde et al., 2011; Pástor and Veronesi, 2012, 2013). As expected, lower investment levels will lead to reduced demand for oil, pushing its price downwards. Malliaris and Malliaris (2013) also maintain that inflationary pressures exercise a significant impact on oil prices.

All that said, the aforementioned studies do not distinguish between the various types of oil price shocks. However, as already discussed, this should be a main consideration when it comes to examining the effects of oil prices on the economy. The pioneers of the notion of oil price shocks are Hamilton (2009a,b) and Kilian (2009b). In particular, Hamilton (2009a,b) identifies two oil price shocks, that is; demand-side oil price shocks, which stem from changes in aggregate demand, and supply-side oil price shocks, which stem from changes in oil production. Kilian (2009b) further disentangles demand-side shocks into two components, i.e. aggregate demand shocks (similar to the Hamilton (2009a,b) classification) and oil specific demand shocks, which are related to the uncertainty of the future availability of oil.

Based on the aforementioned analysis, we argue that conditional on a structural relationship that exists between oil prices (or their shocks) and the economic policy uncertainty index, the following hypotheses can be formulated:

Hypothesis 1. Spillover effects from oil prices (or their shocks) to economic policy uncertainty exist. In particular, we postulate that negative effects of oil prices on economic activity and inflation put additional pressure on policy decision making, which ultimately leads to increased economic policy uncertainty.

Hypothesis 2. Spillover effects from economic policy uncertainty to oil prices (or their shocks) also exist. Specifically, policy decisions have a direct effect on firm investment and production decisions, which further impact demand for oil and thus its price.

Hypothesis 3. Spillover effects between oil prices (or their shocks) and economic policy uncertainty are time-varying. We put forward the argument that spillover effects exhibit a dynamic character, which can be explained by different economic- and oil-related events that take place at different time periods.

In this regard, this study makes an important contribution to the existing literature as (i) it is the first to examine time-varying spillover effects between oil prices and economic policy uncertainty, (ii) it investigates both the effects of oil prices and oil price shocks and (iii) it adds to the limited number of studies pertaining to Baker et al. (2013) economic policy uncertainty index.

Our findings suggest that according to the impulse response function analysis, there is a negative response from both policy uncertainty and changes in oil prices to respective shocks from each variable. Classifying oil price shocks into supply-side, aggregate demand and oil specific demand shocks, we report that the economic policy uncertainty index responds only to aggregate demand shocks (negatively), whereas all three types of shocks are negatively influenced by innovations in the economic policy uncertainty index. Furthermore, time-varying total spillovers between the economic policy uncertainty index and changes in oil prices range between 10% and 25% in the pre-2007 period. During the Great Recession of 2007–2009 we observe a significant peak in spillovers, which ranges between 40% and 50%, depending on the country. When we disentangle oil price shocks, total spillovers significantly increase, reaching even the level of 75%. Net-spillovers suggest that the main transmitter of shocks is the economic policy uncertainty index up until the end of the Great Recession of 2007–2009, while in the years that followed it is the changes in oil prices that assume this role. Once we disaggregate oil price shocks into their three components, we observe that all variables can be either net transmitters or net recipients of spillover shocks, depending on the time period. Finally, results are qualitatively similar for both net oil-exporters and net oil-importers.

Overall, the findings suggest that unless we disentangle oil price shocks and proceed with a time-varying framework, we are not able to capture the full dynamics of the relationship between oil and the economic policy uncertainty index. Given the dynamic interaction between oil and the uncertainty surrounding economic policy decisions, these results are important for policy makers and investors. To be more explicit, it is important for investors to understand that during turbulent periods, attention should be drawn to economic policy uncertainty, considering the fact that the latter affects the market in which they operate. On the