The impact of uncertainty shocks on the volatility of commodity prices

Dimitrios Bakas [a,c], Athanasios Triantafyllou [b,*]

[a] Nottingham Business School, Nottingham Trent University, UK
[b] Essex Business School, University of Essex, UK
[c] Rimini Centre for Economic Analysis (RCEA), Canada

ARTICLE INFO

ABSTRACT

In this paper, we empirically examine the impact of uncertainty shocks on the volatility of commodity prices. Using several alternative measures of economic uncertainty for the U.S., we estimate their effects on commodity price volatility through VAR analysis. We find that the latent uncertainty shocks have the most significant impact on commodity price volatility when compared to observable measures of economic uncertainty. In specific, our results show that the unobservable economic uncertainty measures of Jurado et al. (2015) have a significant and long-lasting positive effect on the volatility of commodity prices. Our findings indicate that a positive shock in unobservable macroeconomic and financial uncertainty leads to a persistent increase in the volatility of the broad commodity market index and of individual commodity prices, with the macroeconomic effect being more significant. Finally, we show that the impact is stronger in energy commodities compared to agricultural and metals markets.

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1. Introduction

Uncertainty shocks have a significant negative impact on the macroeconomy (Bloom, 2009; Colombo, 2013; Jurado et al., 2015; Baker et al., 2016; Caldara et al., 2016; Henzel and Rengel, 2017; Meinen and Roehe, 2017). According to these empirical studies, a rise in economic uncertainty, as measured by several alternative proxies proposed in the literature, has a negative effect on aggregate investment, industrial production and the employment rate. Moreover, many recent empirical studies indicate that economic policy uncertainty (EPU henceforth) shocks, in the form suggested by Baker et al. (2016), result in an increase in stock-market turbulence.[1] While many studies verify this negative impact of uncertainty shocks on the macroeconomy and equity markets, there is limited empirical evidence in the literature regarding the impact of uncertainty shocks on the volatility of commodity prices (Watugala, 2015; Joets et al., 2016; Van Robays, 2016).

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[1] For example, Antonakakis et al. (2013), Arouri et al. (2016), Kang and Ratti (2014) and Pastor and Veronesi (2012) show that rising economic policy uncertainty reduces stock-market prices, while Liu and Zhang (2015) and Pastor and Veronesi (2012), among others, find that economic policy uncertainty shocks have a significant positive impact on stock-market volatility. Lastly, Kelly et al. (2016) and Pastor and Veronesi (2013) show that political uncertainty increases significantly the option-implied and the realized volatility in U.S. equity markets.

In this paper, we extend the literature by examining the effects of economic uncertainty on commodity market volatility.[2] Using various alternative proxies of economic uncertainty for the U.S. and a realized volatility measure for the broad commodity market index, in addition to a panel of 14 individual energy, agricultural and metal commodities, we estimate the impact of uncertainty shocks on commodity price volatility with VAR analysis. All previous work (Watugala, 2015; Joets et al., 2016; Van Robays, 2016) concentrates only on macroeconomic uncertainty without discriminating between observable and latent uncertainty shocks, and does not provide any evidence on the impact of financial uncertainty. Motivated by these empirical studies, we aim to fill this gap in the literature by examining the distinguished effects of observable and unobservable uncertainty measures on the volatility of commodity prices. In this way, our paper is the first providing a unified and more complete investigation of the impact of observable and latent (macroeconomic and financial) uncertainty shocks on commodity price volatility.

We can identify in the literature two structurally different approaches for the measurement of economic uncertainty: observable and unobservable (or latent) uncertainty measures. The observable measures of economic uncertainty are those that can be proxied by the time-series variation of observable economic indicators, such as stock-market volatility (VXO) used in Bloom (2009) or uncertainty about future economic policy, which is based on economic news released in newspaper articles (EPU) (see Baker et al., 2016, for more details on this approach). The unobservable economic uncertainty measures are based on the empirical method of Jurado et al. (2015) (referred hereafter as JLN measures). According to this approach, economic uncertainty cannot be measured by observed fluctuations in various economic indicators because these indicators may fluctuate for several reasons which are not at all related to uncertainty.[3] Jurado et al. (2015) define and measure economic uncertainty as the volatility of the unforecastable component of a large group of important economic (macroeconomic and financial) indicators. In this paper, we use various alternative proxies for economic uncertainty in order to examine which type of uncertainty shock matters most for commodity investors. Our results reveal that a rising degree of unpredictability over the future state of the macroeconomy as well as of the financial sector (i.e., an increase in the unobservable JLN measures of Jurado et al., 2015) is a significant common factor of the contemporaneous rise in the volatility of commodity prices. The economic interpretation of this finding is that rising uncertainty about macroeconomic conditions is translated into rising uncertainty about future aggregate demand and supply, and since commodity prices are mainly driven by aggregate demand and supply conditions, their volatility increases due to these highly uncertain conditions in the macroeconomy. More specifically, our results show that the unobservable (latent) uncertainty JLN measures of Jurado et al. (2015) have a more significant and long-lasting impact on commodity market volatility compared to the observable economic uncertainty measures, such as the EPU index of Baker et al. (2016) and the VXO stock-market index. Therefore, what matters most for commodity investors, is not the macroeconomic and stock-market fluctuations per se, but the degree of unpredictability over these types of fluctuations. According to our findings, commodity markets are relatively immune to sudden changes in the stock-market and the uncertainty about future economic policy. What is important for investors in commodity markets is their ability to anticipate and foresee the sudden swings and turbulence in the financial sector and the macroeconomy. As long as they achieve this, commodity markets become less volatile and less correlated with macroeconomic fluctuations.

Our econometric analysis reveals that in highly unpredictable periods, commodity market volatility rises. This result sheds some light and provides a pure macroeconomic explanation of the rapid rise in the volatility of commodity prices over the 2006–2008 period. The analysis indicates that the highly unpredictable macroeconomic environment (and not the rising volatility in macroeconomic indicators) is the key determinant of the rising volatility in the commodity markets. Our findings reveal that, the more economic agents are able to predict future macroeconomic fluctuations, the less volatile commodity markets will be.

In more detail, our VAR analysis shows that the unobservable economic uncertainty shocks have a more significant (in terms of magnitude) and long-lasting impact on the volatility of commodity prices compared to observable uncertainty shocks. The estimated Impulse Response Functions (IRFs) show that a 1% positive shock in the logarithm of the JLN uncertainty index increases the volatility in the commodity price index by 1.1% in the case of a macroeconomic uncertainty shock, and by 0.6% in the case of a financial uncertainty shock, with the responses of commodity market volatility remaining positive and statistically significant for almost 15 months after the initial uncertainty shock. On the other hand, the impact of the EPU shocks on commodity market volatility has a much smaller and rather transitory effect on the volatility of commodity prices. Our estimated IRFs indicate that commodity market variance increases by 0.03% (3 basis points) after applying a 1% EPU shock and the response vanishes 2 months after the initial uncertainty shock. Our results are robust when we use alternative components of the EPU index, for example the EPU news uncertainty, the monetary policy uncertainty and the fiscal policy uncertainty proxy.

Despite the evidence from previous studies that monetary policy shocks have a significant negative impact on commodity prices, and that expansionary monetary policy is associated with higher commodity prices (see Frankel and Hardouvelis,

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[2] With the term 'economic uncertainty' we refer to both macroeconomic and financial uncertainty. Later in the paper we describe analytically the definitions of both macroeconomic and financial uncertainty shocks.

[3] Jurado et al. (2015) argue that stock-market volatility "*can change over time even if there is no change in uncertainty about economic fundamentals, if leverage changes, or if movements in risk aversion or sentiment are important drivers of economic fluctuations. Cross sectional dispersion in the individual stock returns can fluctuate without any change in uncertainty if there is heterogeneity in the loadings of the common risk factors.*" In addition, Bekaert et al. (2013) provide empirical support to this argument by showing that the time-varying stock-market volatility (as proxied by the VIX index) can be decomposed to investor's risk aversion and to economic uncertainty. Therefore, equity market volatility may change due to changes in risk aversion without any necessary change in economic uncertainty.