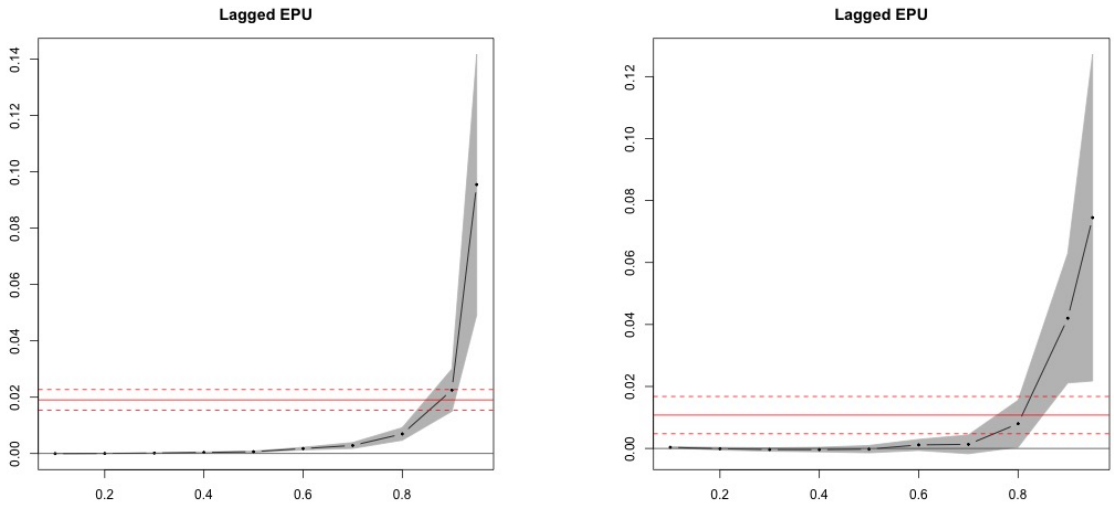
Regime Switching in the Energy Market Volatility: The Role of Economic Policy Uncertainty

Recent episodes of economic policy uncertainty such as changes of fiscal and monetary policies along with the development of the energy market might have important implications for the crude oil and natural gas volatility behavior. While there is a large strand of literature modeling energy market volatility, there are mixed results between energy market volatility and economic policy uncertainty. In doing so, we seek to understand the dynamics of the energy market volatility and economic policy uncertainty considering a unique approach.

Our study employs a two-step approach to first model energy market volatility considering two regimes in the volatility process (i.e., low vs. high volatility). To allow the volatility regimes to differ before and after the shale boom, we consider a structural break and estimate separate Markov-Switching GARCH (MS-GARCH) models for periods before and after 2010. Based on the results from the MS-GARCH models, we further investigate whether economic policy uncertainty affects the probability of a volatile regime in each energy market using quantile regressions. Figure 1 and 2 plot the coefficients of lagged economic policy uncertainty (EPU) across various quantiles of the stable probability for crude oil and natural gas, respectively.

Figure 1: Quantile Regression using OLS for crude oil stable probability



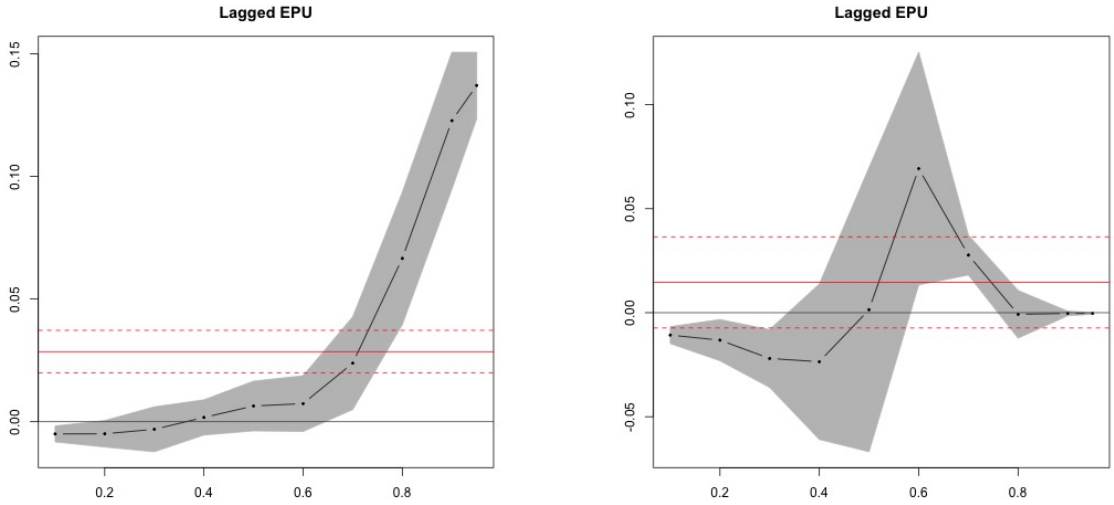
(a) Sub-sample I - Before 2010

(b) Sub-sample II - After 2010

Note: Black dots are the slope coefficients for the each estimated quantile. The solid red line is the least squares estimate, and red dashed line is its confidence interval.

We find that economic policy uncertainty indeed increases the probability of agitated market conditions of both energy markets, although this effect has dampened during the post-shale period, possibly due to the more flexible environment in producing and trading both commodities.

Figure 2: Quantile Regression using OLS for natural gas stable probability



(a) Sub-sample I - Before 2010

(b) sub-sample II - After 2010

Note: Black dots are the slope coefficients for the each estimated quantile. The solid red line is the least squares estimate, and red dashed line is its confidence interval.

Our findings have important implications for both policymakers and market participants; having the ability to predict moments of increased volatility due to changes in economic policy uncertainties can help them to adapt, and perhaps spawn actions to contain its propagation, decreasing turbulent moments in the economy. Moreover, policymakers should be cautious in formulating regime-dependent policies aimed to undermine the possible "wait to invest" effect in the sector since it might spillover to the energy futures market, impacting how private investors behave. For investors, it is important to understand how energy markets respond to abrupt changes in policy-related uncertainty since it affects their portfolio returns. Additionally, during periods of persistent turbulence attention should be drawn to the relationship between economic policy uncertainty and the nature of the markets since they present heterogeneous regime dependence.

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