ENERGY SECURITY AND STRATEGIC STORAGE FROM A FINANCIAL OPTION PERSPECTIVE

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Overview

There are many approaches to measuring energy security: some researchers use geologic and technical factors while others focus upon supply and demand. Common to these approaches is the emphasis upon exposure to supply disruption but not to the probability of its occurrence. As petroleum markets have shown themselves resilient to secular events, we ask if an alternative approach might be useful in quantifying energy security. We apply financial option theory to four eventful periods to learn the expectations of market participants to disruptions. We find the forward-looking views of petroleum market participants to be accurate with regard to both price persistence and the resilience of markets to absorb shocks. Our results cast doubt upon the need for emergency inventories unless justified to dampen market volatility on public good grounds.

Methods

The common thread running through these efforts is upon the magnitude of exposure under supply interruption and the scope for mitigation or recovery but not upon the probability of supply disruption occurring. Over the decades, the international supply chain has shown itself highly resilient to major events, raising the question of whether an alternative approach would be more useful in quantifying energy security. We use financial option theory to measure energy market security, focusing upon the probability of a market disruption rather than magnitude of exposure or the ability to withstand such an event. Our research is premised upon efficient market theory: that prices embody all useful information with regard to supply and demand including that of an oil market disruption.

Results

Using data from five periods of volatile and less volatile market conditions, we employ option theory to understand the forward-looking views of market participants. Notwithstanding commonly held fears over supply insecurity, we argue that the forward-looking views of market participants with regard to prices have proved correct: oil prices have tended to remain at prevailing levels and long-term disruptions do not occur. During some of these periods, we observed a flattening in the distribution of expected prices and a leftward skew in the probability mass, i.e. some greater uncertainty and prices softening which also proved insightful. While the many economic and technical indicators focus upon exposure to supply disruption, we show that interpreting markets through financial option theory produces a useful forward-looking view of future market conditions.

Conclusions

From our results, we see that participants correctly believed markets would remain resilient to major secular events and the impact of perturbations would dissipate. In light of these results, perhaps policy makers should reconsider how energy security is quantified and incorporate the probability of disruption. Our results cast doubt upon the need for maintaining emergency inventories unless justified as a means of dampening price oscillations.

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