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The response of U.S. natural gas futures and spot prices to storage change surprises: Fundamental information and the effect of escalating physical gas production

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A B S T R A C T

We study the behavior of U.S. natural gas futures and spot prices on and around the weekly announcements by the U.S. Energy Information Administration of the amount of natural gas in storage. We identify an inverse empirical relation between changes in futures prices and surprises in the change in natural gas in storage and that this relation is not driven by the absolute size of the surprise. The evidence also indicates prices react first in the futures market for natural gas with that information then flowing to the spot market. Post 2005, corresponding to a period of significant increases in the production of natural gas in the United States, the response of prices to storage surprises was larger in absolute value. No evidence is found of economically meaningful reactions to the surprise other than on the date the storage news is released. The results demonstrate the importance of fundamental information in the formation of natural gas prices.

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1. Introduction

Several market observers have argued that in recent years financial traders have pushed energy futures and spot prices away from, not toward, levels reflecting rational analysis of likely future supply/demand conditions. The literature condemning financialization and abnormal speculation has tended to focus on the oil market (Staff Report of US Senate Permanent Subcommittee on Investigations, 2006; Masters, 2008; Einloth, 2009; Kaufmann and Ullman, 2009; Sornette et al., 2009; Phillips and Yu, 2010; Parsons, 2010; Singleton, 2012). In contrast, many have argued that financialization and abnormal speculation have had little or no impact on prices (Interagency Task Force on Commodity Markets, 2008; Gilbert, 2008; International Energy Agency, 2008; IMF, 2008; Brunetti and Büyükşahin, 2009; Büyükşahin and Harris, 2009; Hamilton, 2009; Irwin et al., 2009; Kilian and Murphy, 2013; OECD Working Party on Agricultural Policies and Markets, 2010).[1] Indeed, Kilian and Lee (2013) in a recent study of the contribution of speculative activity to oil prices conclude that policy recommendations directed at restricting the global derivatives market cannot be expected to reduce real oil prices. The evidence pertaining to the natural gas market is more limited despite the growing significance of this sector. In this study we ask and answer a question related to this debate: Do natural gas prices measured at short-term frequencies respond to fundamental information in the direction predicted by economic theory? Our results answer this question in the affirmative indicating support for the view that it is fundamentals that drive these prices.

As a backdrop, Figs. 1 and 2 present plots of the NYMEX natural gas front month futures contract settlement price and the level of open interest for the contract respectively. Prices have been highly volatile over the last decade while open interest in the NYMEX natural gas futures contracts grew at a compound annual rate of roughly 13.8% from end January 1998 through end January 2012 along with the positions of financial investors in this market such as hedge funds and commodity funds.[2] Debate over whether a link exists between excess speculation and prices and price volatility in this market dates back at least to 2006 when for instance Bert Kalisch, president and CEO of the American Public Gas Association was quoted in the leading industry publication *Gas Daily* as saying in reference to financial investors in natural gas "APGA believes the excessive volatility created by the activities and subsequent fallout of these hedge funds further supports the need for greater transparency in natural gas trading." (*Gas Daily*, October 4, 2006).

Academic research on the fundamentals/speculation issue in the natural gas market is however limited. A recent study by Ji et al. (2011) presents evidence suggesting that natural gas price changes and volatility are mainly driven by market fundamentals rather than abnormal speculation. Haigh et al. (2007) have likewise argued that speculators play a positive role in the natural gas market by reducing volatility and increasing liquidity.

This study examines the relation between surprises in fundamental information, specifically, surprises about changes in the amount of natural gas in storage, and changes in natural gas futures and spot prices. We find an inverse relation exists between the change in storage surprise (actual change minus expected change) and natural gas futures price changes on the day of the EIA storage announcement. The price response is not differentially greater for larger absolute storage surprises. We find no evidence that futures prices respond differently to positive surprises as compared with negative surprises or that the market environment, measured using the level of storage, influences the response. We also find that storage surprises are not influenced by the dispersion of the predictions of individual analysts. A further finding of the research is that the market response was larger in absolute value during the post 2005 period, a period during which there was a significant ramp up of activity in the natural gas market. Finally, we find no evidence of an economically meaningful reaction of natural gas prices to the storage change surprise following the day the news is released. The results reported here support the view that market participants rely heavily on fundamental market news when adjusting natural gas prices and that these prices adjust as economic theory would suggest.

[1] See also the review in United Nations (2011).
[2] Source of data: U.S. Commodities Futures Trading Commission http://www.cftc.gov/OCE/WEB/data.htm

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