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Are USDA reports still news to changing crop markets?

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ABSTRACT

This study investigates whether major USDA reports still provide important news to changing crop markets. The news component of each report, or market "surprise," is measured as a difference between the USDA estimate and its private expectation in corn, soybeans, and wheat markets. Changes in the relevance of USDA information are assessed by examining changes in the magnitude of market surprises and shifts in the futures price reaction to these surprises, which isolates the impact of each report. The stable size of market surprises over time suggests that competition from alternative data sources has not reduced the news component of USDA crop reports. Increasing price reaction to most reports, including those facing competition from alternative information sources, suggests that value of public information may be enhanced in uncertain markets affected by structural changes.

1. Introduction

The landscape of agricultural commodity markets has changed dramatically over the last several decades. Policy changes have had an especially significant impact on crop markets due to the introduction of the U.S. biofuel mandates in 2005 and the subsequent use of crops for energy production (Carter et al., 2017). As Fig. 1 demonstrates, this led to sharp changes in crop prices starting in late 2006. The break was so sharp that it ushered in "a new era" of crop prices (Irwin and Good, 2009). For example, the average futures price across pre- and post-2007 sub-periods increased from $2.46/bu. to $4.75/bu. for corn, $5.99/bu. to $11.16/bu. for soybeans, $3.42/bu. to $6.27/bu. for winter wheat, and $3.79/bu. to $7.04/bu. for spring wheat, increases ranging from 83% to 93%. Similar changes were also observed in the volatility of crop prices, reflecting increased market instability.

Structural change in agricultural commodity markets in the mid-2000s was not limited to biofuels policy. In fact, Irwin and Sanders (2012) argued that "…the first decade of the 21st century has perhaps witnessed more structural change in commodity futures markets than all previous decades combined." The authors highlight three major forms of structural change: (i) a dramatic shift in 2006–2008 from a primarily telephone/open outcry trading platform to computer/electronic order matching platform; (ii) improved market access stemming from the combination of a revolutionary improvement in communication tools (software and hardware) and the rise of electronic trading that allowed much easier and direct access to the markets; and (iii) the entry of new "financial" participants in the commodity futures arena, widely referred to as "financialization."

Physical crop markets have also undergone substantial changes in the last decade, with new crop varieties made possible by rapid strides in biotechnology that offer higher yields but may be more susceptible to drought conditions (Lobell et al., 2014). Furthermore, the surge in communication technology, computing power, storage and remote sensing, commonly referred to as "big data" (Sonka, 2014), resulted in the emergence and growth of private information sources that provide increasing competition to information traditionally provided by the U.S. Department of Agriculture (USDA).

The USDA continues to spend millions of dollars to collect and disseminate market information to the public. The Office of Management and Budget reports that out of "$6.6 billion in total direct

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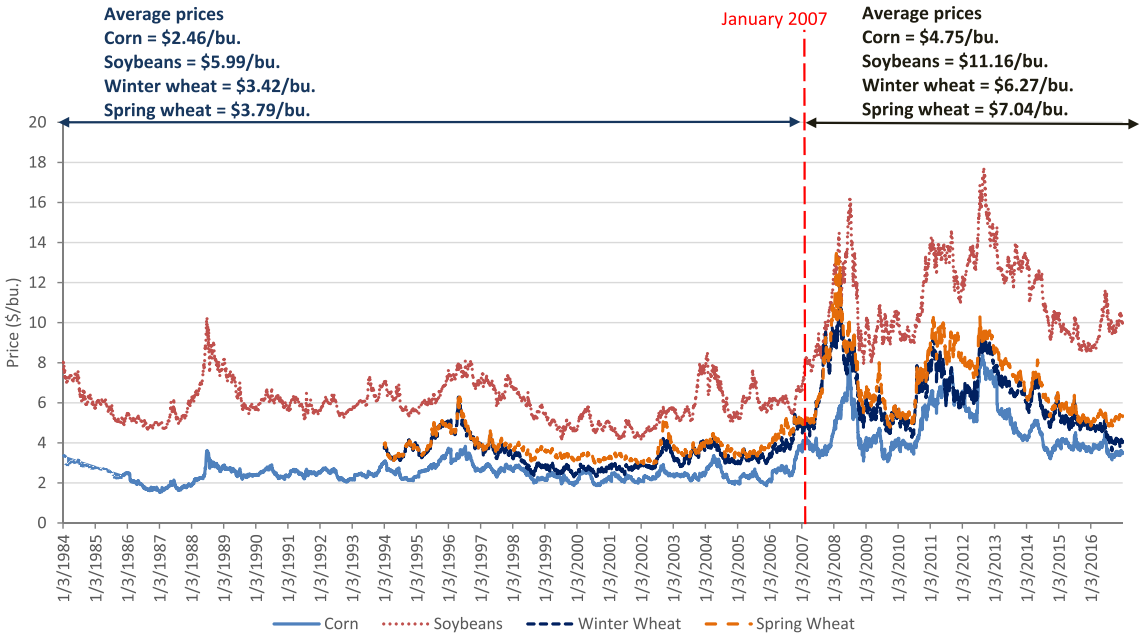

Fig. 1. New crop futures prices.
Note: Sample period is 1984/85–2016/17 marketing years for corn and soybeans and 1994/95–2016/17 marketing years for winter and spring wheat.

funding for major statistical programs across all Federal agencies in 2012, USDA accounted for about $521 million or 7.8% of the total." (C-FARE, 2013, p. 4) Over 30% of these funds are allocated to National Agricultural Statistical Service (NASS), an agency primarily responsible for data collection and dissemination. The justification for this investment in USDA's data products is that in many cases public data are necessary because they facilitate the efficient functioning of the markets, reduce information asymmetries and inform the policy and program formation, operation and evaluation processes (C-FARE, 2013). However, the ongoing structural changes in agricultural commodity markets as well as the emergence of alternative private information sources call the relevance of public data into question especially in the times of budget shortfalls.

An extensive literature provides ample evidence that USDA crop reports have moved markets for decades (e.g., Colling and Irwin, 1990; Fortenbery and Sumner, 1993; Baur and Orazem, 1994; Isengildina-Massa et al., 2008; McKenzie, 2008; Adjemian, 2012; Lehecka et al., 2014; Dorfman and Karali, 2015).[1] However, less is known about changes in impact over time. Some evidence of diminished market impact starting in the mid-1980s has been reported (Fortenbery and Sumner, 1993), but other evidence indicates no change or even an increasing impact after the mid-1980s (Garcia et al., 1997; Isengildina-Massa et al., 2008). Two recent studies estimating changes in market impacts (Isengildina-Massa et al., 2016; Ying et al., 2017) suggest that some USDA crop reports are still informative and influential in crop futures markets, but there are some reports whose impact appears to be declining.

This discussion indicates that the available evidence on the changing market impact of USDA crop reports is limited. In addition, previous studies have important limitations. First, most studies focus on the price impact of only one type of USDA report in one or two markets. This prevents comparison of market impacts across major USDA acreage, production, and stock reports and across markets, which may be important because various reports and markets could respond to structural changes differently. Second, price impact is most frequently measured in the literature using a dummy variable (or its equivalent) on report release days, which makes it impossible to separate the impact of reports released on the same day. This "clustering" is a non-trivial problem. For example, almost all Crop Production Annual Summary and Prospective Plantings reports since 1985 were released on the same day as quarterly Grain Stocks reports. Therefore, the dummy variables used to measure price impact pick up the combined impact of all reports released on the same day.

The purpose of our study is to investigate whether USDA crop reports are still news to the changing crop markets using direct measures of market news that avoid identification and clustering issues. We address limitations in previous studies by directly measuring the market "news" or "surprise" component of the reports and then estimating changes in the price impact based on the news component. This allows the price impact of a given USDA report to be uniquely identified and overcomes the clustering issue. We construct the most comprehensive set of market expectations in the literature to date in order to compute the market surprise as the difference between USDA and private analysts' forecasts, The data set includes expectations for all major USDA crop reports including Prospective Plantings, Acreage, Winter Wheat Seedings, Crop Production, Crop Production Annual Summary, and Grain Stocks, for corn, soybeans, winter wheat, and spring wheat for the sample period 1984/85 through 2016/17 marketing years. In view of the multiple sources of structural change affecting agricultural commodity markets in the mid-2000s, the sample is divided into pre- and post-2007 sub-periods to assess possible changes in the price impact of USDA information.

Structural changes in commodity markets resulted in increased market uncertainty and higher competition from private information sources. While greater market uncertainty may make USDA information more valuable, competition from private information sources may replace some of the USDA data products and make them irrelevant. These changes in impact may affect market surprises in USDA information, potentially resulting in different price reactions. We test these hypotheses by first assessing the equality in absolute surprises across time.

[1] A few studies provide empirical estimates of the direct welfare benefits of public crop forecasts (Hayami and Peterson, 1972; Freebairn, 1976; Bradford and Kelejian, 1978; Abbott et al., 2016; Gouel, 2017). In these studies, a theoretical supply/demand structure for a market is proposed, parameter estimates are obtained, and then social welfare is estimated under different information or expectation assumptions. The estimation results suggest the social welfare value of USDA forecasts has substantially exceeded the cost.