

NCCC-134

APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

Do Large Export Sales to China Move Commodity Prices?

by

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Suggested citation format:

McKenzie, A. M. and W. Johnson. 2023. "Do Large Export Sales to China Move Commodity Prices?" Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. [<http://www.farmdoc.illinois.edu/nccc134>].

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Paper presented at the 2023 annual conference of the NCCC-134 Committee on Applied Commodity Price Analysis, Forecasting, and Market Risk Management.¹

Submitted: June, 2023

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¹ This work was funded in part by Foreign Agricultural Service cooperative agreement. The views expressed here are those of the authors and may not be attributed to the Foreign Agricultural Service or the U.S. Department of Agriculture.

Do Large Export Sales to China move Commodity Prices?

The U.S. government places great value on the release of information to enhance price discovery in commodity markets. A large literature documents the benefits of USDA reports in helping to efficiently align commodity futures prices to fair market values (e.g., McKenzie, 2008; Adjemian, 2012). However, the question of whether U.S. Export Sales Reports (ESR) move markets has received little academic attention. The few studies that have investigated the issue are somewhat dated and have focused attention on the Weekly ESR rather than on the Large Daily Export Sales report. While the weekly report contains aggregate information about all export sales by commodity and country of destination over a given week, the Large Daily Export Sales report documents export sales exceeding 100,000 metric tons in any one day to any single country. In the current climate of volatile markets coupled with the sporadic timing of potentially large unanticipated purchases of U.S. agricultural commodities by China, the question of whether large export sales to China moves commodity prices is a timely and important research topic.

The ESR and Large Daily Export Sales Reports were introduced in 1973 in the wake of large, unexpected purchases of US grain by the Soviet Union. These unanticipated purchases contributed to large price spikes in U.S. corn and wheat markets and motivated the U.S. government to more closely scrutinize U.S. grain exports to better anticipate and, if necessary, mitigate potential market disruptions. In addition, at this time there was concern that large firms engaged in substantial trade deals might take advantage of this “inside information” to unfairly profit from futures positions. Aligned to these concerns was the desire to better gauge if price

discovery in commodity futures markets could be improved by disseminating export sales information to the market. Efficient price discovery in commodity futures markets is of paramount importance to U.S. commodity producers who use these markets to inform their marketing decisions and to manage their price risk.

Three prior studies (Conklin, 1983; Patterson and Brorsen, 1993; Xie et. al., 2016) have investigated whether the Weekly ESR moves commodity prices, with mixed results. Conklin, found that corn, wheat and soybean futures price reactions are correlated to export sales over the 1975 – 1980 period. He concluded that these commodity futures markets efficiently respond to the report information. In contrast, Patterson and Brorsen found little evidence to suggest that corn, cotton, soybean, and wheat futures react to the reports over the 1980 – 1990 period. However, they did find significant price reactions in corn and wheat futures markets prior to report release dates, indicating that traders may anticipate information in the report prior to its release. Finally, Xie et. al. found cotton futures prices reacted to the reports over the 1995 – 2008 period but not over the 2008 – 2012 period.

In this paper, we focus attention on futures market reactions to the release of daily large export sales reports announcing large sales of corn, soybeans, and wheat to China.

Data

Our data comprises all daily large export sales reports and Chicago Mercantile Exchange (CME) intraday futures tick data for corn, soybeans and wheat from January 3rd, 2011, through August 1st, 2022. In total this sample period yields us 375 large corn sales, 535 large soybean sales and

48 large wheat sales. Figures 1 – 3 show the large sales by commodity and country of destination over time. Figure 1 shows the importance of China and Mexico as purchasers of large corn sales. Noticeably, China has only been an active large corn buyer over the last several years, and a number of those largest purchases exceed 1,000,000 metric tons. From figure 2, we can see in comparison, large sales of soybeans are on average smaller but much more frequent than large corn sales. Finally, figure 3, illustrates the fact that large wheat sales are much less frequent and again smaller in magnitude than large corn sales.

Methods

The Foreign Agriculture Service (FAS) defines a daily large export sale as a sale of 100,000 metric tons or more of one commodity in a single day to one destination or 200,000 metric tons or more of one commodity in any reporting week to one destination. Exporters must report to FAS the amount traded, the commodity type and classification, the marketing year of the shipment, and the destination by 3 p.m. E.T. on the business day after the transaction. FAS releases the large daily export sales report to the public at 8am central time on the next business day, in effect creating a 3-day event window as illustrated in figure 4. Given that the report is released when the market is closed – the overnight CME session ends at 7:45am and the daytime session begins at 8:30am – to gauge if the reports are newsworthy and a surprise to the market, we measure the futures price change from the last trade at 7:45am to the last trade in the first 8:30am trading minute following the report release. Specifically, we use a prototypical event study approach, whereby minute-by-minute futures price changes or returns for corn, soybeans and wheat markets are measured 60 minutes immediately prior to and 60 minutes immediately

following a large sales release. Minute-by-minute futures returns are calculated as log returns, $R_{it} = \ln(P_{t+1}/P_t)$.

Then average price changes for each large sales event are measured in event time and statistical significance determined based upon a 95% confidence interval. More formally, returns are averaged across the N large sales events to obtain the minute-by-minute mean return in event time:

$$R_t = \frac{1}{N} \sum_{i=1}^N R_{it} \quad (1)$$

Similarly, minute-by-minute trading volume levels over the same 120-minute event window were also documented and assessed for statistical significance at the 95% confidence level. *A-priori*, we would expect a statistically significant positive price response with larger than normal trading volumes if large export sales to China are newsworthy. In addition, to benchmark our event day results we measure the same 120-minute trading returns and volume changes one day prior to a report release and one day after a report release.

Results

Figure 5 presents the 120-minute event window results for average returns on days when a large daily export sales report is released – referred to as the event day. Panel (a) clearly shows that corn futures prices immediately react to the report release. Significant corn futures returns of around 0.16% are observed over the first minutes trading between the close of the overnight and the opening of the daytime session. At current prices this translates to a price move of around 1 cent per bushel. However, there is a small but significant corn futures price reversal (-0.09%) in

the second minute after release, equivalent to a 0.5 cent per bushel price decrease. Even smaller, but significant price changes occur over the first 6 minutes of the day session as the market absorbs the news.

Event day soybean futures price reactions shown in panel (b) of figure 5 are more muted in comparison to corn returns. The first minute returns following the report release are smaller (0.03%) and only marginally significant. These returns translate into a 0.5 cent per bushel increase at current prices. Finally, we observe no significant wheat futures price reactions on the event day (panel c) of figure 5.

As a benchmark comparison, figure 6 shows the 120-minute corn returns for the day immediately prior to the report release panel (a), and corn returns for the day immediately after the report release panel (b). In both cases, although returns are volatile in the first few trading minutes of the daytime session, in general returns are very small and insignificantly different from zero across the 120-minute trading interval. These results would suggest that there is no information leakage that significantly moves markets prices prior to the release of the large corn sales reports to China.

Our trading volume results for corn presented in figure 7 add greater weight to the notion that large corn export sales reports contain news. Panels (a) – (c) of figure 7 depict the levels of trading volume for large corn sales on the event day (day of report release), the day before the report release, and the day after the report release. The first minute price spike on the event day is accompanied by a surge in volume in the same opening minute (Figure 7, panel a). However,

there is an essential caveat to this, typically, volume is always higher on the opening bell irrespective of whether a release occurs, so to better gauge the volume impact of the report, we compare the trading volume on the event day to trading volume on the day prior (Figure 6, panel b) and the day after (Figure 7 panel c) the report release. Trading volume is significantly higher in the first minute trading of the event day (4,000 contracts) than in the first minute of trading for days immediately surrounding the report release (2,500 – 3,000 contracts). Given that higher levels of trading volume are associated with the market receiving “news,” this again adds more evidence to the conclusion that large corn sales to China are newsworthy events to the market.

Finally, we examine whether extremely large corn export sales reports induce greater price responses. Figure 8, panel (a) shows event day corn returns with respect to the release of large corn export sales in excess of 1,000,000 metric tons. These larger sales induce significant increases in first-minute returns following the report releases of around 0.5%. Furthermore, panel (b) of figure 8 demonstrates that the very largest sales to China – those in excess of 1,500,000 metric tons – result in significant returns increases of between (0.6% - 0.75%), and at current prices, this translates into price increases of between 4 to 5 cents per bushel. This is strong evidence that the size of sale is important to the market and that very large corn sales to China move futures prices considerably.

Conclusion

Our results show that daily large corn export sales to China are newsworthy and that the very largest sales result in large futures price reactions. In contrast, we find much smaller reactions to large soybean export sales to China and no evidence that large wheat export sales to China move

futures markets. However, further research is needed to verify the robustness of these results by accounting for simultaneous daily large export sale report releases to other countries. For example, if large export sales to countries other than China are reported on the same day as a large export sale to China, this would result in “clustering effects,” whereby it would be more difficult to attribute price reactions to just the sale to China. Future research efforts will address this potential issue using binary regression models to account for sale size and country of destination for the sale.

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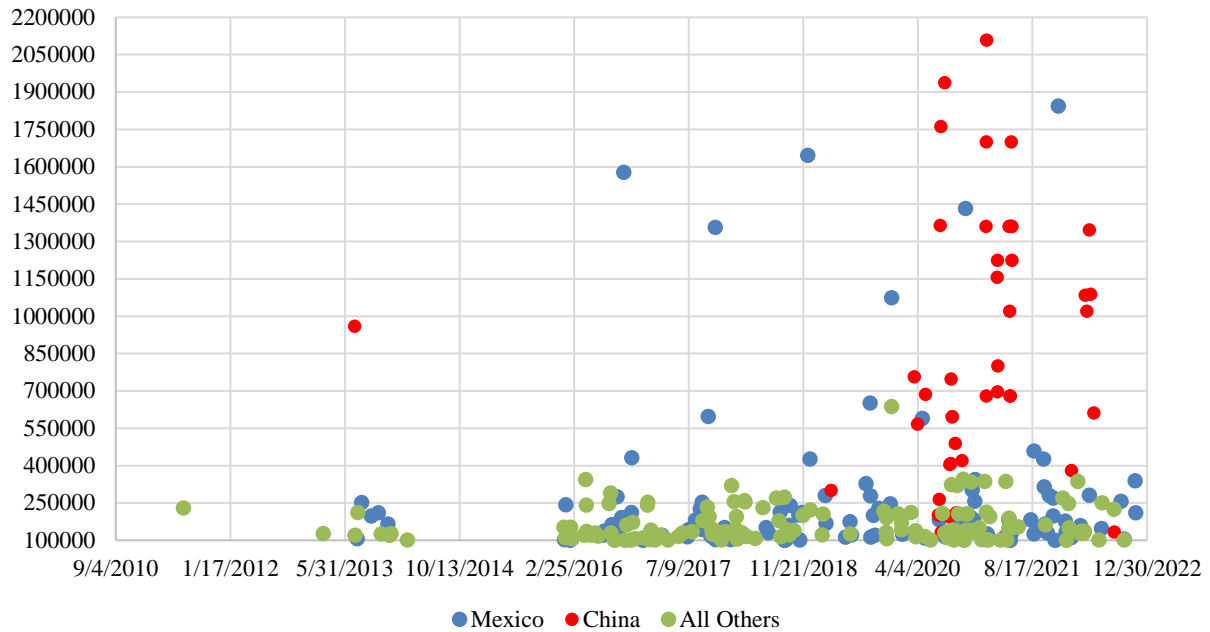


Figure 1: Large Daily Corn Sales in Metric Tons Over Time (x-axis: Dates, y-axis: Sale Size in Metric Tons)

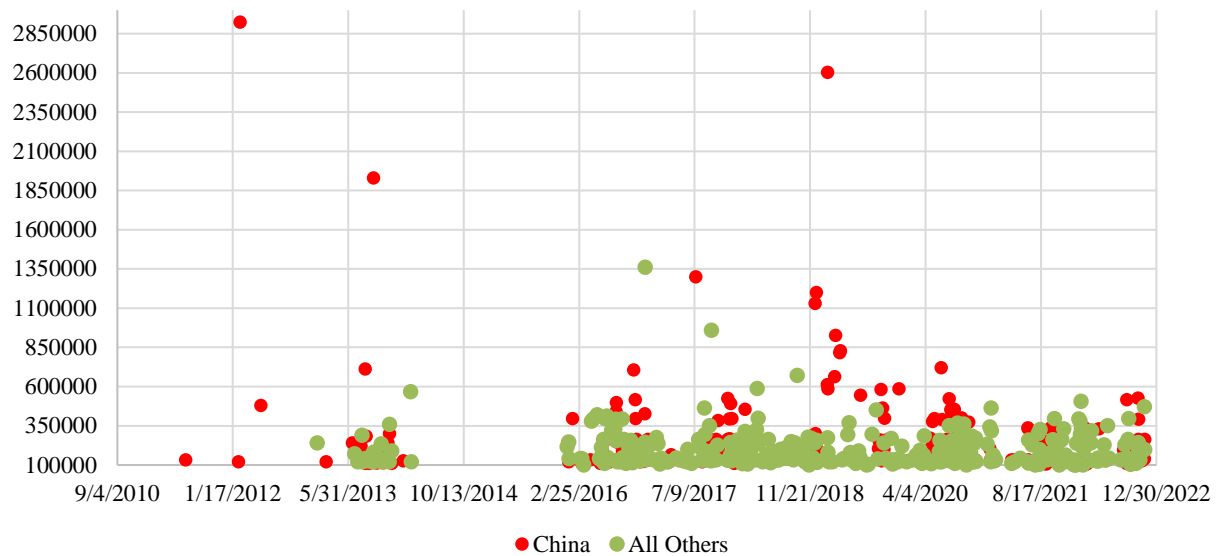


Figure 2: Large Daily Soybean Sales in Metric Tons Over Time (x-axis: Dates, y-axis: Sale Size in Metric Tons)

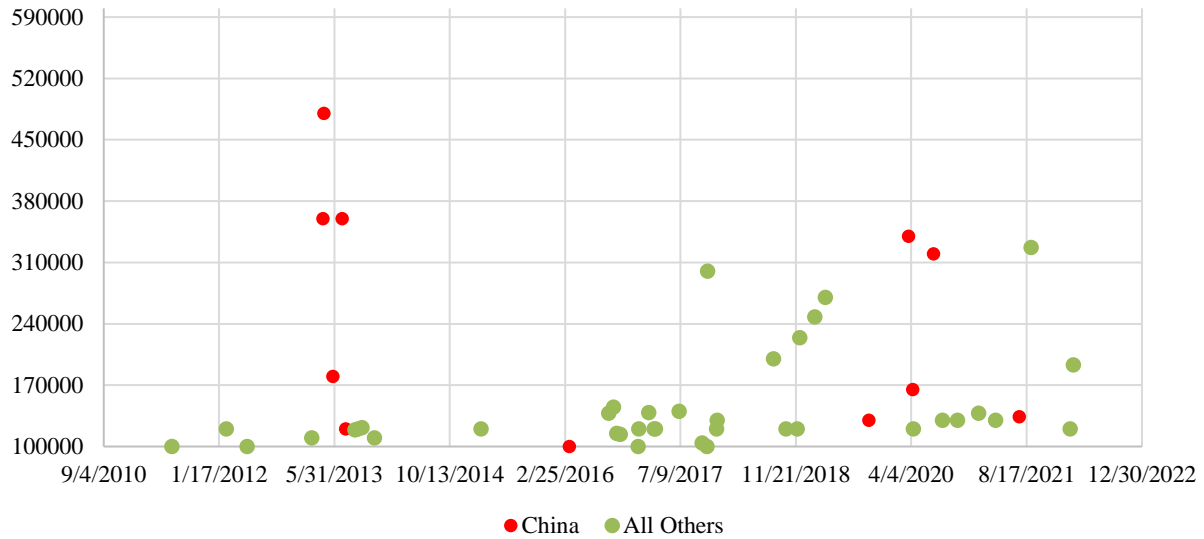


Figure 3: Large Daily Wheat Sales in Metric Tons Over Time (x-axis: Dates, y-axis: Sale Size in Metric Tons)

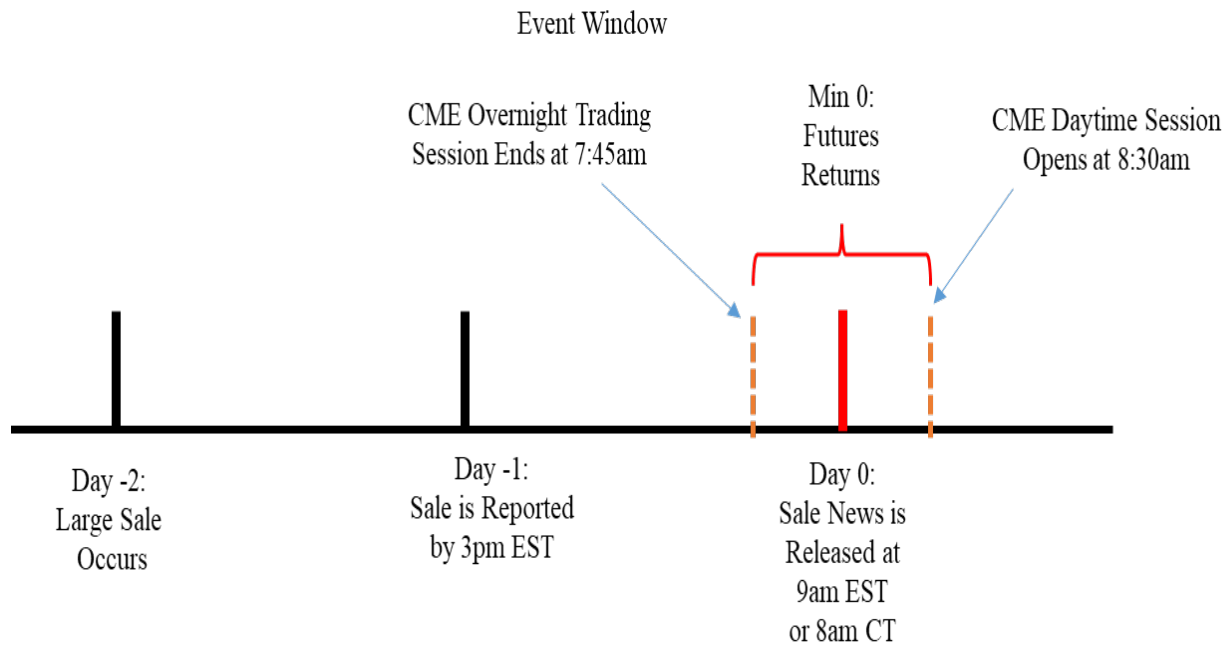
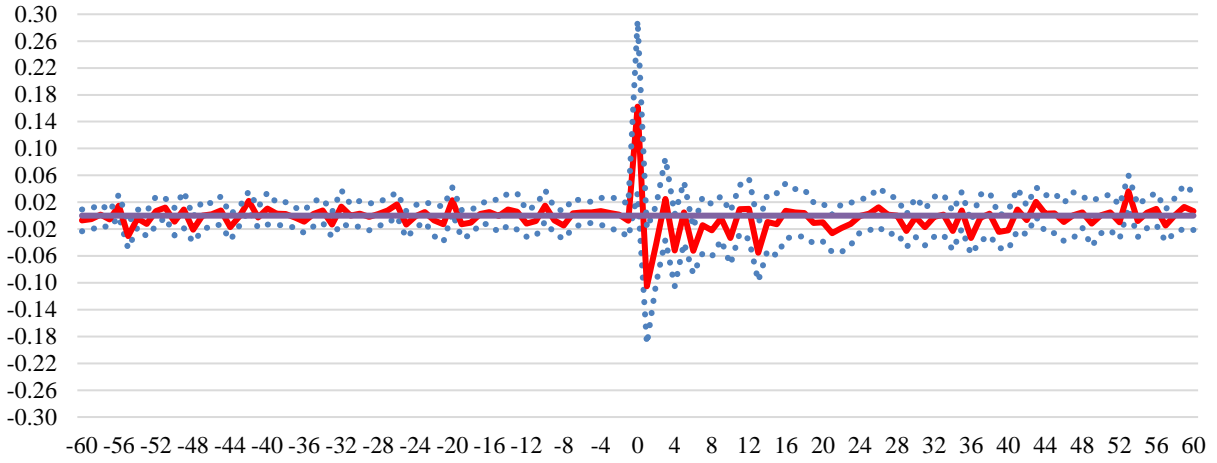
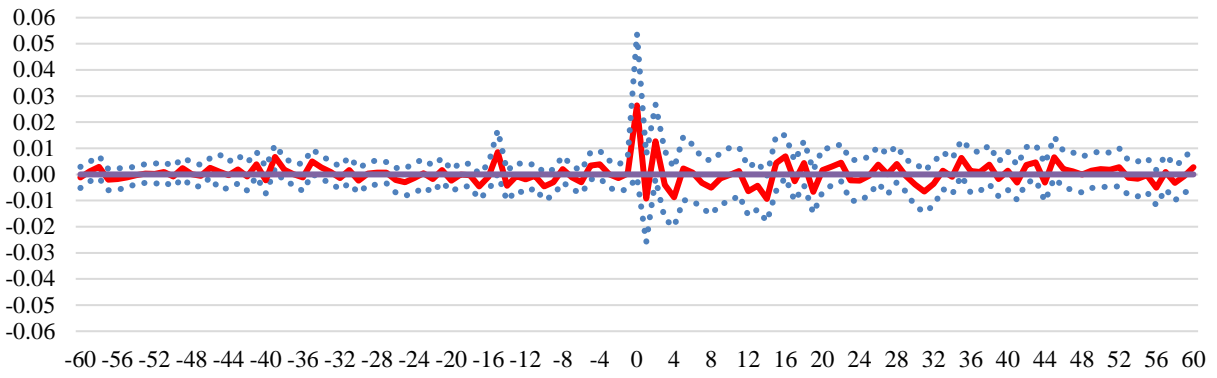


Figure 4: Event Window of The Sequence of Intraday Returns and Release of Reports

Corn Returns Event Day panel (a)



Soybeans Returns Event Day panel (b)



Wheat Returns Event Day panel (c)

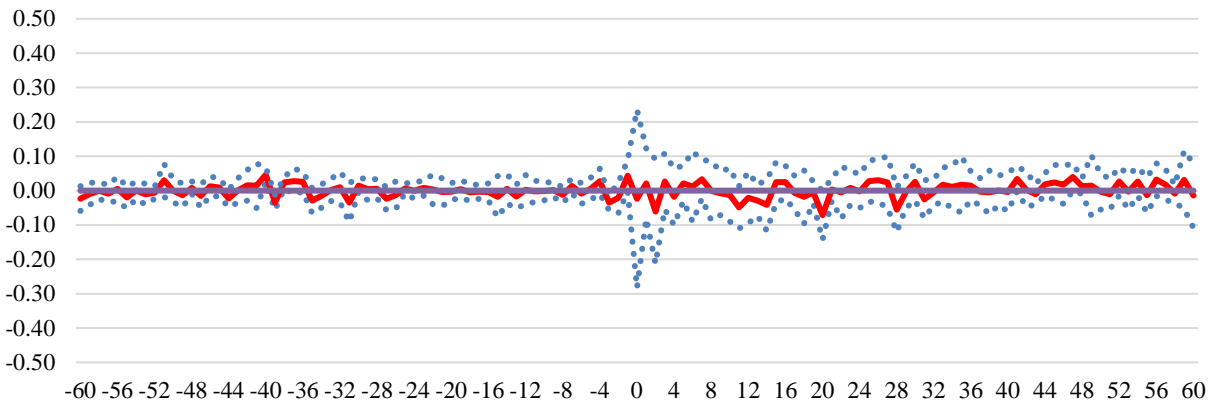


Figure 5: Corn (panel a), Soybeans (panel b), and Wheat (panel c) Event Day 0 Returns (x-axis: Minutes Prior and Post to opening minute, y-axis: Returns)

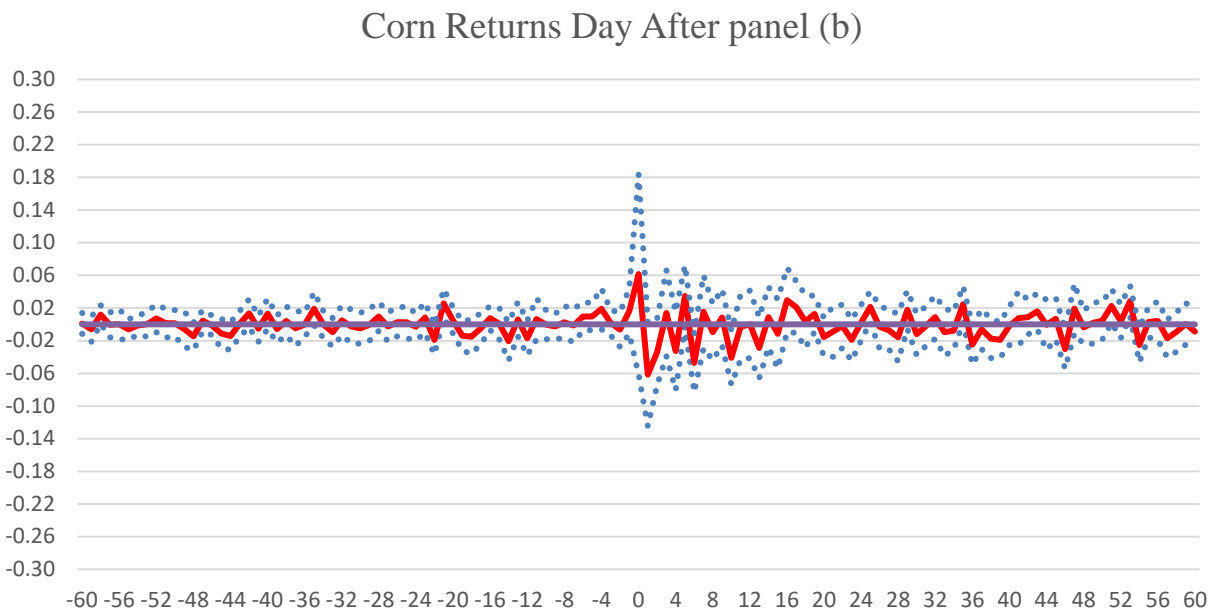
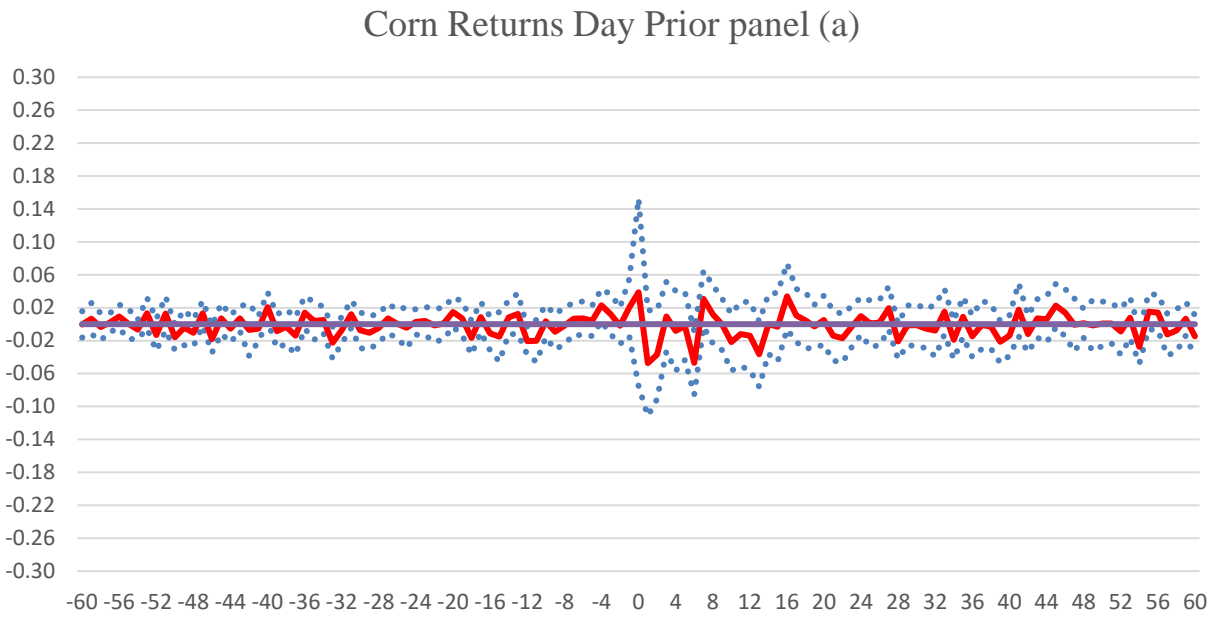
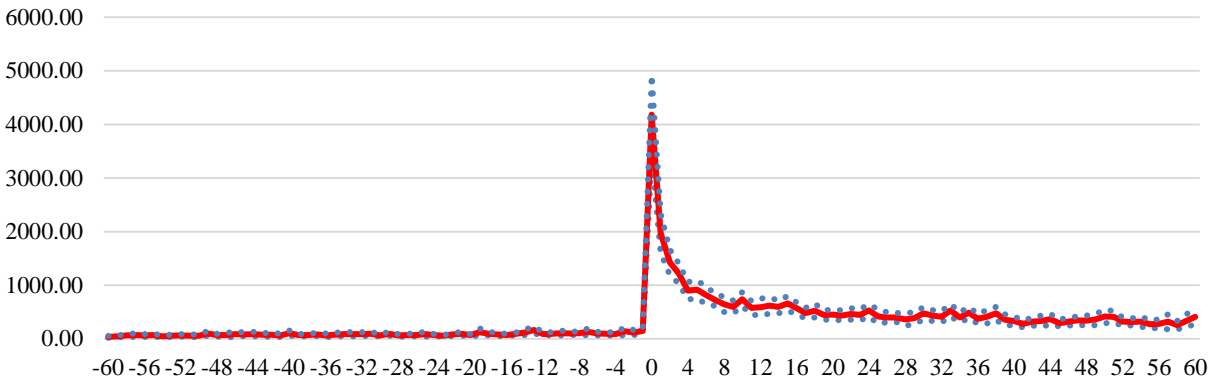
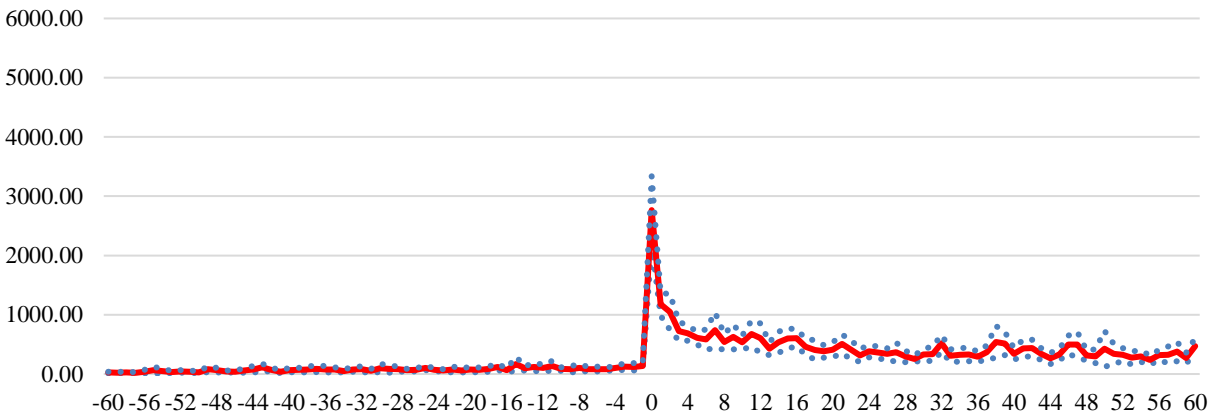


Figure 6: Corn Returns one day prior to report release (panel a), and one day after the report release (panel b) Returns (x-axis: Minutes Prior and Post to opening minute, y-axis: Returns)

Corn Volume Event Day panel (a)



Corn Volume Day Prior panel (b)



Corn Volume Day After panel (c)

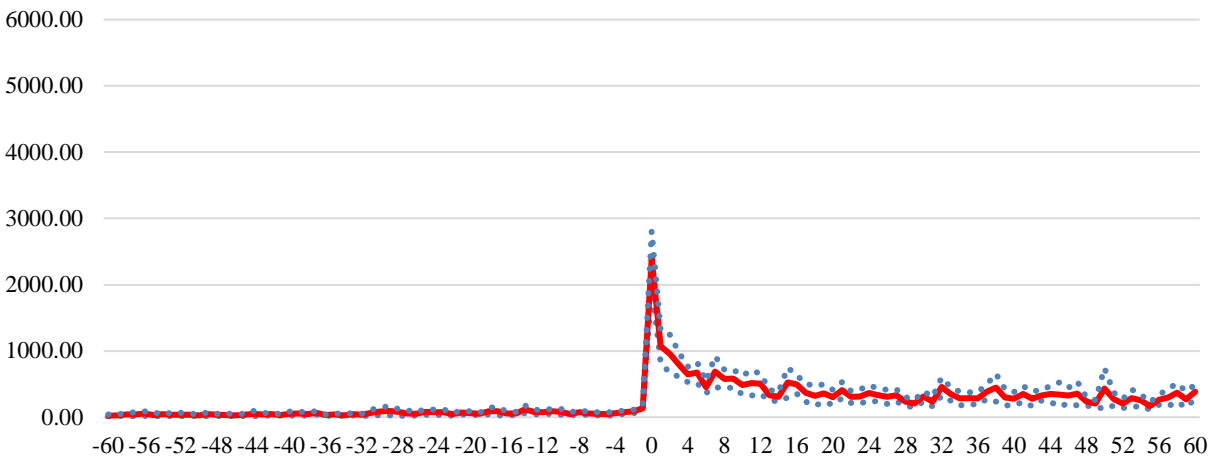


Figure 7: Corn Volume Event Day 0 (panel a), one Day Prior (panel b), and one Day After (panel c) (x-axis: Minutes Prior and Post to opening minute, y-axis: Volume)

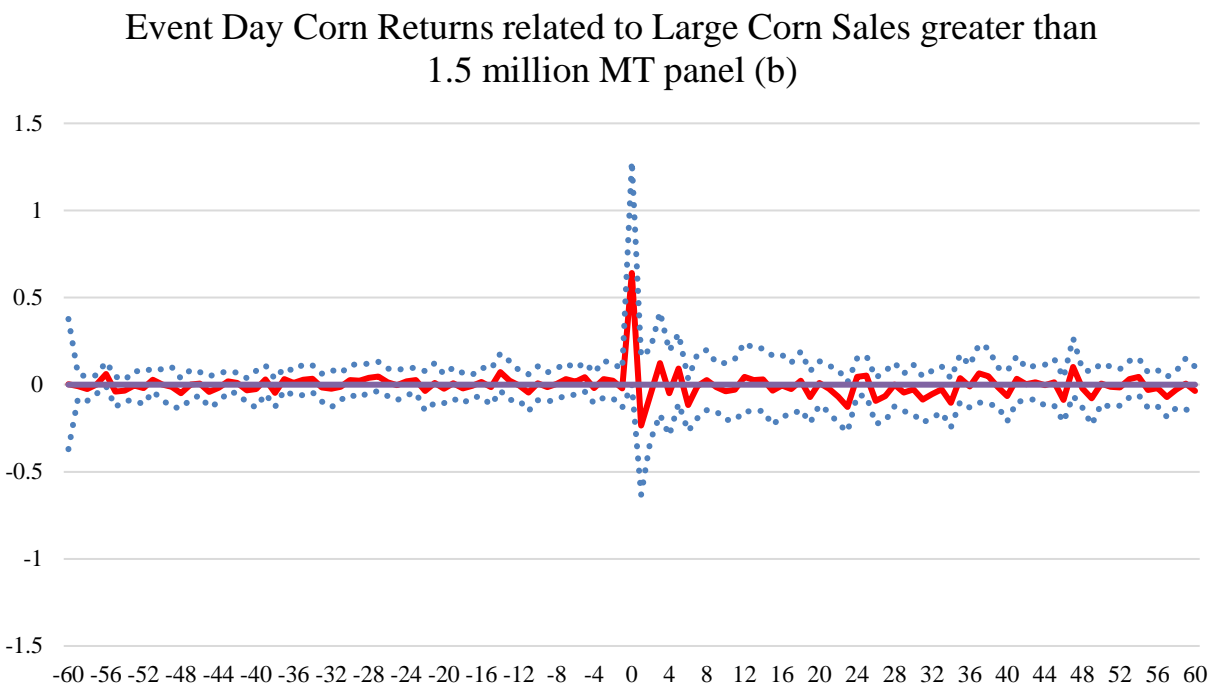
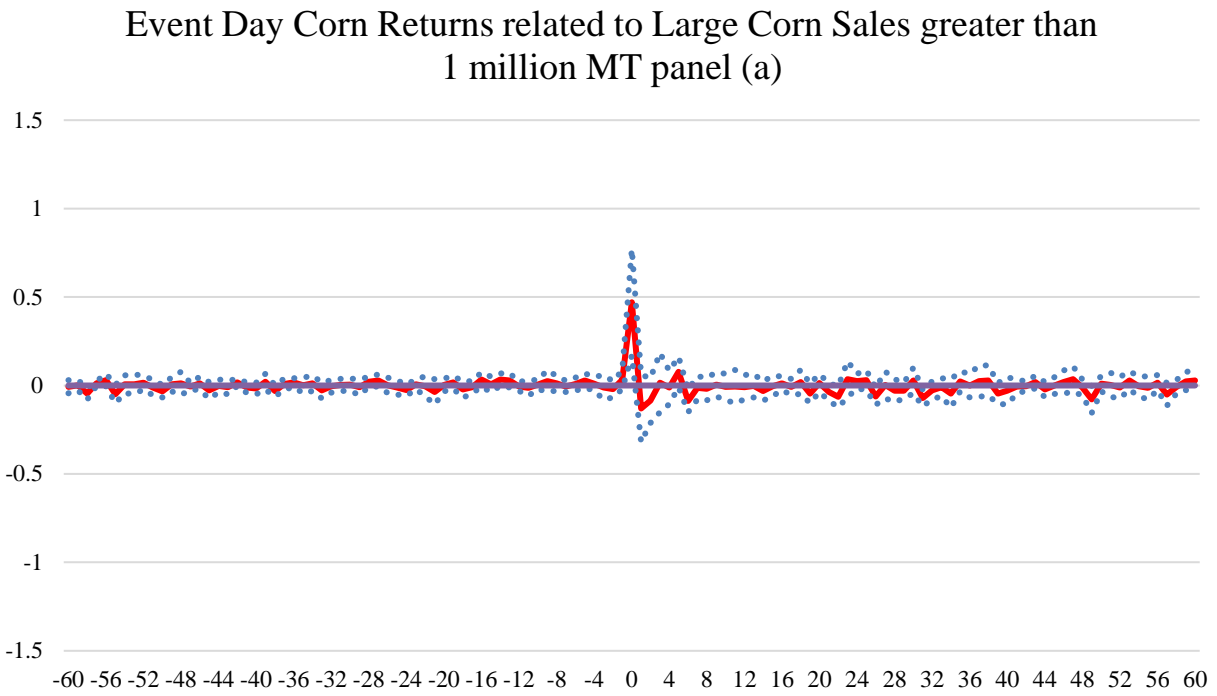


Figure 8: Large Corn Sales to China Greater than 1,000,000 MT (panel a) and 1,500,000 MT (panel b) (x-axis: Minutes Prior and Post to opening minute, y-axis: Returns)