WASDE Surprises and Futures Prices: What Moves Markets?



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Abstract

We examine corn and soybean futures price movements in the periods surrounding the release of the monthly World Agricultural Supply Demand Estimates (WASDE) by the United States Department of Agriculture. Using polling estimations to calculate a degree of "surprise" for each WASDE release, we found statistically significant relationships between U.S. corn and soybean ending stock data and relevant corn and soybean futures intraday price movements post-release, with the nature of correlations changing as time from the release passed. Additionally, directionally correct drift prior to release suggests that we also observed informed trading and/or superior internal research.

INTRODUCTION

The World Agricultural Supply Demand Estimates (WASDE) is a market moving report, a statement evidenced by the robust literature examining its release (Adjemian, 2012; Andersen et al., 2007; Du and Kane, 2019) and by simply observing the price action of corn and soybean futures at 11:00 AM CT on the day of each WASDE release. To examine the report with respect to futures pricing, we use polling and WASDE data going back to 2013, sourced from Reuters, to calculate a degree of "surprise," or polling error, of relevant WASDE indicators. We first examine patterns in the polling data and surprises, noting that primary WASDE corn and soybean ending stocks polling has not become more or less accurate to each respective day's release in the last 11 years. It was noted that for some indicators, May and August WASDE surprises demonstrate statistically significant differences from other months, perhaps reflecting the fundamental methodological differences in those reports. We then regressed WASDE surprises against futures pricing at increments of 1 minute, 5 minutes, 30 minutes, and end of the day to note correlations in surprise magnitude and direction with price action, finding directionally intuitive correlations with U.S. new crop corn and soybean ending stock indicators, and correlations changing in nature as time from the WASDE passes. (Throughout our review period, corn and soybean futures markets closed at either 1:15 PM or 1:20 PM, at which time the daily settlement was calculated from a relevant settlement period.) Additionally, we explored those relationships with respect to 11:00 AM and 10:50 AM reference points, finding stronger correlations between surprise magnitude and pricing beginning at 10:50, indicating pre-announcement drift as demonstrated in the literature (Kurov et al., 2014; Bernile, Hu, and Tang, 2014; Andersen et al., 2007). Our research marks a novel contribution to the corpus in two primary ways: we use intraday pricing data to examine immediate effects, and the scope of our research spans from the beginning of the WASDE being released while CME Group corn and soybean futures markets are open.

The WASDE is released by the United States Department of Agriculture (USDA) between the 8th and 12th calendar days each month. The report

contains forecasts for global and domestic supply and use of major commodity crops. The WASDE is a collaborative effort across USDA agencies: domestic field crop data is sourced primarily from the National Agricultural Statistics Service (NASS), the Economic Research Service (ERS) contributes policy and use inputs, and international data is gathered by the Foreign Agricultural Service (FAS). The WASDE is watched closely by industry players and considered a foundational source of regular agricultural market information. Exemplifying the tremendous interest and market-moving potential of the report, the USDA takes great efforts to safeguard the number prior to official release by creating a designated "lock-up" area where windows are sealed, curtains are drawn, and electronic communication is cut off (USDA, 2024). The WASDE has been released at 11:00 AM since January 2013, prior to which it was released at 7:30 AM, during a time of closure for CME Group grains and oilseeds markets. The change from 7:30 AM to 11:00 AM created an opportunity for market participants to trade on the report at the time of its release, resulting in an immediate expression of the report's information in the form of price discovery.

Prior to each report's release, estimates of select WASDE indicators are aggregated by market information providers, including Reuters and Bloomberg. There is an assumption among market participants that polling is widely respected and digested by the market prior to release, and thus polling values are "baked in" to relevant market pricing going into the number. Price movement after the release, therefore, would be expected when polling values, which represent market expectation before release, differ significantly from the release values. Moreover, we expect price movement to be directional depending on whether the difference in the actual minus polling numbers represent an expansion or contraction of understood supply or demand, and price movement should be proportional to the degree of new information presented by the release.

The WASDE has been studied extensively. Our research differs from prior research in two significant ways: our research scope begins with the movement of the WASDE release time from 7:30 AM to 11:00 AM and extends into 2024, giving us more than 10 years of data and encapsulates the entire period (to May 2024) during which the WASDE was released in open Chicago Board of Trade (CBOT) grains and oilseeds markets. Notably, the data includes intraday pricing provided directly by the exchange, allowing us to examine the impact of the WASDE immediately post-release and throughout the remainder of the trade date. Relevant prior research was conducted before 2012 (Adjemian, 2012), precluding an examination of immediate market reaction. Without intraday pricing data, other research employs daily returns, resulting in a less nuanced view of the report's impact.

DATA

This section describes the price and announcement data used in the analysis. Our data is comprised of two distinct data sets: the first, provided by Reuters, contains the date of release, the Reuters polling median, the actual WASDE number, and the prior month's value. The second set of data is comprised of futures prices surrounding WASDE releases.

WASDE Indicators

WASDE indicators reflect corn and soybean seasonality. In the Midwest, corn and soybeans have only one growing season per year: planting occurs in the spring and harvest in the autumn. After the harvest occurs in September and/or October, corn and soybeans are dried and stored for delivery throughout the calendar year. CME Group corn and soybean futures are physically deliverable, meaning that when a market participant holds open interest into the delivery period for the contract and are matched for delivery, they are obligated to make or take physical delivery of the commodity (Chicago Board of Trade, n.d.). It is physical delivery, or the threat thereof, that tethers these financial products to their underlying physical markets, forcing convergence (Hieronymus, 1977; Fernandes, Kunda, and Robe, 2022).

The listing cycles of CME Group corn and soybean futures reflect the respective crop years of the underlying commodities. Corn is listed for delivery in March, May, July, September, and December; with the latter expiration designated as the beginning of the next new crop year because the supply underlying December corn futures is newly harvested. CBOT soybean futures are listed for January, March, May, July, August, September, and November delivery, with November as the designated first new crop instrument. The WASDE lists new crop and old crop indicators to refer to respective designated marketing years, which span September 1 through August 31 for corn and soybeans.

Not all WASDE releases are created equal. The WASDE releases old crop corn and soybean data only in the months of May through September, with the May report giving the first new crop forecasts for the upcoming crop year, the physical supply of which is at that time, still in the field[1]. For example, the May 2023 WASDE released U.S. new crop corn ending

stock and U.S. old crop corn ending stock numbers, with the former referring to an estimation of the ending stocks that will be carried from the upcoming 2023/2024 crop year into the 2024/2025 crop year, and the latter number referring to the ending stocks that will be carried from the 2022/2023 crop year into the 2023/2024 crop year beginning in September 2023. The August WASDE is also of special consideration because the field crop indicators incorporate mid-summer surveys and newly formed yield estimations (Hultman, 2023).

Futures Prices

Our analysis additionally entails intraday pricing of corn and soybean futures listed at the CBOT, a designated contract market within CME Group. Our wider data set includes the opening, high, low, and closing prices for the 10:50, 11:00, 11:05, 11:30 AM minutes, as well as the daily settlement prices and trade volume for all corn and soybean futures instruments traded on WASDE days. This data was supplied directly by CME Group.

Designating Instruments

In choosing which polling results to examine alongside the pricing of which futures instruments, we sought to accurately align physical supply. Table 1 shows which WASDE indicators were examined with respect to the pricing for which futures instrument for data falling in the calendar year 2023, with all other years following analogous seasonal patterns. Yield and output were examined as new crop instruments.

METHODOLOGY

Our research seeks to examine the relationship between WASDE polling, the WASDE release, and futures pricing from a variety of angles. First, we examine trends in our polling data to determine whether polling is becoming more or less accurate, or if polling skews more bullish or bearish (meaning whether pollsters are more likely to overestimate or underestimate supply, respectively). We seek to identify monthly, seasonal, or annual patterns in polling errors, to examine the relationship between polling errors and futures prices in 1-minute, 5-minute, 30-minute, and daily increments, and to observe the existence of directionally accurate price drift prior to release, as has been noted by prior research. Finally, we seek to identify whether the relationship between polling errors and price movements demonstrates monthly, seasonal, annual, or continuous patterns.

To determine the surprises, we borrow methodology from (Bernile, Hu, and Tang, 2014) and (Kurov et al., 2014), who studied directionally accurate price drift preceding macroeconomic releases. Central to our analysis is the concept of the z-score[2], which indicates how far a data point is from the average of its group. A z-score of zero tells us that the number is equivalent to the average of its group, while a z-score of 1 indicates that the value is one standard deviation above the average and z-score of -1 indicates that the value is one standard deviation below the average. To examine the relationship between surprises over time, as well as between surprises and price movement, we employed linear regression analysis.

The U.S. corn and soybean ending stock indicators were the primary subject of analysis, due the availability of ending stock polling data each calendar month. Moreover, we believe that ending stocks, which function as a net of both supply and demand, contain more information than yield or output alone, though it was observed that for months offering yield and output polling, those surprises were on average more strongly correlated with ending stock surprises.

RESULTS

Figure 1 shows that the z-scores of the surprises for the four Reuters polls denoting U.S. corn and soybean ending stocks are approximately normally distributed. Between 2013 and 2024, the polling median was equal to actual WASDE estimate 28 times, constituting zero surprise. We performed a t-test to determine whether the difference between the number of bearish and bullish surprises across years is statistically significant, and with a p-value of 0.208, we cannot observe statistically significant difference between the frequency of bearish vs. bullish surprises. The total number of bearish surprises (actual - polling > 0, experts underestimating) is 187 and of bullish surprises (experts overestimating) is 163.

For the Reuters poll estimating U.S. new crop corn ending stocks, the standard deviation of polling errors is equivalent to 110 million bushels, meaning that roughly 68% of polling medians fall within +/- 110 million bushels of the reported WASDE U.S. new crop corn ending stocks number. Between the four indicators, old crop polling is associated with lower standard deviations of errors than new crop polling, suggesting greater accuracy of old crop polling. The Reuters poll with the greatest standard deviation of surprise was for U.S. new crop soybean ending stocks, with a standard deviation of polling errors of 10% of the total number, or 40 million bushels.

We observed polling accuracy as indicated by the standard deviation of polling surprise. Both U.S. new crop corn and soybean ending stocks show the widest ranges and highest median standard deviations in May and August, while patterns are less observable for old crop indicators. This is intuitive because the May WASDE provides the first annual estimations for the upcoming new crop year, and the August WASDE incorporates novel inputs to the statistical evaluation of the number, likely making polling accuracy more challenging for those two months.

The Effect of WASDE Surprises on Futures Prices

All four of the ending stock indicators show negative and statistically significant correlations when regressing standardized surprise against price movement of the respective assigned futures instruments (see Table 3). While the group of all U.S. new and old crop corn and soybean ending stocks showed a negative and statistically significant correlation when regressed against their designated futures, correlation results are stronger when indicators are examined individually. In both views, there is a pattern of the coefficient of standardized surprise increasing as time from the release passes, while the R2 coefficient, which indicates the percent of variation attributable to the linear correlation model, decreases. U.S. new crop corn ending stock surprises demonstrate a stronger correlation (indicated by a higher R2) with corn futures prices than U.S. new crop soybean ending stock surprises do with their respective futures. Table 4 results compare the last reported futures prices during the 11:00, 11:05, 11:30 AM, and closing minutes compared to the opening 10:50 and 11:00 AM prices.

In each of the tables, the coefficient of standardized surprise, which indicates the slope of the trendline between the dependent (each price move) and independent variables (standardized surprise), has the lowest absolute value at 11:01 and increases in absolute value from 11:05, 11:30, and to the daily settlement. The coefficient of determination R2, however, demonstrates a pattern of lessening value as the dependent variable covers an increasingly wide period. A strengthening coefficient of standardized surprise as time from the release passes suggests that the effect of the WASDE surprise on futures prices is the strongest in absolute price change at the daily close, suggesting that the WASDE contains fundamental information that the market digests throughout the remainder of the trading day. As the trading day progresses and the market digests other more material information, however, the standardized WASDE surprise accounts for a diminishing percent of price variation, signified by a lessening R2 value. For both U.S. new crop corn and soybean ending stocks, the coefficients of standardized surprise and determination are stronger when examining price action in comparison to 10:50 rather than to 11:00 AM, indicating the presence of directionally correct pre-release price drift. Additional analysis was done to examine the role that prior WASDE reports play in the price movement post-release, finding no independent correlation with polling surprise. Nor was statistical significance determined to be associated with the direction of surprise, suggesting that bullish and bearish surprises are associated with roughly equal and opposite price movement.

INTERPRETATION OF RESULTS

After completing this work, we have a several takeaways.

- *U.S. corn and soybean ending stocks surprises are statistically significantly correlated with futures price movement. The relationship is stronger for corn than for soybeans.*

  This observation is intuitive and corroborated by trade press, which commonly cite corn and soybean futures price movement as attributable to WASDE ending stocks indicators. These indicators serve as foundational information about the nation's commodity supply while additionally carrying information about demand. The relative strength of the relationship in corn could be attributable to the greater trade volume, suggesting a more responsive market. Figure 3 shows the average corn and soybean futures Globex trading volume for the instruments detailed in Table 2's WASDE release dates (Globex volume comprises all electronic volume excluding block trades).

- *WASDE ending stock surprises correlate most strongly with futures price movement benchmarked at 10:50 (10 minutes prior to release) compared to the 11:00 AM opening price, demonstrating directionally correct price drift prior to release.*

  Price drift aligning in direction with post-release price movement has been observed in the literature across economic releases not limited to the WASDE (Kurov et al., 2014). Kurov, Sancetta, and Strasser discuss information leakage and superior internal research as potential sources of drift.

- *Between the four WASDE U.S. ending stocks indicators, old crop polling is associated with lower standard deviations of errors than new crop polling.*

  U.S. old crop ending stocks polling is more accurate than U.S. new crop ending stocks polling. This observation aligns with our intuitive understanding of crop years, as old crop ending stocks should be readily observable because they physically exist at the time of WASDE release. The numbers in the WASDE indicating U.S. new crop ending stocks, conversely, for May through October, refer to predictions of the nation's commodity stocks. After October, U.S. new crop ending stocks should intuitively still be more difficult to estimate than old crop ending stocks because new crop ending stocks are more less established than their old crop counterparts in WASDE months where both are listed.

- *For regressions examining U.S. new crop corn and soybean ending stocks on futures price movement, the absolute value of the coefficient of standardized surprise increases and the R2 coefficient decrease as the dependent variable is associated with price movement over a longer period.*

  When examining the relationship between U.S. new crop corn and soybean ending stocks surprise and price movement, the slope of the regression line (indicated by the coefficient of standardized surprise) is flattest when the post-release window is shortest, and the slope of the regression line is steepest when the post-release window extends to the daily settlement period. At the same time, the coefficient of determination R2 weakens over this period, suggesting that the model has less explanatory power as time from the release passes. This relationship is interesting and intuitive, as the WASDE carries fundamental information that is digested through the day. While at the same time, new information is presented throughout the trade date post-release, weakening the explanatory power of the model on price variation.

- *Change from the prior month's WASDE ending stocks estimate demonstrates an even stronger relationship with corn and soybean futures prices than does polling surprise. Change from the prior month and polling surprise are strongly correlated with one another.*

  With the exception of May, which represents the first estimates of the new crop year, each WASDE ending stocks estimate is an update of information from the prior month. For example, the U.S. old crop corn ending stocks number released in the July WASDE is an estimation of the nation's resting corn supply and refers to the same physical supply of corn reported by U.S. old crop corn ending stocks in the WASDE from the prior month (June). In July, the U.S. new crop corn ending stocks number is a projection of the nation's supply in the upcoming crop year, updated with new information from the prior month's estimate. The observed relationships between prior reports, report surprise, and price movement suggest that the prior month's estimate is a major input to polling and therefore cannot be observed as a second independent variable paired with polling surprise. The stronger relationship between the surprise and prior report for soybeans indicates that polling might be more based on the prior number than for corn, which is treated with more accurate polling (discussed above).

- *May and August WASDE polling demonstrates statistically significant difference from other months, across corn and soybean new crop ending stock indicators.*

  This observation speaks to the novel information presented in the May and August WASDEs, which make these reports more difficult to accurately predict. May is the first estimation of the new crop year and thus has no prior number reporting on the same physical supply. August includes new survey and yield data and thus differs fundamentally from its prior month. As discussed above, the prior release is a major input to polling, and in May and August, novel methodology makes the prior release is less useful as an input.

CONCLUSION

Traders respond to new information (Kyle, 1985), and the WASDE is one of the most meaningful media in agricultural economics. The results of this paper demonstrate a correlation between the extent to which WASDE corn and soybean ending stock numbers defy expectations (expressed as standardized surprise) and futures price movement in relevant instruments in the periods post- (and pre-) release.

This paper discusses the relationship between futures prices and WASDE U.S. old and new crop corn and soybean ending stock indicators only. Correlations

between WASDE corn and soybean yield and output and futures pricing were examined, and in some cases, coefficients of correlation between these indicators and futures prices were stronger than with ending stock surprises. Yield and output indicators, however, are released only seasonally and therefore were not primary subjects of analysis. Yield and output were not considered in multivariate regression to complement ending stocks due to collinearity. Further research could delve into the relationship between ending stocks, yield, and output to best determine market response to the WASDE report.

Only U.S. WASDE indicators were considered in this analysis, however the WASDE releases additional ending stock numbers for Brazil, Argentina, and the world. Further analysis could examine the effect of international indicators on corn and soybean futures pricing.

Finally, a benchmark time of 10:50 AM (10 minutes prior to release) was chosen to capture drift prior to the WASDE release while considering minimal extraneous information, as determined by Anderson et al. (2007). Kurov, Sancetta, and Strasser (2014), however, found a pre-release window of 30 minutes to be optimal. Both Anderson et al. and Kurov et al. utilize pricing data more than 10 years old, and thus new research with a focus on drift prior to release should be a welcome addition to the corpus.

FOOTNOTES

1 Estimates for a particular crop year are covered in 17 consecutive WASDE reports. A crop year becomes new crop in May and is reported as new crop through April of the next year (13 reports), at which point it becomes reported as old crop from May through September (five reports).

2

(1) Surprise = *Actual WASDE estimate – Polling Median*

(2) Each surprise is standardized: $Standardized\ Surprise = \frac{Surprise}{st\ dev\ (Surprise_{RIC})}$

For statistical purposes, z-score of each surprise is also calculated:

(3) $z - score = \frac{Surprise - average(Surprise_{RIC})}{st\ dev\ (Surprise_{RIC})}$

Following this logic, a one-unit change in standardized surprise is a one standard deviation degree of polling error with respect to the actual WASDE estimate.

Additionally, when examining the relationship between price movement on WASDE releases and the prior report, we created a similar variable to show the relative magnitude that a WASDE report differs from the prior month.[2]

(4) *DIFF_ACT_PREV = Actual WASDE estimate – prior month's WASDE estimate*

(5) Or $PREVIOUS_{RIC,\,t} = ACTUAL_{RIC,\,t-1}$

(6) Each surprise is standardized: $DIFF\_ACT\_PREV = \frac{DIFF\_ACT\_PREV}{st\ dev\ (DIFF\_ACT\_PREV_{RIC})}$

For statistical purposes, z-score of each surprise is also calculated:

(7) $ZSCORE\_DIFF\_ACT\_PREV_{RIC,\,t} = \frac{(ACTUAL_{RIC,\,t} - PREVIOUS_{RIC,\,t}) - avg(ACTUAL_{RIC} - PREVIOUS_{RIC})}{st.dev(ACTUAL_{RIC} - PREVIOUS_{RIC})}$

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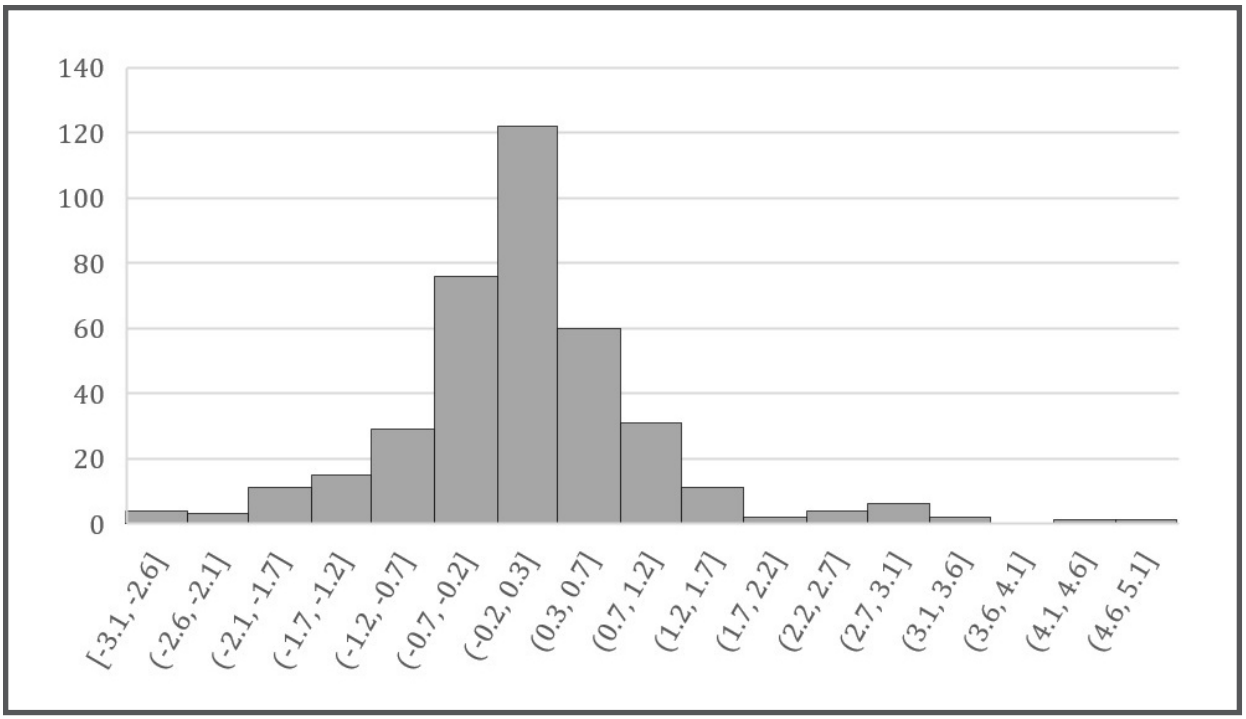

Figure 1. Frequency histogram of surprise z-scores

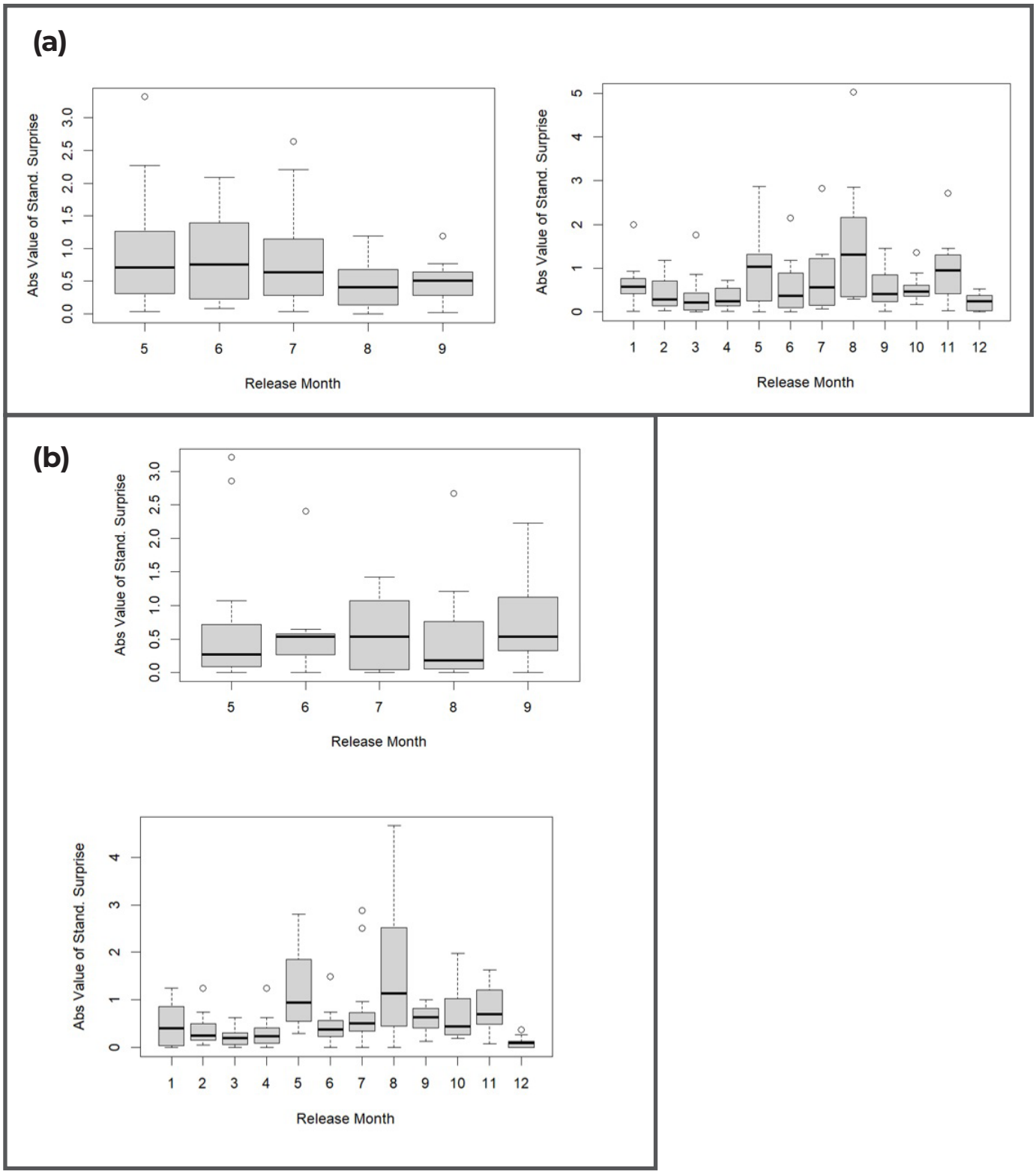

Figure 2. Standardized surprise across WASDE release months: (a) corn ending stocks and (b) soybean ending stocks

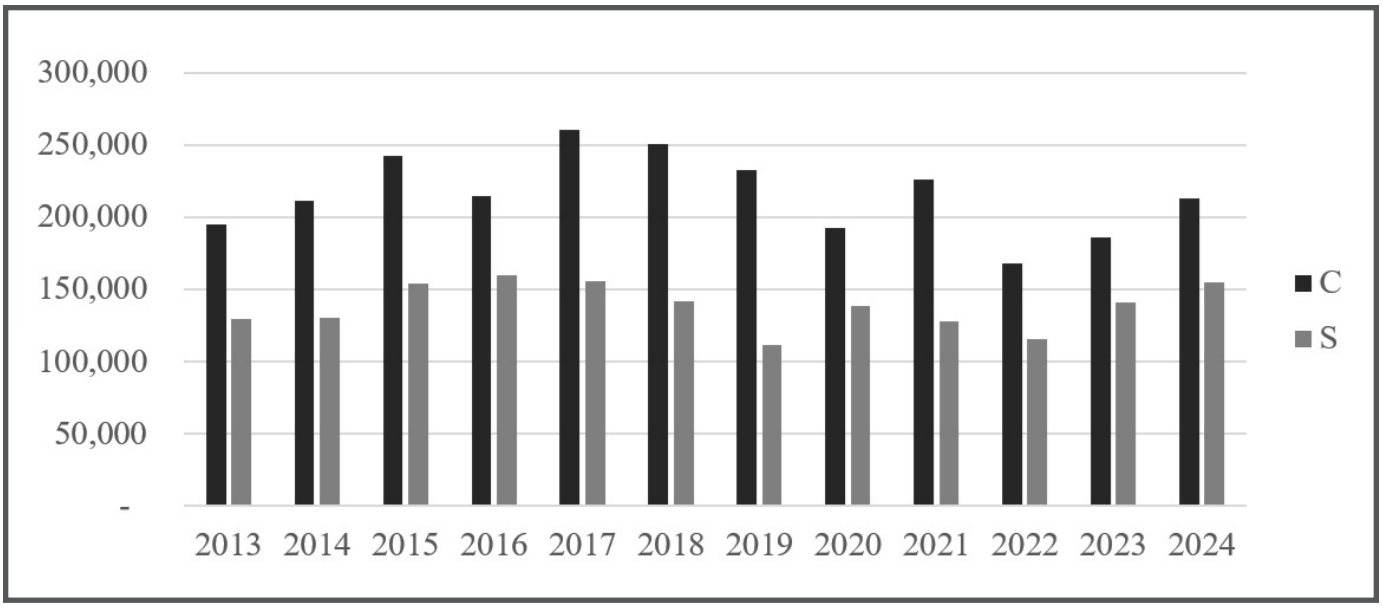

Figure 3. Average corn and soybean futures volume on WASDE days (selected instruments; January 2013 through May 2024)

Table 1. WASDE Months and Corresponding Futures Instruments, 2023				
Month of WASDE Release	**U.S. Old Crop Corn (Marketing Year 22/23)**	**U.S. New Crop Corn (Marketing Year 23/24)**	**U.S. Old Crop Soybeans (Marketing Year 22/23)**	**U.S. New Crop Soybeans (Marketing Year 23/24)**
January 2023		March 2023 corn futures		March 2023 soybean futures
February 2023		March 2023 corn futures		March 2023 soybean futures
March 2023		May 2023 corn futures		May 2023 soybean futures
April 2023		May 2023 corn futures		May 2023 soybean futures
May 2023	July 2023 corn futures	December 2023 corn futures	July 2023 soybean futures	November 2023 soybean futures
June 2023	July 2023 corn futures	December 2023 corn futures	July 2023 soybean futures	November 2023 soybean futures
July 2023	September 2023 corn futures	December 2023 corn futures	August 2023 soybean futures	November 2023 soybean futures
August 2023	September 2023 corn futures	December 2023 corn futures	September 2023 soybean futures	November 2023 soybean futures
September 2023	December 2023 corn futures	December 2023 corn futures	November 2023 soybean futures	November 2023 soybean futures
October 2023		December 2023 corn futures		November 2023 soybean futures
November 2023		December 2023 corn futures		January 2024 soybean futures
December 2023		March 2025 corn futures		January 2024 soybean futures

Table 2. Summary Statistics of U.S. Ending Stock Polls					
Description	**ST DEV (Bushels)**	**ST DEV (PCT)**	**ABS(AVG Stand. Surprise) (Std devs)**	**ABS(AVG Stand. Surprise) (Bushels)**	**Observations**
U.S. old crop corn ending stocks	50 M	3%	0.73	36.5 M	56
U.S. new crop corn ending stocks	110 M	6%	0.66	72.6 M	134
U.S. old crop soybean ending stocks	28 M	7%	0.64	17.92 M	56
U.S. new crop soybean ending stocks	40 M	10%	0.65	26 M	132

Table 3. Regression Results

(a) U.S. New and Old Crop Corn and Soybean Ending Stocks vs. Futures Pricing

	Last price at time compared to first price at 10:50 *Dependent variable:*				Last price at time compared to first price at 11:00 *Dependent variable:*			
	11:00	11:05	11:30	Daily close	11:00	11:05	11:30	Daily close
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Standard surprise	-0.034*** -0.004	-0.037*** -0.005	-0.039*** -0.006	-0.041*** -0.007	-0.031*** -0.004	-0.034*** -0.005	-0.036*** -0.006	-0.038*** -0.007
Constant	-0.007* -0.004	-0.0001 -0.005	-0.003 -0.006	0.002 -0.007	-0.010** -0.004	-0.003 -0.005	-0.006 -0.006	-0.0002 -0.007
Observations	378	378	378	378	378	378	378	378
R2	0.147	0.128	0.102	0.087	0.117	0.109	0.086	0.075
Adjusted R2	0.144	0.126	0.1	0.084	0.115	0.107	0.083	0.073
Residual Std. Error (df = 376)	0.082	0.096	0.116	0.134	0.085	0.097	0.118	0.135
F Statistic (df = 1; 376)	64.603***	55.379***	42.840***	35.627***	49.957***	46.163***	35.250***	30.534***
Note: *p**p***p<0.01					*p**p***p<0.01			

(b) U.S. New Crop Corn Ending Stocks vs. Futures Pricing

	Last price at time compared to first price at 10:50 *Dependent variable:*				Last price at time compared to first price at 11:00 *Dependent variable:*			
	11:00	11:05	11:30	Daily close	11:00	11:05	11:30	Daily close
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Standard Surprise	-0.037*** -0.004	-0.039*** -0.005	-0.040*** -0.006	-0.041*** -0.006	-0.036*** -0.004	-0.039*** -0.005	-0.039*** -0.006	-0.041*** -0.007
Constant	0.003 -0.004	0.009* -0.005	0.007 -0.006	0.009 -0.006	0.003 -0.004	0.009* -0.005	0.007 -0.006	0.009 -0.007
Observations	134	134	134	134	134	134	134	134
R2	0.407	0.333	0.271	0.24	0.38	0.317	0.256	0.223
Adjusted R2	0.403	0.328	0.266	0.234	0.375	0.312	0.25	0.217
Residual Std. Error (df = 132)	0.044	0.056	0.066	0.074	0.046	0.057	0.067	0.077
F Statistic (df = 1; 132)	90.696***	65.988***	49.127***	41.732***	80.908***	61.178***	45.407***	37.903***
Note: *p**p***p<0.01					*p**p***p<0.01			

(c) U.S. New Crop Soybean Ending Stocks vs. Futures Pricing

	Last price at time compared to first price at 10:50 *Dependent variable:*				Last price at time compared to first price at 11:00 *Dependent variable:*			
	11:00	11:05	11:30	Daily close	11:00	11:05	11:30	Daily close
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Standard Surprise	-0.060*** -0.008	-0.065*** -0.009	-0.077*** -0.011	-0.078*** -0.013	-0.058*** -0.008	-0.063*** -0.009	-0.075*** -0.011	-0.076*** -0.013
Constant	-0.002 -0.008	0.004 -0.009	0.005 -0.011	0.013 -0.013	-0.006 -0.008	0.001 -0.009	0.002 -0.011	0.009 -0.013
Observations	132	132	132	132	132	132	132	132
R2	0.329	0.302	0.284	0.217	0.284	0.279	0.258	0.203
Adjusted R2	0.324	0.296	0.279	0.211	0.279	0.274	0.252	0.197
Residual Std. Error (df = 130)	0.087	0.1	0.123	0.149	0.092	0.102	0.128	0.15
F Statistic (df = 1; 130)	63.657***	56.140***	51.659***	35.961***	51.630***	50.366***	45.167***	33.208***
Note: *p**p***p<0.01					*p**p***p<0.01			