How Much Would It Be Worth to Know the WASDE Report In Advance?

By

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Past research has shown that prices move in response to WASDE reports, but have only looked at price movements right before and right after the reports. This research seeks to determine the profitability of trading based on knowing the next WASDE report at the time of the current report. The research should help traders evaluate investments in efforts to predict the report. First, a trade and hold model is used to determine the profits of trading based on whether ending stocks will be up or down in the next WASDE report. Second, a price forecast model using an ending stocks regression is used to forecast price at the next WASDE report release. The intercept of the model is calibrated so that the model predicts the current price without error; the slope is based on report data from no more than the last two years of data. Using the forecasted price, the position of the trading model's profit calculation can change daily based on where the closing price of the commodity is in relation to the price prediction. Profits were averaged on a days-til-report, monthly, and yearly basis. Both models were profitable and the most profitable day to trade was the report release day. However, the trade and hold model outperformed the variable position model which suggests more work is needed to increase the forecasting power of this model. This might be accomplished by using additional years of data or by a form of Bayesian smoothing to improve the forecasts.

Keywords: WASDE, price forecasting, inverse ending stocks, trade and hold model, variable position model

Introduction

The United States Department of Agriculture (USDA) releases crop production reports that provide estimates of corn, soybean, and wheat yield. The USDA releases monthly World Agricultural Supply and Demand Estimates (WASDE) which contain fundamental market information such as the National Agricultural Statistics Service (NASS) crop production reports, and ending stocks estimates. Private firms attempt to predict the WASDE reports using satellite imagery, publicly known supply and demand estimates, experimental plots, crop tours, and calls to grain firms as well as many other ways to gather fundamental information (Milonas 1987).

The objective of this research is to determine the value of WASDE report predictions in the days before the report is released and the optimal use of the predicted information. Many agricultural economists have studied the effects of USDA crop production reports on commodity prices. Findings by Adjemian (2011), Fortenbery and Sumner (1993), Isengildina, Irwin, and Good (2006); Isengildina-Massa et al. (2008); McKenzie (2008); Milonas (1987); and Sumner and Mueller (1989) confirm that WASDE reports contain significant fundamental market information that causes market prices to change after the reports are released. Adjemian (2012) declares that USDA crop production reports cause "unmistakably significant" changes in market prices. A trading firm that can predict these market movements would have incentive to gather relevant and accurate information to develop their forecast models. This research is important to private firms because it will provide a daily value of the predictions leading up to the report. A trader will be able to use this research to determine how many days before the report is released, it is profitable to use their predicted WASDE information.

These reports are released on a monthly basis and contain information compiled by several USDA agencies such as NASS; the reports offer information on supply and demand and contain two main components, acres to be harvested and expected yield per acre (Vogel and Bange 1999). The NASS Crop Production report and the WASDE report are developed secretly and are released between the 9^{th} and 12^{th} of every month (Vogel and Bange). The key to these reports having a dramatic effect on markets is to ensure that the information remains secret until the official report release. The USDA fiercely guards this information to insure that nothing is leaked before the report date (Vogel and Bange).

The USDA reports have been shown to be very influential in causing extreme price movements in otherwise stable markets (Isengildina, Irwin, and Good 2006). Sumner and Mueller (1989) found that the harvest forecast reports released in the months of August, September, and October cause a greater change in corn and soybean market prices than other reports. Known periods of greater market realignments offer traders a chance to capitalize on market movements. Adjemian (2011) found that "virtually all" of the WASDE reports that contained NASS crop production reports stood out as significant. The struggle of private firms is to determine what direction the market will move based on the new information contained in these reports. Private agencies already release prediction data in the days prior to a USDA report (McKenzie 2008). One could argue that if this data were totally accurate and in turn negated the need for WASDE reports, it would remove the volatility from the market in the days before a report. This is clearly not the case. Isengildina-Massa et al. (2008) found that after WASDE reports containing NASS crop production reports were released, implied volatility in corn and soybean markets was reduced by an average of 2 and 2.5 percentage points 89% and 100% of the time respectively. This makes a strong case that private firms are not able to predict all of the information that is contained in the NASS crop production reports.

The establishment of the relevance of WASDE reports has brought on a desire to predict the information contained in these reports. There are companies that have been effectively predicting at least parts of the crop production report (McKenzie 2008). However, the reports are still being released and continue to strongly affect the market. According to Fortenbery and Sumner (1993), this is because the NASS crop production reports change the supply and demand expectations and therefore alter the fundamental information collectively known by the market participants.

Previous literature has shown the effects of WASDE reports a few days before the report release. However, the past literature has not considered models of how to use predictions to trade. This research will study US corn and soybean commodities spanning the years of 1975-2012. The main objective will be to determine the profitability of trading on a daily basis to determine what days are most profitable, and how long before a report release that it is profitable to trade. Other information that will be provided is details on seasonality through monthly profit calculations and structural change through yearly profit calculations. This research will successfully fill a void in the current literature and serve as a very relevant guide to the profitability of trading based on WASDE report information.

Conceptual Framework

A few notable price forecasting models have been developed to predict futures prices. Anderson and Tweeten (1975), Westcott and Hull (1985), Westcott and Hoffmann (1999), and Do (2010) all used some form of a stocks-to-use ratio or utilization to ending stocks ratio to estimate futures prices. Anderson and Tweeten (1975) set the precedent for wheat price prediction using these methods. Later work by Do (2010) expanded the model to include new information. The new model estimated by Do actually yielded a lower R-squared value for the regression than was obtained by Anderson and Tweeten (1975). A conclusion can be drawn here that it is detrimental to use very old data to predict new prices. There may also be evidence that the market experienced a structural change since the first model was developed. Suggested causes for recent structural change are commodity index funds, ethanol mandates, and decreased supply. Mallory, Irwin, and Hays (2012) report that a third of the U.S. corn crop is being used in ethanol production which has been aided in recent years by the presence of sufficient supply, profitable prices, and government mandates. Westcott and Hull (1985) and Westcott and Hoffmann (1999) both analyzed the effect of different situations on market behavior. The important findings by these researchers for the purpose of this model estimation is that there is evidence to support the fact that futures price prediction models can be affected greatly by policy and structural change in the market. Therefore to accurately predict prices these models should only use data relevant to the current market structure and policy instead of using all of the historical information that is available.

Procedure and Data

Ending stocks information is provided in the monthly WASDE reports. The units for this data at the US level are in millions of bushels for corn and soybeans. Periodically the USDA released corrections for the WASDE reports which resulted in two or more reports in a single month. Those reports were included in this data set. Futures price data are from R & C Research at www.price-data.com. Corn and soybean prices are from CBOT and are measured in dollars per bushel. The only contract that was traded for both commodities was March. This simplifies the profit calculations due to the fact that contracts did not have to be rolled over upon expiration. Also, using the March contract provides a common trading month in which to compare the two commodities. The March contract should reflect changes in overall supply and demand information similar to the nearby contract.

The initial trading model is based only on the direction of the change in WASDE ending stocks. If ending stocks went down in the future month, a buy indicator was triggered. Conversely, if ending stocks went up in the future month, a sell indicator was triggered. One position was held throughout the month and was closed on the release day using the difference in the close of the current month and the close of the future month as the calculation of profit. The profit equation identified as the trade and hold model is:

(1) $$Profit_{d,m,t} = (-1)^{I(ES_{m+1,t} > ES_{m,t})} * (Close_{d,m,t} - Close_{d-1,m,t})$$

where *d* is days until the next report, *m* is the current month, and *t* is the year (1975,…,2012), $Profit_{d,m,t}$ indicates the daily profit, $ES_{m+1,t}$ is the ending stocks for the next month, $ES_{m,t}$ is the ending stocks for the most recent report, $Close_{d,m,t}$ is the closing price, and $Close_{d-1,m,t}$ is the closing price of the previous day.

In order to develop a forecast of corn futures prices, actual historical ending stocks are regressed on futures prices to determine the effect of ending stocks on the price movements observed in the futures market. This was accomplished by using an inverse ending stocks regression. The development of this model was influenced by the work of Anderson and Tweeten (1975), Westcott and Hull (1985), Westcott and Hoffman (1999), and Do (2010). Their models used a stocks-to-use ratio and utilization to ending stocks ratio. We use an inverse ending stocks regression and estimate a new regression for each month. This equation is defined as:

(2) $$Price_{m,t} = \beta_{1,m,t} + \beta_{2,m,t} * \frac{1}{Ending\ Stocks_{m,t}} + e_{m,t}$$

where *t* is year (1975,…, 2012), *m* is month from June to March of the crop year, $Price_{m,t}$ is the regression estimation of price given $Ending\ Stocks_{m,t}$, $\beta_{1,m,t}$ is the intercept term, $\beta_{2,m,t}$ is the slope coefficient on inverse ending stocks, $Ending\ Stocks_{m,t}$ is ending stocks, and $e_{m,t}$ is the error term. The months of April and May are used to estimate the first regression of the crop year which typically begins in May and ends in April of the next year. The slope coefficient is calculated by the following equation:

(3) $$\bar{\beta}_{2,m,t} = \begin{cases} \frac{m}{10} * \hat{\beta}_{2,m,t} + \left(1 - \frac{m}{10}\right) * \beta_{2,\bar{m},t-1} & \text{if } m \leq 10 \\ \hat{\beta}_{2,m,t} & \text{if } m > 10 \end{cases}$$

$$\text{if } \hat{\beta}_{2,m,t} < 0 \text{ then } \hat{\beta}_{2,m,t} = 0$$

$$\text{if } \beta_{2,\bar{m},t-1} < 0 \text{ then } \beta_{2,\bar{m},t-1} = 0$$

In this equation, $\bar{m}$ is the last month of the crop year, $\bar{\beta}_{2,m,t}$ is the moving average slope coefficient, $\hat{\beta}_{2,m,t}$ is the predicted slope coefficient, and $\beta_{2,\bar{m},t-1}$ is the last slope coefficient of the previous year. The decision to limit the use of the previous year's regression slope coefficient in this manner is used to allow frequent structural change in the regression. It also helps maintain the model's accuracy early in the year when there is limited information. The slope coefficient is calculated using a moving average based on the previous year's last regression's slope. Slowly throughout the year the slope is weighted more to the current year than the previous year and in the last month does not use any of the previous slope estimation. The intercept is calibrated as follows:

(4) $$\bar{\beta}_{1,m,t} = Close_{m,t} - \bar{\beta}_{2,m,t} * \frac{1}{Ending\ Stocks_{m,t}}$$

The calibration of the intercept $\bar{\beta}_{1,m,t}$ forces the regression to pass through the actual closing price of month *m*. $Close_{m,t}$ is the close price, $\bar{\beta}_{2,m,t}$ represents the weighted average slope, and $Ending\ Stocks_{m,t}$ is the ending stocks for the current month. Using the weighted average slope and calibrated intercept, the variable position model is defined as:

(5) $$\widehat{Price}_{m+1,t} = \bar{\beta}_{1,m,t} + \bar{\beta}_{2,m,t} * \frac{1}{Ending\ Stocks_{m+1,t}}$$

where $\widehat{Price}_{m+1,t}$ represents the price prediction for corn in the next month m+1and $Ending\ Stocks_{m+1,t}$ is the ending stocks for one month in the future.

A nonparametric regression of daily profits versus days to the next report was used to graphically show how profit changes as the report release approaches. The loess option in the GAM procedure of SAS using three degrees of freedom was used to do the smoothing with the nonparametric regression.

Once the profits of the commodities are calculated using the trade and hold model and the variable position model, the daily profits are averaged together based first on days until the report, then by the month in which the observation was recorded, and then by the year. This is a very important step for this research since the objective is to discover the profits from trading on a daily basis. Monthly and yearly averages will be helpful in determining the effects of seasonality and structural change respectively.

These models will provide the information necessary to determine the value of predicting WASDE reports. The trade and hold model will be useful in identifying the potential profit from trading based only on the expected direction of the change in ending stocks as opposed to trying to accurately predict what they will be. The variable position model makes trades based on the price forecast. The difference in the profits between the two models is interesting to discover because it would be much easier and cost effective to not have to know the prediction perfectly.

Results

The fixed position model was run using US corn and soybean data. Average profit was calculated on a daily, monthly and yearly basis. The purpose of this model was to determine the profitability of trading based only on the change in ending stocks. The effectiveness of allowing the model to change position on a daily basis can then be compared to the simple, one position a month, model.

Table 1 shows the average daily profit from the trade and hold model. The information in the table was obtained by calculating the profits from the model and individually averaging all of the observations together based on the days until the report. Not all days were profitable to trade. Intuitively, assumptions can be drawn from these results that it is indeed more profitable to trade closer to the report release date, as indicated by the presence of comparatively large profits on those days. However, there is no obvious trend in the results and the day of the report release was the second most profitable day to trade. A large profit on the report release day makes sense due to the new information being released to the market. But, as was mentioned before, there does not seem to be a very large difference in daily profits throughout the month. It appears that there is a steady return to trading until just a few days before the report release. To calculate a total or aggregate profit, the mean profits for all of the days are summed to be 13.69 cents per bushel. To determine the amount of model error resulting from the prediction, the total market movement was calculated between reports. This was calculated by taking the absolute value of the difference in the close price between report days. This calculation resulted in a total market movement of 7388.25 cents per bushel for all of the WASDE reports. To compare the predictive ability of our model to this total market move it is necessary to average market movement between reports. On average the market moved 16.83 cents per bushel. This is quite promising given that the average total profit calculation was 13.69 cents per bushel the model appears to be capturing 81.34% of possible profits for the trade and hold strategy employed by this model.

The daily profits are shown in Table 2. Monthly data offers the opportunity to determine the effect of the growing cycle, and the collection of harvest data on price. Also it offers a way to determine which reports tend to provide the most influential information. Some reports are calculated based on more information than other reports. As is reported in Table 3, the most profitable months to trade with this model are February, June, July, August, and October. Historically, June-August is an important time in the growth cycle of corn which greatly affects yield due to weather concerns. However, it was expected that January would have been more profitable due to the importance of that report and the detailed harvest information contained within it. Instead it was observed that the most profitable month was February.

Yearly profits were calculated to study the change in market structure and can be found in Table 4. Sudden changes in market structure due to policy changes, the economic climate, or weather patterns can dramatically affect the profitability of a trading model. Starting in 2008 there tended to be higher average profits of about 1 to 1.5 cents per bushel higher than in previous years. This coincides with the rapid rise of commodity prices.

The average daily profit was also calculated for soybeans. Similar results were found in that the most profitable day to trade is the report release day. Unlike corn there was a much more noticeable difference between the days until the report. Also, the report release day had the highest profit. At 2.66 cents per bushel this is over .5 cents per bushel more than the next most profitable day. The total average profit was again calculated by averaging the mean of all of the observations. This returned a value of 17.10 cents per bushel.

Similar to the analysis of corn, the total market movement was calculated for soybeans. The soybean market moved a total of 17211.75 cents per bushel over all of the WASDE reports. This was an average movement of 41.18 cents per bushel over the course of a report month. Returning an average profit of 17.10 cents per bushel, it appears that the model is capturing 40.91% of the soybean market movement using the trade and hold strategy. This is much lower than corn and may reflect the soybean market being more of an international market than the corn market.

The monthly profit calculations reveal that the most profitable months to trade are February, June, July, and October. Work by Isengildina-Massa et al. (2008) and Adjemian (2011) has already revealed the importance of the January crop reports due to the information on harvest data contained in them. However, this model did not show substantial profit until February.

Just as was observed in corn, there is a substantial increase in the profits from the trade and hold model starting in 2008. This substantiates the argument for structural change due to the fact that these separate commodities are showing similar evidence at the same periods in time.

The trade and hold model showed that both corn and soybeans are the most profitable to trade on the report release date. Also, the months during critical growing periods and when important harvest information is released are the most profitable to trade. These observations hold true with the current research. Cumulative daily profits were calculated to be 13.69 and 17.10 cents per bushel for corn and soybeans respectively. This was 81.34% and 40.91% of the total obtainable profit for corn and soybeans as calculated from the absolute value of the difference in the close prices on report release days. Also, both commodities became more profitable to trade from 2008 to the present. This can be explained in part by the introduction of index funds, ethanol mandates, and overall decreased supply that leads to tighter supplies. Low supply can lead to larger slope coefficients of the regression. An increase in price volatility offers an increased opportunity to trade given that if the market price does not move profit cannot be obtained. While the trade and hold model assumed one position to trade throughout a month based on the movement of ending stocks, there could potentially be more profit obtained by allowing the model to change trading positions on a daily basis depending on the commodity price relative to a forecasted price.

The variable position model is a daily trading model that was simulated with US corn and soybeans for the years 1975-2012. Ending stocks from the WASDE reports and futures prices from R&C Research were the only data used and it was assumed that the crop year begins in May of every year. The only contract month that was traded was the March contract for corn and soybeans. It is believed that this month would capture most of the market information from the crop year. The intercept and slope beta's were retained from the model estimation so they could be plotted against date as can be seen in figure 1 and figure 2. Corn and soybeans will be discussed together to simplify the explanation due to the very similar results obtained for both commodities.

In figure 1 the intercept coefficient stayed relatively constant throughout the sample period. By calibrating the intercept so that the regression line travels through the last known price, the variance of the intercept coefficients was reduced. This ensured that there were no wild breaks in predictions across months and that the regression of the price forecasts would have to include the last known price.

As is observed in figures 3 and 4 the coefficients for slope tend to vary more over time. As the market structure has changed in recent years the variance of the slope coefficients has become large compared to earlier observations. To combat this, the variable position model uses a moving average approach to help minimize the effect of previous data to the year immediately prior to the current estimates. This helps alleviate the effect of structural change. Both commodities experience a major change in slope coefficients around the year 2008. As was discussed earlier in this paper, some have attributed this to index funds, ethanol mandates, and overall lower supplies which tighten supplies and lead to a greater slope of the regression line. At these low quantities prices tend to make larger moves with changes in supply.

The results of the nonparametric regression are shown in figure 5 and 6. These are smoothed profits and reveal that on average the model is profitable with an upward trend moving toward the report release date. Also, as was observed in the trade and hold model, profits tend to rise sharply in the days immediately prior to the release date. This is the type of movement that would be expected when the market is obtaining more and more information as the report release date approaches. Possibly it is because private firms are beginning to predict at least parts of the report. The variable position model resulted in positive profits for the majority of the days. However, the cumulative profit was 9.15 cents per bushel for corn and 4.39 cents per bushel for soybeans. This is lower than the trade and hold model which returned 13.61 and 17.10 cents per bushel for corn and soybeans respectively. This reduction in profit is likely due to forecast error in which the forecast model does not perfectly predict the price at the close on the report release day. It appears that simply knowing if ending stocks will increase or decrease is sufficient to make larger profits that this forecasting model. Future research should consider ways to improve the forecasting model. As shown in Figures 3 and 4, there is considerable year-to-year variation in slope coefficients. Some sort of smoothing of slope coefficients such as using data from additional years or using Bayesian smoothing may improve forecasts.

The monthly profits calculations show that January, March, June, September and October are the most profitable to trade for corn. Soybeans most profitable months are January, March, June, and November. These are similar results to what was obtained with the trade and hold model in which the growing season and harvest are important times to trade due to the importance of the information entering the market. Again, it does not appear that December was a profitable month to trade for either commodity but that the larger profits were gained in January. Isengildina-Massa et al. (2008) found that the January, August, September, October, and November crop reports showed the most significant price movement in corn and soybeans. This model returns results similar to their observations; however, this model generates large profits earlier in the year as well.

Upon the calculation of the yearly profits similar results to the trade and hold model were obtained. There is the obvious change in both commodities at the year 2008. However, both commodities did not respond the same. Corn returned negative profits in 2008 but quickly returned to positive and experienced the largest gains observed for all of the years. Soybeans were different. In 2007, 2008, and 2012 soybeans returned negative profits. It appears that soybeans have responded to the recent market structure less predictively than has corn.

Summary and Conclusions

This research determined the value of a World Agricultural Supply and Demand Estimates report prediction on a daily basis for both United States corn and United States soybeans. To calculate profits two models were used. The trade and hold model returned a buy/sell indicator based on whether ending stocks went down or up. This model returned a cumulative profit per report of 13.69 cents per bushel for corn and 17.10 cents per bushel for soybeans. The most profitable months to trade were February, June, July, August, and October. For soybeans the months of February, June, July, and October were the most profitable.

The variable position model used a forecast of the price on the day of a report release. To minimize the effect of structural change on the model a weighted average approach to calculate the slope coefficient on the model regression estimation was used. New regressions were developed for every month and the intercept coefficient was calibrated to so that the most recent month’s price is estimated without error. Substantial structural change in ending stocks regressions was observed around 2008. Daily profits of the two commodities were very similar to the trade and hold model. The largest profits were observed on the report release days and although very slight, it appeared that days closer to the report were more profitable to trade. However, the variable position model did not outperform the trade and hold model returning cumulative profits per report of 9.15 and 4.39 cents per bushel for corn and soybeans respectively. This suggests that the forecasting model did not accurately predict prices well enough to change daily positions to capture more market movement.

The pattern of monthly profits was similar to the trade and hold model. The most profitable months to trade for corn were January, March, June, September, and October. For soybeans the most profitable months were January, March, June, and November. These months coincide with important crop reports and important growing cycles of the plants themselves. Being able to predict the effect of summer weather and harvest yields would be very beneficial based on these results.

On average, trading a WASDE report is profitable even immediately after a report release. Profits are not just prevalent in the days immediately before a report, rather they stay relatively constant until near the report release.

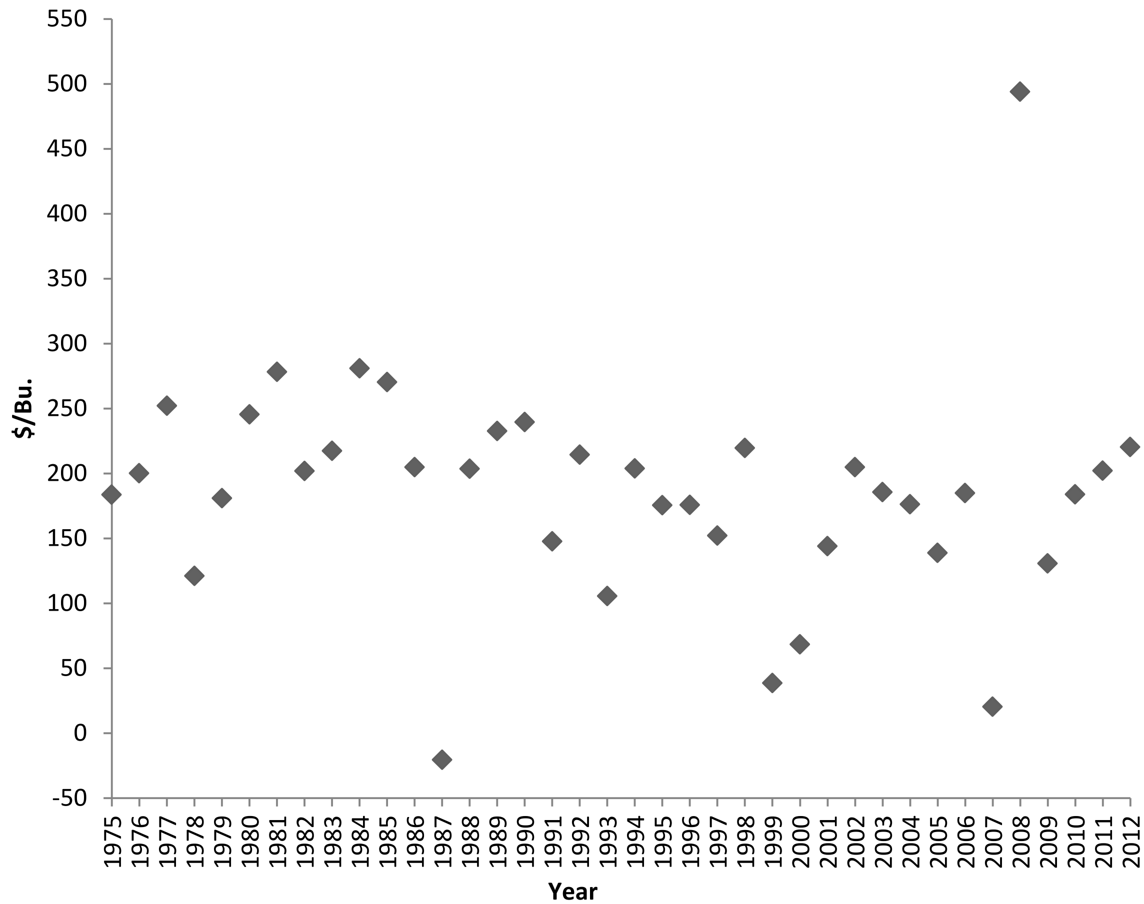

Figure 1. U.S. corn: Final intercept coefficient of each crop year

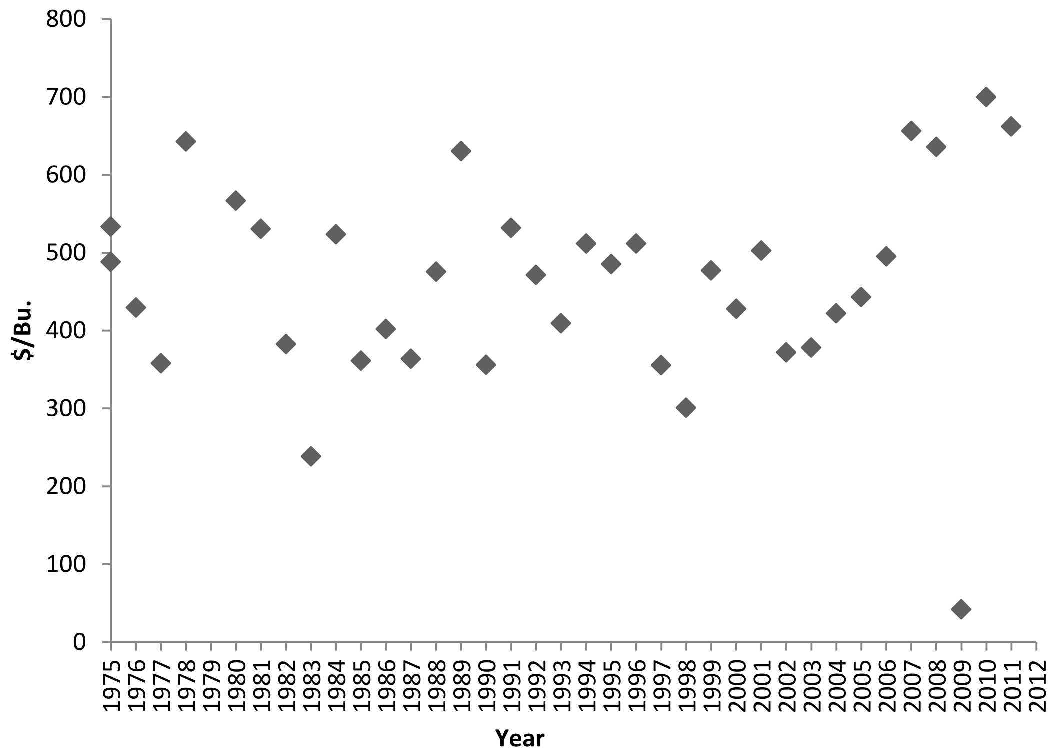

Figure 2. U.S. soybeans: Final intercept coefficient of each crop year

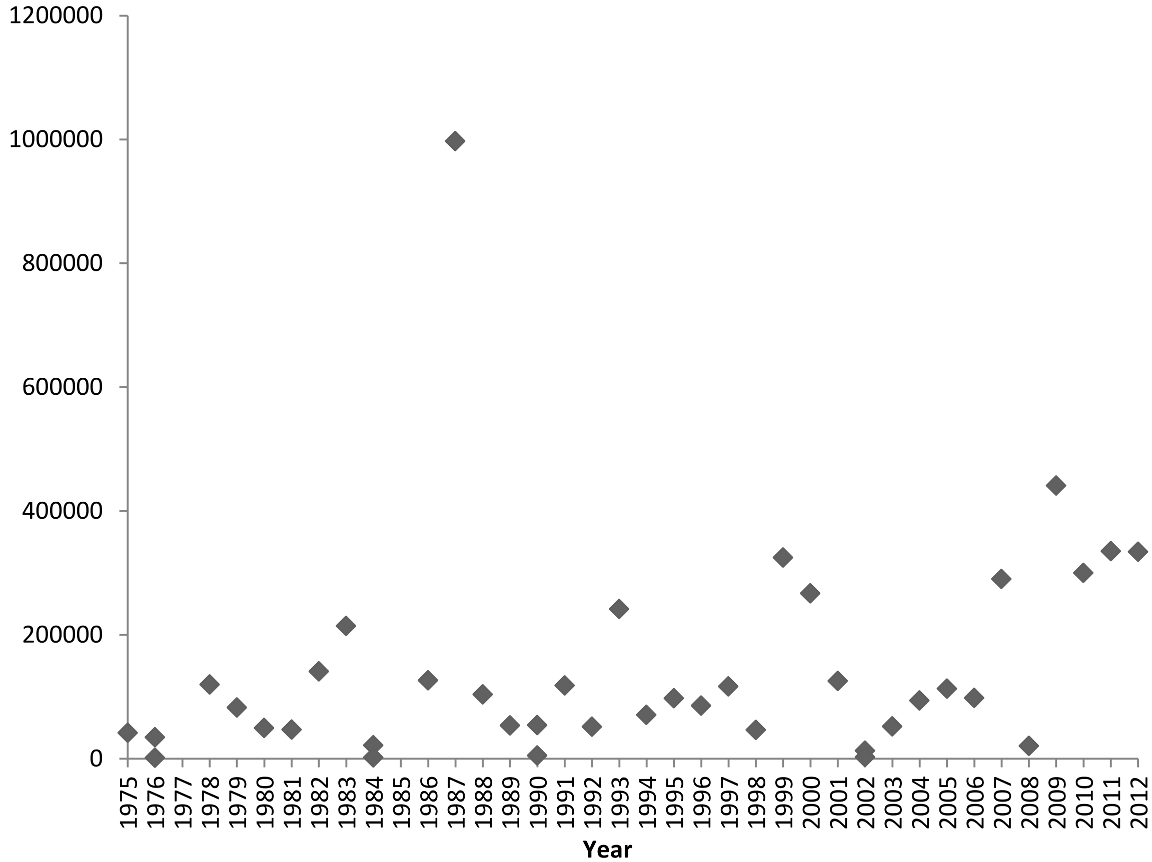

Figure 3. US corn: Last slope coefficient of each crop year

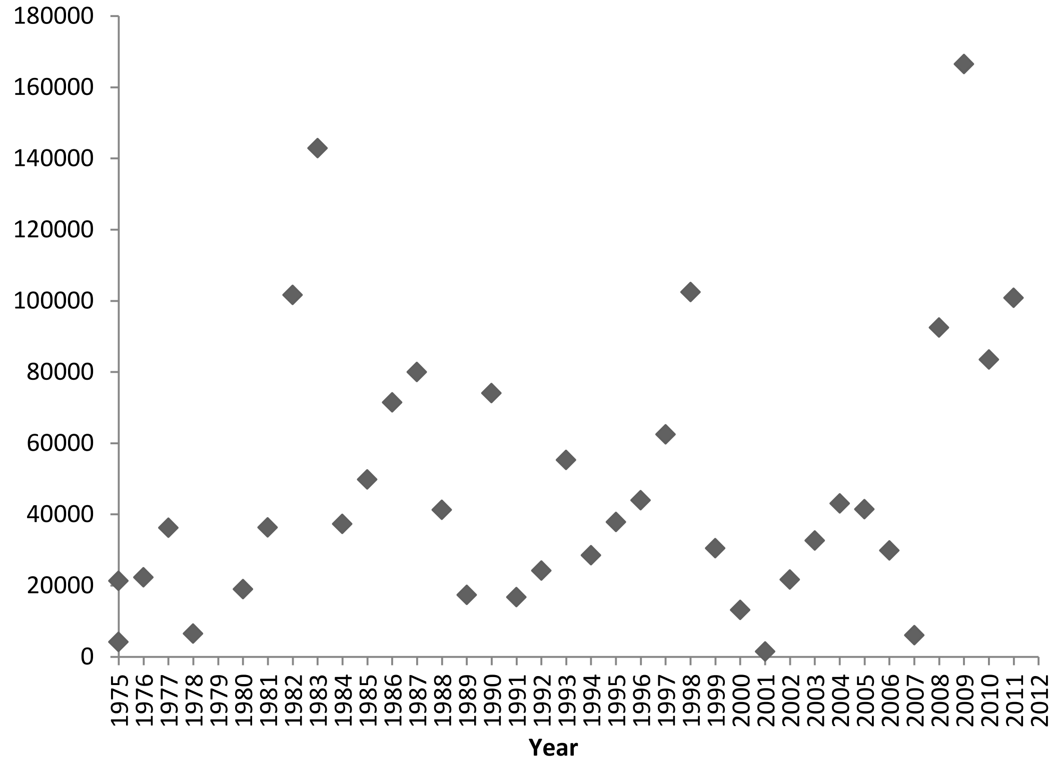

Figure 4. US soybeans: Last slope coefficient for every crop year

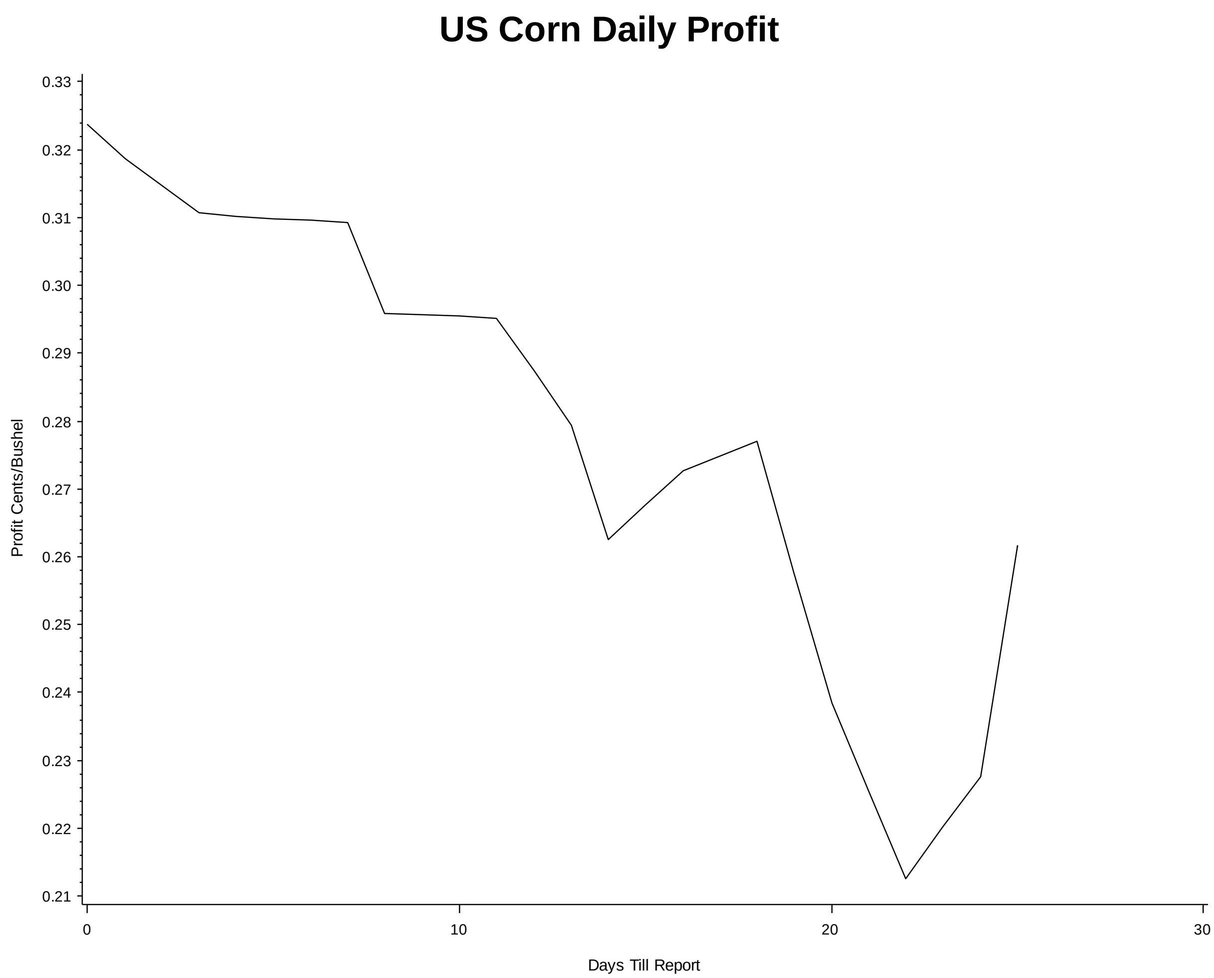

Figure 5. US corn: Nonparametric regression of daily profits versus days to the next report

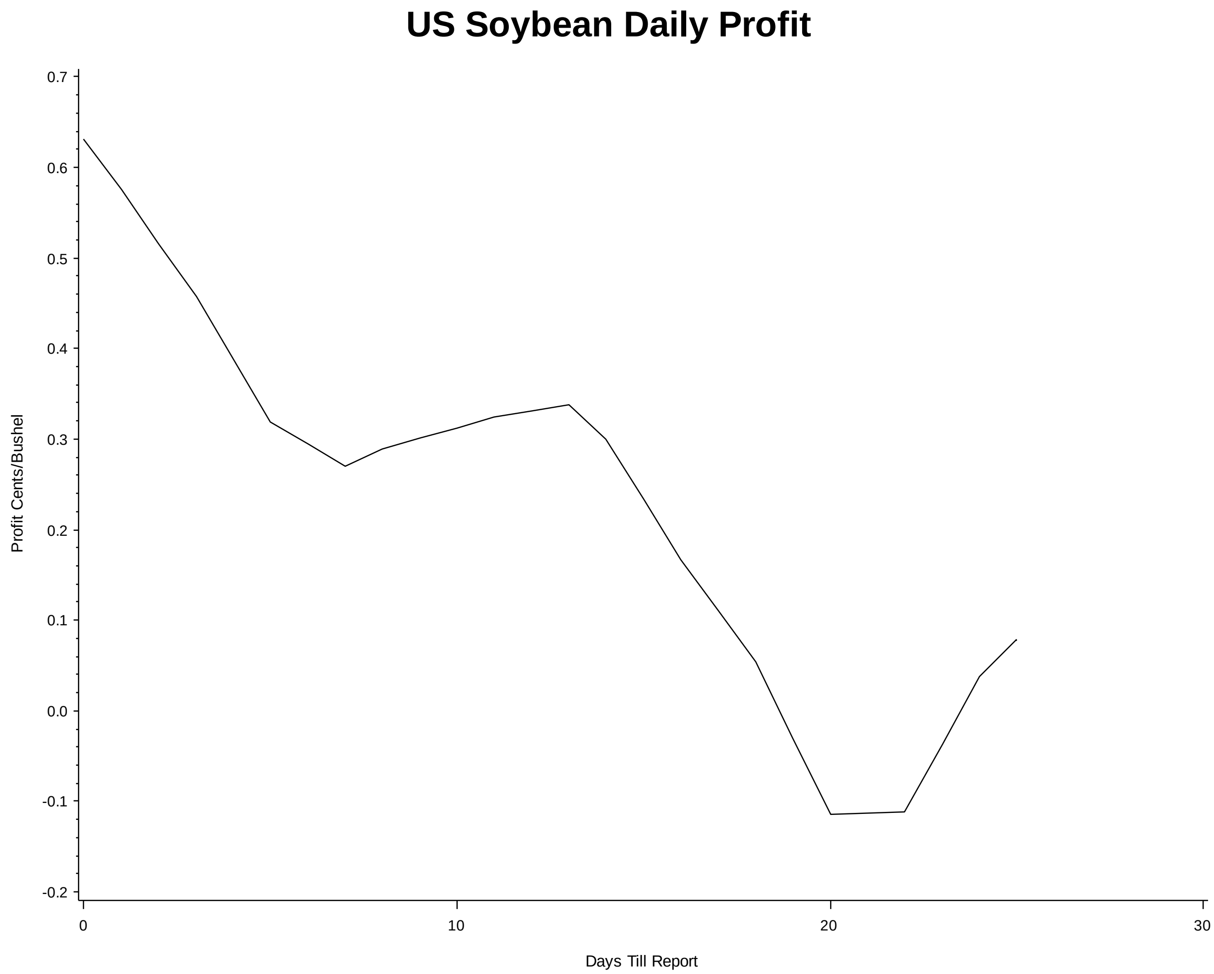

Figure 6. US soybeans: Nonparametric regression of daily profits versus days to the next report

Table 1. Average US Corn Daily Profit Cents/Bushel Trade and Hold Model

Days Until Report	Observations	Mean	Standard Deviation	Minimum	Maximum
0	346	1.25	7.19	-40.00	30.00
1	346	0.43	4.70	-40.00	22.00
2	260	-0.42	4.23	-19.00	12.00
3	260	0.05	5.16	-20.75	24.00
4	246	0.51	5.44	-23.50	30.00
5	208	0.47	4.49	-15.00	27.00
6	300	0.23	4.71	-27.00	24.75
7	386	0.10	4.97	-30.00	17.00
8	323	0.60	4.82	-13.25	30.00
9	252	0.57	5.80	-29.00	29.00
10	237	0.33	5.47	-16.00	30.00
11	234	1.05	5.95	-28.25	30.00
12	201	0.83	5.99	-31.50	40.00
13	302	0.36	4.70	-23.50	29.25
14	391	0.20	4.56	-27.25	22.00
15	332	0.51	4.49	-22.25	20.00
16	253	-0.49	4.93	-30.00	13.75
17	242	-0.16	4.71	-16.75	23.25
18	225	0.34	4.21	-17.25	14.00
19	194	0.32	3.51	-10.00	11.75
20	308	0.94	5.11	-19.50	35.75
21	406	0.68	4.65	-19.50	22.25
22	347	0.67	5.01	-16.50	28.75
23	256	0.01	4.32	-19.75	20.00
24	255	0.31	5.65	-28.50	30.00
25	250	0.55	4.97	-21.00	25.75
26	214	0.34	4.29	-14.25	26.75
27	316	0.25	4.43	-18.75	23.25
28	363	0.28	4.98	-28.00	30.00
29	248	1.30	5.82	-13.75	30.00
30	118	0.63	6.09	-30.00	30.00
31	90	0.64	4.55	-10.00	22.00

Table 2. Average US Corn Monthly Profit Cents/Bushel Trade and Hold Model

Month	Observations	Mean	Standard Deviation	Minimum	Maximum
1	769	0.26	4.92	-40.00	30.00
2	680	0.46	4.14	-30.00	26.25
3	529	0.18	4.37	-23.50	22.00
4	563	0.13	4.55	-31.50	29.25
5	699	0.13	4.52	-19.00	27.50
6	789	0.68	5.99	-30.00	30.00
7	791	0.66	6.17	-29.00	30.00
8	829	0.70	5.35	-28.00	30.00
9	775	0.53	5.54	-28.50	40.00
10	830	0.61	5.32	-40.00	30.00
11	722	0.44	4.36	-21.00	30.00
12	733	0.09	4.05	-22.25	24.75

Table 3. Average US Corn Yearly Profit Cents/Bushel Trade and Hold Model

Year	Observations	Mean	Standard Deviation	Minimum	Maximum
1975	233	1.07	6.44	-10.00	10.00
1976	205	0.38	4.49	-10.00	10.00
1977	216	0.24	3.20	-10.00	10.00
1978	187	-0.09	2.46	-8.75	8.75
1979	171	0.11	2.39	-7.75	6.50
1980	206	0.50	4.07	-10.00	10.00
1981	227	0.31	3.97	-10.00	10.00
1982	226	0.63	3.08	-7.75	10.00
1983	238	0.07	2.47	-7.50	9.75
1984	237	0.15	4.15	-10.00	10.00
1985	238	-0.05	2.46	-9.50	9.25
1986	238	0.16	1.88	-5.75	5.75
1987	240	-0.04	2.26	-10.00	5.75
1988	237	0.17	2.65	-10.00	10.00
1989	236	0.16	5.39	-15.00	15.00
1990	239	-0.10	2.97	-14.00	10.00
1991	236	0.03	2.67	-10.00	9.50
1992	240	0.34	2.93	-10.00	10.00
1993	233	0.08	2.34	-12.00	6.00
1994	237	0.03	2.70	-12.00	9.75
1995	238	0.35	2.79	-11.50	12.00
1996	235	0.57	3.23	-12.00	11.00
1997	240	0.26	4.83	-12.00	12.00
1998	237	0.37	3.58	-12.00	12.00
1999	238	0.14	3.03	-8.50	12.00
2000	211	0.28	2.93	-12.00	12.00
2001	231	0.24	2.63	-11.25	10.25
2002	230	-0.03	2.65	-9.25	8.75
2003	237	0.38	3.25	-11.25	10.25
2004	233	0.50	3.24	-8.75	14.50
2005	232	0.16	3.98	-14.50	20.00
2006	234	0.21	3.14	-11.00	14.00
2007	231	0.95	5.66	-19.75	20.00
2008	236	1.13	7.42	-23.50	22.00
2009	228	2.19	13.52	-30.00	30.00
2010	231	0.71	8.05	-28.50	30.00
2011	234	1.30	10.17	-30.00	30.00
2012	233	2.22	12.09	-40.00	40.00

Table 4. Average US Soybean Daily Profit Cents/Bushels Trade and Hold Model

Days Until Report	Observations	Mean	Standard Deviation	Minimum	Maximum
0	345	2.66	13.67	-55.25	70.00
1	345	0.87	10.81	-45.00	57.25
2	259	0.76	9.92	-38.75	31.75
3	253	0.51	11.88	-46.50	60.75
4	242	0.65	13.41	-102.00	70.00
5	211	0.93	11.15	-47.50	49.75
6	300	-0.15	10.52	-51.25	34.50
7	383	0.49	11.12	-57.75	42.50
8	323	0.56	10.90	-70.00	50.25
9	250	0.46	12.74	-47.00	50.00
10	230	0.88	10.98	-47.00	46.75
11	230	2.33	11.74	-38.75	70.00
12	204	0.42	12.34	-51.50	42.50
13	301	0.74	11.04	-45.00	53.75
14	387	-0.18	9.91	-45.00	31.75
15	329	1.03	10.54	-50.00	41.00
16	250	0.22	11.47	-70.00	40.25
17	237	-0.21	10.96	-40.25	44.50
18	225	0.97	10.97	-63.50	45.25
19	193	0.39	9.51	-30.00	30.00
20	304	-0.41	9.95	-36.50	32.50
21	403	0.50	10.06	-41.50	38.50
22	346	0.73	10.99	-52.50	48.50
23	257	-0.10	9.90	-45.00	30.00
24	252	0.08	12.17	-66.75	55.25
25	250	0.40	11.90	-50.00	69.75
26	214	-0.45	11.08	-49.50	47.00
27	313	0.29	9.28	-40.25	41.50
28	361	0.95	11.25	-70.00	45.00
29	247	0.33	11.64	-33.75	70.00
30	118	0.57	14.16	-38.50	70.00
31	87	-0.14	9.54	-30.00	27.75

Table 5. Average US Soybean Monthly Profit Cents/Bushel Trade and Hold Model

Month	Observation	Mean	Standard Deviation	Minimum	Maximum
1	752	0.47	10.53	-50.00	70.00
2	705	0.91	9.63	-70.00	47.25
3	528	0.27	10.98	-102.00	47.00
4	546	-0.24	9.08	-40.25	45.25
5	706	-0.02	9.38	-55.25	37.25
6	788	1.14	11.88	-50.00	63.75
7	791	1.56	14.41	-68.25	60.75
8	838	0.57	12.69	-70.00	70.00
9	775	0.65	11.58	-63.50	70.00
10	827	0.70	11.40	-51.25	70.00
11	697	0.42	10.34	-70.00	54.75
12	696	-0.18	9.31	-37.50	40.25

Table 6. Average US Soybean Yearly Profit Cents/Bushel Trade and Hold Model

Year	Observation	Mean	Standard Deviation	Minimum	Maximum
1975	160	3.35	15.66	-30.00	30.00
1976	213	0.10	10.15	-30.00	20.00
1977	195	0.81	12.41	-25.00	26.75
1978	213	1.14	12.12	-30.00	30.00
1979	211	0.09	8.80	-27.50	26.75
1980	168	0.11	10.08	-30.00	30.00
1981	227	-0.25	14.22	-30.00	30.00
1982	226	-0.06	7.50	-23.00	27.25
1983	238	0.12	6.07	-16.50	18.50
1984	237	1.20	14.74	-30.00	30.00
1985	238	1.06	8.92	-24.00	30.00
1986	238	0.11	5.87	-19.50	23.00
1987	240	-0.01	4.41	-18.50	20.50
1988	237	0.90	8.31	-30.00	30.00
1989	236	0.72	15.90	-45.00	45.00
1990	239	0.00	7.58	-31.50	30.00
1991	236	-0.16	6.90	-21.50	20.50
1992	240	0.59	7.57	-30.50	30.00
1993	233	0.62	5.14	-16.50	22.75
1994	237	0.65	7.21	-25.75	30.00
1995	238	0.69	7.20	-33.25	30.00
1996	235	0.11	6.92	-23.00	30.00
1997	240	1.22	9.73	-29.25	30.25
1998	237	0.31	8.24	-28.50	30.00
1999	238	0.28	6.74	-23.00	30.00
2000	210	0.41	7.47	-30.00	30.00
2001	231	-0.46	5.93	-27.00	14.25
2002	230	0.43	5.58	-19.75	21.00
2003	237	0.45	6.34	-16.00	26.50
2004	232	1.98	10.20	-31.25	35.00
2005	232	0.60	11.82	-33.75	50.00
2006	234	0.54	10.04	-50.00	42.50
2007	231	-1.13	7.37	-42.25	18.00
2008	236	2.69	17.00	-102.00	47.00
2009	228	-0.85	27.71	-70.00	70.00
2010	231	1.47	16.80	-49.25	60.75
2011	234	1.61	17.53	-70.00	70.00
2012	233	0.52	15.14	-51.50	57.25

Table 7. Average US Corn Monthly Profit Cents/Bushel Variable Position Model

Month	Observations	Mean	Standard Deviation	Minimum	Maximum
1	759	0.43	4.96	-20.00	40.00
2	651	-0.13	4.20	-18.25	30.00
3	273	0.65	5.55	-35.75	23.50
4	0				
5	0				
6	515	0.59	6.37	-30.00	30.00
7	784	0.35	6.22	-29.00	30.00
8	829	0.05	5.40	-29.25	30.00
9	775	0.59	5.53	-40.00	35.75
10	830	0.46	5.34	-30.00	40.00
11	722	0.12	4.38	-30.00	25.75
12	720	-0.01	4.06	-22.00	24.75

Table 8. Average US Soybean Monthly Profit Cents/Bushel Variable Position Model

Month	Observations	Mean	Standard Deviation	Minimum	Maximum
1	752	0.76	10.52	-50.00	70.00
2	676	-0.43	9.72	-70.00	47.25
3	273	0.51	12.80	-102.00	50.50
4	0				
5	0				
6	487	1.03	12.46	-30.50	63.75
7	773	-0.86	14.43	-68.25	60.75
8	838	0.23	12.70	-70.00	55.50
9	775	0.46	11.59	-63.50	70.00
10	827	0.22	11.42	-70.00	70.00
11	697	0.79	10.32	-70.00	54.75
12	696	-0.07	9.31	-40.25	40.00

Table 9. Average US Corn Yearly Profit Cents/Bushel Variable Position Model

Year	Observations	Mean	Standard Deviation	Minimum	Maximum
1975	208	0.04	6.76	-10.00	10.00
1976	161	0.41	4.35	-10.00	10.00
1977	160	-0.27	3.65	-10.00	10.00
1978	144	-0.01	3.06	-20.00	8.75
1979	127	0.20	2.25	-7.75	6.50
1980	172	0.55	4.35	-10.00	10.00
1981	178	0.28	4.32	-10.00	10.00
1982	178	-0.02	3.17	-10.00	10.00
1983	187	-0.01	2.57	-9.75	7.00
1984	185	-0.12	4.48	-10.00	10.00
1985	186	0.27	2.46	-9.50	9.25
1986	186	-0.12	1.93	-5.75	5.75
1987	185	0.09	2.03	-6.00	5.50
1988	188	0.22	2.49	-7.25	10.00
1989	186	-0.69	5.71	-15.00	15.00
1990	186	0.14	2.92	-10.00	14.00
1991	185	-0.16	2.56	-9.00	10.00
1992	188	0.35	3.10	-10.00	10.00
1993	186	-0.18	2.16	-12.00	4.75
1994	187	0.15	2.80	-12.00	9.75
1995	170	0.14	2.53	-11.50	12.00
1996	187	0.65	3.39	-11.00	12.00
1997	188	-0.05	4.35	-12.00	14.25
1998	187	0.46	3.80	-12.00	12.00
1999	187	0.26	2.96	-8.50	12.00
2000	188	0.25	2.97	-12.00	12.00
2001	186	0.23	2.35	-8.25	10.25
2002	182	-0.06	2.65	-9.25	8.75
2003	186	-0.10	3.49	-10.25	11.25
2004	188	0.20	3.48	-14.50	14.50
2005	187	0.25	2.96	-8.25	10.00
2006	188	0.06	3.21	-14.00	11.00
2007	186	0.70	6.17	-19.75	20.00
2008	189	-0.19	7.50	-22.00	23.50
2009	181	0.31	14.33	-30.00	30.00
2010	187	1.17	8.22	-28.50	30.00
2011	189	2.67	10.90	-35.75	30.00
2012	188	2.54	11.86	-40.00	40.00

Table 10. Average US Soybeans Yearly Profit Cents/Bushel Variable Position Model

Year	Observations	Mean	Standard Deviation	Minimum	Maximum
1975	126	-2.06	16.93	-30.00	30.00
1976	169	0.45	10.06	-20.00	30.00
1977	128	-0.76	13.69	-25.50	26.75
1978	169	-0.70	12.69	-30.00	30.00
1979	170	0.39	9.24	-25.00	27.50
1980	124	-1.02	8.95	-30.00	30.00
1981	178	-0.41	15.72	-30.00	30.00
1982	178	0.12	7.38	-27.25	25.75
1983	187	0.87	5.91	-14.00	18.50
1984	185	0.16	16.24	-30.00	30.00
1985	186	0.50	9.63	-30.00	30.00
1986	186	0.08	5.93	-19.50	23.00
1987	185	0.30	3.94	-16.00	12.00
1988	188	0.64	7.84	-30.00	30.00
1989	186	1.21	16.41	-45.00	45.00
1990	186	0.34	7.42	-30.00	31.50
1991	185	0.08	6.86	-21.50	20.50
1992	188	0.80	8.22	-24.25	30.50
1993	186	-0.25	4.72	-17.00	22.75
1994	187	0.20	7.81	-30.00	30.00
1995	170	-0.05	6.28	-30.00	30.00
1996	187	0.75	7.08	-21.25	30.00
1997	188	0.82	9.55	-30.25	35.25
1998	187	0.28	8.83	-30.00	25.75
1999	187	-0.09	7.03	-23.00	30.00
2000	187	-0.30	7.74	-30.00	30.00
2001	186	-0.63	5.24	-14.50	17.25
2002	182	0.18	5.83	-19.75	21.00
2003	186	0.11	6.78	-16.00	26.50
2004	188	0.55	11.10	-30.50	35.00
2005	187	0.07	10.42	-32.75	29.25
2006	188	1.13	10.59	-32.50	50.00
2007	186	-0.15	7.84	-16.75	42.25
2008	189	0.60	18.52	-102.00	50.50
2009	181	-0.45	28.51	-70.00	70.00
2010	187	2.03	16.99	-49.25	60.75
2011	189	2.17	18.99	-70.00	70.00
2012	188	-1.40	15.31	-51.50	57.25

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