USDA EXPORT SALES REPORT: IS IT NEWS?

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Abstract

This paper investigates whether the U.S. Export Sales report provides new information to the market. Event study methodology is used to evaluate the movement of futures prices on days around the release of the report. The results reveal that the information in the report is generally anticipated by traders.

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The U.S. government has long recognized the importance of information in competitive markets. Indeed, one of the primary missions of the U.S. Department of Agriculture is the collection and dissemination of market information. However, recent reductions in government expenditures have led to reduced reporting services. As these reductions have occurred, economists have turned their attention to evaluating the benefits of these services to society (see Gardner and Just). With further budget reductions possible, policymakers need to be aware of the value of particular government reports.

Several studies have focused on different USDA reports. These studies broadly fall into two categories in terms of their research objective: (1) do the reports provide new information to the market; (2) what level of efficiency do markets exhibit in responding to the reports. This latter category of studies is conducted under the maintained hypothesis that the reports do contain new information. Examples of recent studies falling into this second category include those which have focused on the response of livestock futures prices to the Hogs and Pigs and Cattle on Feed reports (see Colling and Irwin and Schroeder, et al). The recent study by Sumner and Mueller falls into the first category. These researchers evaluated the information content of USDA harvest forecast reports (or crop reports), concluding that these reports do provide new information.

One USDA report that has received little research attention is the U.S. Export Sales report. The export sales reporting system was formed in response to the large and unexpected grain purchases by the Soviet Union in 1972. These purchases created a disruption in the domestic food marketing system and raised concerns over the potential for profit-taking activities by large grain companies in the futures market. To insure that all market participants are apprised of export market activities, the U.S. Congress mandated an export sales reporting requirement in 1973.

Conklin prepared one study focusing on the U.S. Export Sales report. Specifically, he focused on the issue of informational efficiency in the corn, wheat, and soybean futures markets. This investigation was conducted using using cross-spectral analysis with data from June 1975 to June 1980. The author concludes that a statistically significant relationship does exist between the export sales information and price changes and that these markets exhibit semi-strong and strong form pricing efficiency.

The purpose of this study is to determine if the U.S. Export Sales report provides new information. This paper does not attempt to measure the costs and benefits of this data service nor does it test for informational efficiency. Yet, it does answer one fundamental question for policymakers and users of this service. This paper will extend Conklin's analysis by focusing on the period August 1980 to August 1990. This data period follows the change in reporting requirements for exporters enacted in June 1980. This change and the reporting requirements are further discussed below. Event study methodology is used to analyze price movements in the cotton, soybeans, and wheat futures markets around the release date of this report. Further, recognizing that the variance of futures prices changes through time, a Generalized Autoregressive Conditional Hetereoskedasticity (GARCH) model is used in evaluating the price movements. Previous event studies have generally not considered conditional heteroskedasticity.

Information Services and Market Prices

As discussed by Sumner and Mueller, four criteria must be met for information services to be of value. First, the service must cover a topic of interest to the economic agents. Second, it must reach the agents while relevant decisions are pending. Third, it must be considered accurate. Fourth, the announcements must be new information or information not anticipated by some of the economic agents. If the information is news or fulfills one of these other criteria, the agents will react in some manner.

If the prior information of the agents were known, the increment of new information provided could be directly measured. This was the innovation provided by Colling and Irwin and Pearce and Roley. These researchers had access to survey data on traders' expectations. Data on expectations are rarely available. However, even in the absence of data on prior information, market prices are observable.

Movements in market prices reflect changes in the reservation price of a significant number of agents or traders. Traders form their reservation price based on supply and demand information and on other subjective factors. Changes in traders' perceptions may cause market prices to move up or down and on average price changes will be zero. Also, the magnitude of price changes will reflect the degree of change in perceptions. Larger-than-average price changes will reflect larger-than-average changes in perceptions.

Data

Data on U.S. export sales (U.S. Department of Agriculture) and futures market closing prices (Dunn and Hargitt) for cotton, soybeans, and wheat for July 1980 to September 1990 were used. Under the export sales reporting system, U.S. exporters are required to report on every Thursday to the Export Sales Reporting Division of the USDA's Foreign Agricultural Service. In these reports the companies provide information on all sales activity for the preceding Friday through Thursday. The USDA then reports total sales information on the following Thursday after the futures markets close. Prior to June 26, 1980, exporters were required to report sales on Thursday for the preceding Monday through Sunday. Large sales of certain commodities must be reported by 3:00 p.m. (Eastern time) on the next business day after the sale. Then, the USDA issues a press release at 3:30 p.m. announcing the sale. Wheat and soybeans are subject to this next-day reporting requirement. This study focuses on the weekly sales reports.

Each weekly report contains information on export sales for the current marketing year and for the next marketing year (advance sales on next year's crop). The sales data exhibits strong seasonal patterns. Sales for the current marketing year's crop are larger during the early months of the marketing year and steadily decline throughout the season. Conversely, sales for the next marketing year are low during the early months of the current year and increase as the next marketing year draws near. It might be assumed that sales volume reflects traders' interests in the announced information. Thus, to relate the sales data to the traders' interest and behavior would require that the two series be combined or spliced in some manner. Devising a rule for splicing the two series would require a certain level of subjectivity and would possibly vary from year to year. Further, information from both marketing years may be important during certain times. One way to address these issues, the manner selected in this study, is to add the weekly sales for the two marketing years together.

The movements in futures prices in response to the export sales report's release were measured in this study. Since trading volume in futures contracts tends to be concentrated in near-maturing contracts, the daily change in the closing price of the nearby (earliest maturing) contract became the variable under observation. However, no contract was tracked into its expiration month. On the first day of the month prior to the expiration month, the next earliest maturing contract replaced the nearby contract in the series of daily price changes. More precisely, the change in the log of the daily closing futures price was analyzed in this study.

The daily change in the log of the closing futures price for the four days prior to the report's release and three days following were analyzed. Since the report is usually released after the markets close on Thursday, the closing price on Thursday is considered as one day prior to the release, time t-1.

Procedure

Event study methodology, as outlined by Chance, is used in this investigation. Any event study requires the event to occur often enough to provide a reasonable sample size. The weekly release of the export sales report is chosen as the event in this study. If the markets are efficient, prices should adjust quickly to the event. If traders obtain information from other sources or make predictions on the event, then prices may adjust prior to the event. Any delay in adjustment would suggest that the markets are inefficient. Absence of unusual price movements (average or less-than average price movements) around the release date would suggest that the reports contain no new information, suggesting that it is not truly an "event" (Chance).

The release of the report is the event in this study, even though the report contains information on activities which occurred 7 to 14 days before. When the normal release date (Thursday) coincided with the release of another major USDA report, such as the crop report, these observations were removed from the sample. Further, when a holiday caused a change in the normal release date, these changes were accounted for in the analysis of the future price movements. If the precise release date could not be identified, the observation was excluded from the sample. For cotton, a total of 401 observations were available for analysis. Wheat and soybeans had samples with 405 observations.

The daily change in the log of the closing price for the nearby futures contract for the days around each the event was calculated as follows,

$$(1)\quad \Delta P_{it} = \ln P_{it} - \ln P_{it-1} \text{ for each } i = 1,\ldots N,\ t = -4,\ldots -1,1,\ldots 3;$$

Thus, for each event, i, the daily change in the log of the closing price was observed for time t. These times usually correspond to the Monday, Tuesday,

Wednesday, and Thursday before the report's release and the Friday, Monday, and Tuesday after the release. Price variability for each day around the event was measured by the mean of the daily change in the log of the closing futures price. However, recognizing that the variance of speculative prices changes through time (Bollersev, et al), a GARCH model was used to obtain predictions of the variance.

Autocorrelation and partial autocorrelation functions of the innovation series are typically used to identify and check the time series behavior of ARMA models (Box and Jenkins). Bollersev shows that these same functions, when applied to a squared residual series, can be used for identifying the lag structure of the conditional variance. For cotton and wheat, a GARCH(1,2) process was identified and estimated. A GARCH(1,3) process was identified for soybeans. Also, seasonality variables were included in the model for the soybean price variable model. The identified models and estimated parameters exhibited covariance stationarity and were generally consistent with those estimated by Yang.

After obtaining the predicted variances for each of the price series, the conditional means were calculated as weighted means using the predicted variances as weights. Thus, the procedure is a feasible generalized least squares procedure. This procedure yields asymptotically efficient estimates of the means and their standard errors.

$$(2)\quad \overline{\Delta P_t} = \frac{\sum_{1}^{N} W_{it}\,\Delta P_{it}}{\sum_{1}^{N} W_{it}} \quad \textit{for each } t = -4,\ldots 1,1,\ldots 3, \textit{ where } W_{it} = \frac{1}{\sigma_{it}^2}\ .$$

The conditional mean values were calculated for three subsamples. The subsamples were classified as neutral events, large, favorable events, and large, unfavorable events. The classification scheme is further discussed below.

Lacking specific data on agents' expectations with regard to the announcement, it was assumed that agents form their expectations based on previous announcements. Therefore an autoregressive process was fitted to the export sales data. The appropriate number of lags to include in each model was determined by Akaike's information criterion. Ordinary least squares was used to estimate these models. The models identified and estimated for cotton, soybeans, and wheat were an AR(6), an AR(4), and an AR(7), respectively. All models exhibited covariance stationarity. Ljung-Box portmanteau statistics failed to reject the null hypothesis of no autocorrelation in the residuals. The predicted values obtained from these models were used as a proxy for the agents' expectations.

If an announced value fell below the predicted (or expected) value by more than 50,000 running bales for cotton, 175,000 metric tons soybeans, or 300,000 metric tons for wheat, this event was classified as a large, unfavorable event. It was viewed as unfavorable in that the market price would be expected to decline. Similarly, those announcements exceeding the predicted value by these same magnitudes were classified as large, favorable events. Neutral events fell between these two classifications.

Comparisons were made between large events (favorable and unfavorable) and neutral events to test for differences in the mean daily price changes. The null hypothesis was that price changes during large events were no different from neutral events. This hypothesis test was conducted using a test for the difference in means drawn from independent, normally distributed samples with unequal observations, but equal variances. Price changes for large events are expected to exceed the neutral events, suggesting that a one-tailed hypothesis test may be appropriate.

Results

Table 1 presents the mean value of the daily change in the log of the closing futures price for cotton on days around the release of the export sales report for the subsamples previously described. The direction of price change for the large, unfavorable events and the large, favorable events generally moves as expected. On the day the report is released (Thursday after the futures market closes), the daily change in the futures price is significantly different from zero for large, favorable events. Further, the large, favorable event and large, unfavorable event mean daily price changes are significantly different from the neutral event mean daily price change on this same day. On the day following the release of the report there is no significant movement in prices. Other significant price changes and significant differences in price changes are observed, however, these are likely attributable to other market phenomena, such as day of the week effects. These results would suggest that the report does not provide new information to the market and that the information in the report may be anticipated by market participants.

Table 2 presents the mean daily price changes and the difference in mean daily price changes for soybeans. In the large, unfavorable and large, favorable samples the expected sign is only obtained on three of the seven days surrounding the event. Further, no significant movement in prices is observed on the days immediately prior to the release of the report. One counter-intuitive result is obtained in the calculation of the difference between the large, unfavorable event and neutral event mean daily price changes on the day following the report's release, where a positive significant difference is observed. Yet, a significant negative difference is found on the next day, yielding no net effect over the two days.

Table 3 presents the calculated statistics for wheat. In the large, unfavorable events the direction of movement in the closing price moves as expected in most cases. However, for large, favorable events none of the

signs are as expected. Further, some of these price changes are significantly different from zero. These results would certainly suggest that the report provides no new information.

Conclusions

This paper investigated whether the U.S. Export Sales report provides new information. Event study methodology was used to evaluate the movement of futures prices around the release of the report. The report does not provide new information to the market and the information may be anticipated by traders. However, this is not an assessment of this report's value to society. It may play an important information verification role in the market. Also, the existence of the report may prevent market participants from attempting to keep sales secretive.

Table 1. Cotton: Mean Daily Change in the Log of the Closing Futures Price on Days Around the Release of the U.S. Export Sales Report, August 1980 to September 1990.

Day Relative to Event	Neutral df = 276	Large Unfavorable df = 60	Large Favorable df = 65	Difference from Neutral: Large Unfavorable df = 336	Difference from Neutral: Large Favorable df = 341
	(1)	(2)	(3)	(4)=(2)-(1)	(5)=(3)-(1)
	Percentage Changes				
t-4	-0.127*[a]	0.010	0.007	0.138	0.134
	(-1.822)[b]	(0.052)	(0.042)	(0.817)	(0.839)
t-3	-0.098*	-0.042	0.150	0.056	0.248*
	(-1.833)	(-0.318)	(1.155)	(0.458)	(2.049)
t-2	0.168*	-0.054	-0.002	-0.222	-0.170
	(2.895)	(-0.417)	(-0.018)	(-1.664)	(-1.320)
t-1	0.021	-0.207	0.250*	-0.227*	0.230*
	(0.348)	(-1.492)	(1.926)	(-1.671)	(1.728)
Report Released at 3:00 pm					
t+1	0.011	-0.083	0.154	-0.094	0.142
	(0.188)	(-0.630)	(1.176)	(-0.695)	(1.070)
t+2	-0.153*	-0.147	0.028	0.006	0.182
	(-2.293)	(-0.833)	(0.162)	(0.040)	(1.155)
t+3	0.015	0.123	-0.119	0.108	-0.135
	(0.302)	(0.897)	(-0.870)	(0.906)	(-1.145)

[a] Asterisk denotes significance at the 0.05 level, one-tailed test.
[b] t-statistic.

Table 2. Soybeans: Mean Daily Change in the Log of the Closing Futures Price on Days Around the Release of the U.S. Export Sales Report, August 1980 to September 1990.

Day Relative to Event	Neutral df = 278	Large Unfavorable df = 60	Large Favorable df = 64	Difference from Neutral: Large Unfavorable df = 338	Difference from Neutral: Large Favorable df = 342
	(1)	(2)	(3)	(4)=(2)-(1)	(5)=(3)-(1)
	Percentage Changes				
t-4	-0.137	-0.112	-0.016	0.024	0.120
	(-1.863)[a]	(-0.717)	(-0.093)	(0.149)	(0.729)
t-3	0.117*[b]	0.013	0.060	-0.104	-0.057
	(2.020)	(0.115)	(0.480)	(-0.819)	(-0.452)
t-2	0.056	0.006	0.156	-0.050	0.100
	(0.996)	(0.037)	(1.463)	(-0.363)	(0.825)
t-1	0.026	-0.007	-0.051	-0.033	-0.077
	(0.405)	(-0.043)	(-0.379)	(-0.224)	(-0.553)
Report Released at 3:00 pm					
t+1	-0.094	0.151	-0.050	0.245*	0.044
	(-1.536)	(1.150)	(-0.444)	(1.800)	(0.339)
t+2	-0.022	-0.301*	-0.018	-0.279*	0.004
	(-0.301)	(-1.964)	(-0.126)	(-1.676)	(0.026)
t+3	-0.009	0.146	0.106	0.155	0.115
	(-0.144)	(1.096)	(0.914)	(1.164)	(0.898)

[a] t-statistic.
[b] Asterisk denotes significance at the 0.05 level, one-tailed test.

Table 3. Wheat: Mean Daily Change in the Log of the Closing Futures Price on Days Around the Release of the U.S. Export Sales Report, August 1980 to September 1990.

Day Relative to Event	Neutral df = 273	Large Unfavorable df = 64	Large Favorable df = 64	Difference from Neutral: Large Unfavorable df = 337	Difference from Neutral: Large Favorable df = 337
	(1)	(2)	(3)	(4)=(2)-(1)	(5)=(3)-(1)
	Percentage Changes				
t-4	-0.143*[a]	0.157	-0.156	0.299*	-0.014
	(-1.856)[b]	(1.091)	(-1.083)	(1.829)	(-0.086)
t-3	0.040	-0.043	-0.222*	-0.082	-0.261*
	(0.661)	(-0.321)	(-1.878)	(-0.634)	(-2.080)
t-2	0.127*	-0.039	-0.105	-0.166	-0.232*
	(1.973)	(-0.291)	(-0.897)	(-1.193)	(-1.706)
t-1	0.020	-0.165	-0.399*	-0.185	-0.419*
	(0.306)	(-1.455)	(-3.845)	(-1.337)	(-3.076)
Report Released at 3:00 pm					
t+1	-0.000	-0.127	-0.036	-0.127	-0.036
	(-0.004)	(-1.151)	(-0.283)	(-0.974)	(-0.267)
t+2	-0.090	-0.079	-0.147	0.010	-0.058
	(-1.223)	(-0.452)	(-0.977)	(0.063)	(-0.363)
t+3	0.031	0.173	-0.073	0.142	-0.103
	(0.487)	(1.520)	(-0.558)	(1.074)	(-0.764)

[a] Asterisk denotes significance at the 0.05 level, one-tailed test.
[b] t-statistic.

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