A Nonparametric Search for Information Effects from USDA Reports

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The question of report value has been unsettled in the literature with results varying somewhat across studies and across reports. We employ two nonparametric tests to investigate the potential information value of USDA crop and livestock reports. If the daily returns on futures contracts differ on days with report releases when compared to non-announcement days for a sizeable number of commodities, we consider the report to contain valuable information. Results indicate value in five of the USDA reports investigated, with six other reports showing little or no information value in the markets examined. Most of our results confirm and add robustness to earlier results, but there are some differences both for certain reports and certain commodities.

Key words: futures markets, information value, nonparametric tests, USDA reports.

Introduction

Much research has been done investigating the informational content of various USDA reports (Sumner and Mueller 1989, Colling and Irwin 1990, Fortenbery and Sumner 1993, Mann and Dowen 1996, Irwin, Good, and Gomez 2001, Isengildina, Irwin, and Good 2006, McKenzie 2008, Isengildina-Massa et al. 2008, Karali 2012). The basic premise of this research is that if a report contains new information of value in the marketplace then the futures price should change by a larger amount on the day the report is released (an announcement day) than on a normal day. These price changes are then used to construct a statistical test of the information value of the various reports, generally employing a linear regression model with dummy variables used to designate days on which reports are released. This paper will take a somewhat different approach.

Research on this topic is important for evaluating the benefit of USDA reports relative to the costs of producing them as well as for helping to understand how well futures markets work at incorporating information into prices (the price discovery process). Research so far on these questions has been somewhat mixed, so there is still debate over the amount of information contained in these reports relative to price determination. To allow for more flexibility in the effect of information within the reports, we propose employing several nonparametric tests for the equality of the distribution of price changes on days with announcements versus days with no announcements. The tradeoff in taking a nonparametric approach is that while these methods can uncover impacts of information that are of more diverse forms than the type of regression-based methods used previously can find, nonparametric test also tend to have lower test power. Thus, more types of information value can be uncovered (lowering the bar in one sense to finding informational content in the USDA reports) but it will be harder to show them statistically significant (raising the bar back up in terms of the probability of rejecting a null hypothesis of no information value).

As a first approach, the Kolmogorov-Smirnov test imposes no distributional assumptions on the price changes and allows for testing if two samples come from the same distribution. It essentially is based on the data's cumulative distribution function, rejecting the equality of the two distributions when the empirical cumulative distribution functions of the two samples

diverge by "too large" a distance. By placing price changes from days with announcements in one sample and price changes from the remaining days in the other sample, a nonparametric test for information value in the reports can be performed.

A second approach that will be used is to apply the Henriksson-Merton test for information value to forecasts of price changes on days with announcements. If knowing whether there was an announcement on a particular day improves the forecast of a particular event, then the announcements contain valuable information. The innovation here is in carefully defining the "events" that will be forecast. We perform tests on whether conditioning on announcement days helps to forecast large absolute price changes (do prices change by more than some threshold percentage?). If conditioning on announcement days aids in such qualitative forecasting, then the announcements contain information of value to market participants.

Henriksson-Merton tests have been used previously in the futures markets literature to test for information value in energy market supply forecasts (Sanders, Manfredo, and Boris, 2008) and in distant delivery futures markets (Schnake, Karali, and Dorfman, 2012). This application expands their use in this literature, since they are not actually employed to evaluate forecasting performance, but rather to answer the underlying question of the value in USDA reports as expressed through price changes that are attributed to the release of those reports.

The advantage of this testing approach to that which has been employed previously is that information effects that are not simply a constant increase in some measure, such as the absolute value of the percentage change in price, can be uncovered more easily by testing for equality of distribution than they can be in a regression model framework. Imagine that reports contained new production forecasts that led to either extremely large price changes when the market was surprised or no price change when the market correctly anticipated the information in the report. On non-announcement days, the distribution of price changes might be uniform. A regression model framework might not find information in such reports if the large price change days were offset, in terms of average effect, by the no-change days (with correctly anticipated reports). The Kolmogorov-Smirnov test will be able to spot such an effect because the bimodal distribution of price changes on announcement days will have a different distribution than the uniform distribution of price changes on non-announcement days. The Henriksson-Merton test would find information in such a situation if the probability of large price changes is higher or lower on announcement days than on non-announcement days.

We expect the results to provide new (and potentially different) insights on questions about the value of USDA commodity and market reports. This could add robustness to previous findings or contradict those earlier findings depending on our empirical results. It should also spark discussion about the comparative advantages of different ways to test for information value in the broader context of settings beyond just USDA report announcement effects.

The rest of the paper is organized as follows. The next section describes the methodologies employed in the testing. Data used are then discussed. The fourth section presents the empirical results, compares them to earlier results from the literature, and discusses the implications of our findings. Finally, the last section concludes the paper.

Methodology

Kolmogorov-Smirnov Two-Sample Test

Because the various USDA reports are unlikely to contain equal amounts of information or to cause changes in the distribution of price changes in identical ways, we perform a series of Kolmogorov-Smirnov two-sample tests using different samples. Specific reports concerning selected commodities are tested for information value individually.

The Kolmogorov-Smirnov two-sample test for equality of probability distribution functions is based on the distance between the empirical cumulative distribution functions (cdf) of the two samples being tested (Massey, Jr., 1951). For any value of the random variable being studied, define $F_n(c)$ as the percentage of the sample observations for the data set $\{x_i; i = 1, \cdots, n\}$ that is less than or equal to c. This is the empirical cdf. For the second sample, of potentially different size m, under consideration, define the analogous empirical cdf as $G_m(c)$. The Kolmogorov-Smirnov test statistic is simply given by

$$(1) \qquad KS = sup_c|F_n(c) - G_m(c)|.$$

The distribution of this test statistic is a scaled version of the Kolmogorov distribution which can be derived from the supremum of the absolute value of a Brownian bridge, with published tables of critical values that can be consulted. For the two-sample test that we employ, the scale factor that one applies to the KS test statistic in equation (1) to transform the test statistic to the standard distribution is $[nm/(n+m)]^{1/2}$. Given these definitions and formulas, the computation of the Kolmogorov-Smirnov two-sample test is straightforward and existing tables can be used to make decisions on rejecting or no rejecting the null hypothesis at the desired level of statistical significance.

Henriksson-Merton Test

This test analyzes the correct prediction of the some qualitative (or categorical) event for time series being studied (Henriksson and Merton, 1981; Pesaran and Timmermann, 1992). The observed forecast accuracy of the specified event is transformed into probabilities, with P_{ij} being the probability that the event falls in category i and the forecast was for category j. When the probabilities of k categories are represented in a contingency table, it takes on the form of a matrix which we call P:

$$(2) \qquad P = \begin{bmatrix} P_{11} & P_{12} & \cdots & P_{1k} \\ P_{21} & P_{22} & \cdots & P_{2k} \\ \vdots & \vdots & \vdots & \vdots \\ P_{k1} & P_{k2} & \cdots & P_{kk} \end{bmatrix}.$$

Each row of P measures the probability of correct and various incorrect forecasts of the times when actual event fell into category i. Thus, the main diagonal of P holds the probabilities of correct forecasts. Henriksson and Merton (1981) developed the test for the case of two

categories, while Pesaran and Timmermann (1994) extended the non-parametric procedure for the general case of k categories. To test the null hypothesis of no discernible improvement in event forecasting by including information from some external source, one examines:

(3) $H_0^*: \quad \sum_{i=1}^{n}\left(\hat{P}_{ii} - \hat{P}_{i0}\hat{P}_{0i}\right) = 0.$

In our simple, 2×2 case, the test simplifies so that the test of H_0^* is based on the statistic:

(4) $HM = \sum_{j=1}^{n} \sum_{i=1}^{n} \frac{(O_{ij} - E_{ij})2}{E_{ij}},$

where O is the observed number of forecasts that fall in that cell of the contingency table and E is the expected number of forecasts in that cell. The test statistic is distributed as a $\chi^2(1)$ and the expected number of forecasts in a cell is the product of the row and column sums divided by the total number of forecasts.

Data

USDA Reports

We analyze eleven USDA reports that have been widely studied in the literature. These include Acreage & Prospective Plantings (two reports that we analyze as a single report, explained further below); Cattle; Cattle on Feed; Crop Progress; Feed Outlook; Grain Stocks; Hogs and Pigs; Livestock, Dairy, and Poultry Outlook; Oil Crops Outlook; and World Agricultural Supply and Demand Estimates (WASDE). Earlier studies have shown that markets move on several of these report release days.

At the end of every March, National Agricultural Statistics Service (NASS) publishes Prospective Plantings reports, which contain the expected plantings as of March 1st for several crops, including corn and soybeans. NASS then releases Acreage reports at the end of every June to present planted and/or harvested acreages for those crops. Because both of these reports are published only once a year and because both represent supply conditions for crops, we combine the release days of these two reports in our analysis. During the growing season, weekly Crop Progress reports are published by NASS to convey planting, fruiting, and harvesting progress and overall condition of selected crops, again including corn and soybeans. Feed Outlook reports are published monthly by the Economic Research Service (ERS) and present supply, use, prices, and trade for feed grains. Grain Stocks reports, published quarterly by NASS, contain stocks of multiple crops as well as the number and capacity of on- and off-farm storage facilities. Oil Crops Outlook reports are released monthly by ERS and include supply, use, prices, and trade for oil crops, primarily soybeans and products. The World Agricultural Outlook Board releases WASDE reports every month to provide comprehensive forecasts of supply and demand for major U.S. and global crops and U.S. livestock.

On the livestock side, we consider Livestock, Dairy, and Poultry Outlook reports issued monthly by ERS, containing current and forecasted production, prices, and trade volumes for each of

these sectors. Additionally, we consider three reports published by NASS. Cattle reports, released twice annually, contain the inventory numbers and values of all cattle and calves, and number of operations and size group estimates by class. Monthly Cattle on Feed reports present total number of cattle and calves on feed, placements, marketings, and other disappearances, number of feedlots and fed cattle marketings. Hogs and Pigs reports are issued quarterly and contain data on the U.S. pig crop inventory number by class, weight group, and value of hogs and pigs, farrowings, and farrowing intentions. The report release schedule for this report was changed to monthly from January 2001 through September 2003; however, the quarterly schedule was resumed after September 2003. We include all report release days including those monthly reports in our data set.

Because release times vary across reports the dummy variables representing the report release days should be constructed carefully. Some reports are released before markets open, and some after markets open. We expect that the impact of reports released before markets open would be observed on the release day. Accordingly, for reports released before markets open (Acreage, Feed Outlook, Grain Stocks, and Livestock, Dairy, and Poultry Outlook), the announcement day dummy variables take the value of one on the exact release date. Contrarily, we expect that the impact of reports released after markets close would be observed on the next trading day. Therefore, for reports released after markets close, the announcement day dummy variables take the value of one on the day following the release. Dummy variables for Prospective Plantings and WASDE reports are further modified to reflect the changes in their release times during the sample period.

Futures Returns

We analyze daily returns on soybeans, soybean meal, soybean oil, corn, feeder cattle, live cattle, and lean hogs futures contracts. Crop futures contracts are traded at the Chicago Board of Trade (CBOT) and livestock futures contracts are traded at the Chicago Mercantile Exchange (CME).

We construct rolled-over nearby futures series by splicing the nearby contract price at the end of the month preceding expiration with the second nearby contract price. This procedure eliminates price observations during the delivery period, which may contain anomalies. Daily returns on these selected futures contracts are measured as:

$$R_{it} = 100 \times (\ln F_{it} - \ln F_{i,t-1}), \tag{9}$$

where $\ln F_{it}$ is the natural logarithm of the settlement price of commodity i's futures contract on day t. This close-to-close price change measure captures any noninstantaneous reactions to USDA reports. Because Crop Progress, Feed Outlook, LDPO, and Oil Crops Outlook reports were first available in 1995, we study the sample period from January 1995 through April 2009.

Table 1 presents summary statistics for daily returns on both non-announcement and announcement days. As seen in the table, average daily returns for all commodities are lower on announcement days. Out of 3,319 trading days in our sample, there were 1,127 days with report releases.

Results and Discussion

Kolmogorov-Smirnov Test Results

Table 2 presents the two-sample Kolmogorov-Smirnov test statistics and their *p*-values (in parentheses). Each USDA report under study is tested separately for the seven selected commodities. Looking at the first row of numbers in the table, the results show that price change distributions of soybeans, soybean meal, soybean oil, and corn futures contracts are not identical on the days with Acreage & Prospective Plantings report releases compared to their counterparts on days without these reports. Identical results are found for the Grain Stocks report. On the days with WASDE releases, significant changes in the distribution of price changes are found for the same four crop futures (soybeans, soybean meal, soybean oil, and corn) and, in addition, to the distribution of the price changes of feeder cattle . Thus, these three reports clearly seem to have a nontrivial impact on the return distributions of a variety of commodity futures, with significant effects found widely across our seven futures markets.

In contrast, Crop Progress reports are found to affect only the distributions of lean hogs futures prices while the Kolmogorov-Smirnov tests for both the Feed Outlook and Oil Crops Outlook reports did not result in rejecting the null hypothesis of identical distributions on days with these reports versus days without these reports for any of the seven commodities tested. Thus, these three reports do not seem to have an impact on futures returns of selected commodities. According to this test, we would not find value in these three reports.

Similar to the last three crop-focused reports, the livestock-focused reports do not show much value in the Kolmogorov-Smirnov test results. The Cattle on Feed and the Livestock, Dairy, and Poultry Outlook reports each only show significant changes on announcement days for one commodity, corn for the Cattle on Feed report and lean hogs for the Livestock, Dairy, and Poultry Outlook reports. The Hogs and Pigs reports do a little better, showing significant changes in the distribution of price changes for soybeans, soybean meal, and corn futures. Thus, among the livestock-focused reports, we only find clear value by this measure for the Hogs and Pigs report.

When all the USDA reports studied are combined into a single test of (any) announcement versus non-announcement day returns, the Kolmogorov-Smirnov test statistics are found to be significant for soybean meal, soybean oil, corn, and lean hogs. Figures 1 and 2 show empirical cumulative distribution functions of some selected commodities on announcement versus non-announcement days. The distance between the cumulative distribution functions on announcement and non-announcement days for corn and lean hogs (figure 1) are statistically significant and can be seen visually with ease compared to the non-significant differences for soybean oil and live cattle (figure 2).

We further group USDA reports that are directly related to crops and to livestock. Accordingly, crop report days include the days on which any of the Acreage & Prospective Plantings, Crop Progress, Feed Outlook, Grain Stocks, Oil Crops Outlook, and WASDE reports are released. Similarly, livestock report days include the days with any of the Cattle, Cattle on Feed, Hogs and Pigs, and LDPO report releases. We then compare the price change distributions on crop report

days to those on non-announcement days, those on livestock report days to non-announcement days, and those on crop report days to livestock report days. Table 3 presents our results. Only the return distributions of soybean oil, corn, and lean hogs are different on the days with crop report releases compared to days with no report releases. Corn and lean hogs return distributions are also found to differ across livestock report days and non-announcement days. There is, however, no difference in the return distributions across crop report days and livestock report days. Once the USDA reports are grouped into crop and livestock reports, their impacts on return distributions are identical.

Henriksson-Merton Test Results

For the Henriksson-Merton test, we define an event as a price change that is more than one standard deviation from the mean. We then apply the Henriksson-Merton test to determine if such events (large price movements) are more common on announcement days than non-announcement days. Conditioning on announcement days, we compute the probabilities of correct and incorrect forecasts of large price movements. Test statistics and their *p*-values are presented in table 4.

Acreage & Prospective Plantings and Grain Stocks report days are each shown to help predict large price movements in five of the seven commodities: soybeans, soybean meal, soybean oil, corn, and feeder cattle. WASDE report days also aid in forecasting large price movements in the above four crop futures contracts, but not in the three livestock futures. Test statistics for Crop Progress and Feed Outlook report days are significant only for live cattle, and Oil Crops Outlook reports have informational value in forecasting large price movements only for lean hogs. While Cattle report days are found to have informational value for forecasting large price movements in futures for soybeans and lean hogs (and not feeder cattle or live cattle), the Cattle on Feed reports aid in forecasting large price movements only feeder cattle. Livestock, Dairy, and Poultry Outlook reports only have an impact in forecasting large price movements for soybean oil. Hogs and Pigs report days, on the other hand, are found to have informational value for big moves in soybeans, soybean meal, corn, and lean hogs. When all reports are combined, informational value in forecasting large price movements are found for all commodities but soybean oil and live cattle (and those two have *p*-values less than 0.20).

Discussion

Some differences occur between Kolmogorov-Smirnov and Henriksson-Merton tests results. In general, the Henriksson-Merton test detects informational value by looking for large price movements more frequently than the Kolmogorov-Smirnov test detects differences by examining discrepancies in the price change distributions. The Kolmogorov-Smirnov test statistics are significant in 22 out of 77 cases, while the Henriksson-Merton test statistics are significant in 30 cases. In terms of qualitative differences, the Kolmogorov-Smirnov test finds differences in lean hogs return distributions on Crop Progress release days, while the Henriksson-Merton test finds informational value for live cattle returns. Trading days with Cattle on Feed report releases have different distributions than the days without Cattle on Feed releases for corn price changes; but

these report days have informational value in forecasting large price changes in feeder cattle futures. A similar conflict occurs for Livestock, Dairy, and Poultry Outlook reports. While the Kolmogorov-Smirnov test statistic is significant for lean hogs, the Henriksson-Merton test statistic is significant for soybean oil. The only case where the Kolmogorov-Smirnov test results in more tests statistics that are significant is the WASDE reports. Even though the distributions of feeder cattle returns are found to differ across WASDE report days and non-WASDE report days, these reports do not contain informational value in forecasting large price changes in feeder cattle futures.

Compared to previous literature our informational value test results are somewhat different. In earlier studies, Hogs and Pigs reports are found to affect the variance of returns on soybean meal, soybean oil, corn, lean hogs (Karali, 2012), and live cattle (Isengildina, Irwin, and Good 2006). However, our tests do not detect any informational value of these reports for soybean oil and live cattle price changes. While Isengildina, Irwin, and Good (2006) report a change in the variance of live cattle futures returns on Cattle on Feed report days, we find informational value on these report days for feeder cattle, not for live cattle. Karali (2012) shows that the variance of returns on soybean meal and corn futures increases on the days with Crop Progress reports; however, we find informational value in these reports only for live cattle price changes. WASDE reports are shown to affect the return variances of live cattle and lean hogs in Isengildina, Irwin, and Good (2006), and soybeans, soybean meal, and corn in Karali (2012). In our study while we further discover informational value of WASDE report days for soybean oil, we fail to do so for live cattle and lean hogs.

Conclusions

In this paper, we analyze eleven different USDA reports in search of information value that might be revealed by differences in the price changes of seven commodity futures contracts between days on which reports are released and non-announcement days. To formally test for these different price changes we use two nonparametric tests. The Kolmogorov-Smirnov test examines whether the empirical cumulative distribution functions of price changes on announcement and non-announcement days are equal. The Henriksson-Merton test is used to determine if large absolute price changes are more likely to occur on announcement days compared to non-announcement days.

Our results show that five of the eleven USDA reports contained market-effecting information across multiple commodities of the seven futures contracts examined, while six of the reports showed little evidence of information value. The valuable reports are: Acreage & Prospective Plantings, Grain Stocks, WASDE, and the Hogs and Pigs report. When all the announcement days are combined to test the “any report announcement days” versus non-announcement days, the results come down convincingly in favor of information value in the set of all USDA reports. These information value test results are quite consistent between the two nonparametric tests although they test for somewhat different characteristics within the distributions of future price changes.

We confirm earlier findings of value in at least some of these USDA reports and when testing them as a single, joint set of reports. In particular, the Hogs and Pigs reports and WASDE reports were previously found to be associated with significant moves in multiple commodity markets by Isengildina, Irwin, and Good (2006) and Karali (2012) which mostly match our results. There are, however, some differences between earlier findings and our results, especially for live cattle futures. Even though the Cattle on Feed, Hogs and Pigs, and WASDE reports were shown to move live cattle futures prices in earlier studies, we fail to find any informational value in these reports for live cattle price changes. There may still be work to do on the value of these USDA reports, but we may collectively be starting to focus on which reports have the most value and impact across a range of commodities and which other reports only affect one or two commodity markets at best. Further investigation on the value of USDA reports related to crops can be carried out by testing separately whether reports closer to harvest have additional information compared to reports released earlier in the production season.

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Table 1: Summary Statistics of Data

$R_t = 100 \times (\ln F_t - \ln F_{t-1})$	Mean	Min.	Max.	Std. Dev.
Non-Announcement Days				
Soybeans	0.019	-7.318	6.445	1.429
Soybean Meal	0.062	-8.236	6.246	1.569
Soybean Oil	-0.003	-7.239	8.039	1.448
Corn	-0.024	-7.699	7.397	1.510
Feeder Cattle	0.005	-6.010	3.348	0.847
Live Cattle	-0.003	-6.357	3.564	0.947
Lean Hogs	0.041	-6.649	6.306	1.507
Announcement Days				
Soybeans	-0.033	-6.996	6.078	1.599
Soybean Meal	-0.046	-8.105	7.528	1.722
Soybean Oil	-0.072	-6.721	6.433	1.576
Corn	-0.065	-7.584	6.968	1.714
Feeder Cattle	-0.013	-3.177	2.785	0.876
Live Cattle	-0.027	-3.541	3.708	0.925
Lean Hogs	-0.171	-6.881	6.881	1.636
Announcement Day Dummy Variables	*n*			
Acreage & Prospective Plantings	28			
Crop Progress	474			
Feed Outlook	162			
Grain Stocks	52			
Oil Crops Outlook	158			
WASDE	151			
Cattle	23			
Cattle on Feed	156			
Hogs and Pigs	50			
Livestock, Dairy, and Poultry Outlook	169			
All	1127			

Notes: Sample period spans from January 1995 to April 2009. The variable *n* for the announcement day dummy variables represent the total number of report releases.

Table 2. Kolmogorov-Smirnov Test Results

	Soybeans	Soybean Meal	Soybean Oil	Corn	Feeder Cattle	Live Cattle	Lean Hogs
Acreage & Prospective Plantings	0.291* (0.014)	0.259* (0.039)	0.269* (0.029)	0.294* (0.013)	0.185 (0.269)	0.154 (0.491)	0.133 (0.675)
Crop Progress	0.025 (0.961)	0.038 (0.587)	0.039 (0.574)	0.044 (0.399)	0.038 (0.587)	0.048 (0.288)	0.091* (0.002)
Feed Outlook	0.049 (0.847)	0.047 (0.878)	0.061 (0.594)	0.050 (0.834)	0.042 (0.940)	0.051 (0.810)	0.051 (0.806)
Grain Stocks	0.331* (0.000)	0.367* (0.000)	0.270* (0.001)	0.327* (0.000)	0.100 (0.666)	0.108 (0.566)	0.106 (0.584)
Oil Crops Outlook	0.044 (0.932)	0.045 (0.918)	0.039 (0.974)	0.042 (0.954)	0.047 (0.882)	0.047 (0.889)	0.052 (0.795)
WASDE	0.122* (0.025)	0.136* (0.009)	0.123* (0.024)	0.129* (0.015)	0.117* (0.035)	0.073 (0.418)	0.093 (0.153)
Cattle	0.170 (0.485)	0.117 (0.894)	0.152 (0.630)	0.179 (0.416)	0.207 (0.252)	0.171 (0.478)	0.138 (0.743)
Cattle on Feed	0.065 (0.552)	0.087 (0.202)	0.077 (0.321)	0.111* (0.048)	0.071 (0.426)	0.072 (0.418)	0.077 (0.326)
Hogs and Pigs	0.215* (0.017)	0.199* (0.034)	0.124 (0.414)	0.230* (0.009)	0.125 (0.403)	0.159 (0.151)	0.161 (0.140)
Livestock, Dairy, and Poultry Outlook	0.075 (0.313)	0.064 (0.511)	0.076 (0.296)	0.087 (0.169)	0.054 (0.726)	0.045 (0.900)	0.115* (0.026)
ALL	0.037 (0.261)	0.045* (0.097)	0.044 (0.102)	0.056* (0.017)	0.036 (0.271)	0.027 (0.656)	0.078* (0.000)

Notes: Two-sample Kolmogorov-Smirnov test statistics and their p-values (in parentheses) are shown. Asterisks (*) represent significance at the 10% level.

Table 3. Kolmogorov-Smirnov Test Results for Report Groups

	Soybeans	Soybean Meal	Soybean Oil	Corn	Feeder Cattle	Live Cattle	Lean Hogs
Non-announcement vs Crop report days	0.044 (0.188)	0.049 (0.111)	0.051* (0.091)	0.060* (0.029)	0.032 (0.571)	0.037 (0.385)	0.081* (0.001)
Non-announcement vs Livestock report days	0.041 (0.656)	0.061 (0.186)	0.043 (0.602)	0.070* (0.089)	0.059 (0.210)	0.035 (0.811)	0.091* (0.009)
Crop vs Livestock report days	0.056 (0.385)	0.046 (0.644)	0.048 (0.580)	0.057 (0.360)	0.052 (0.478)	0.048 (0.597)	0.071 (0.151)

Notes: Two-sample Kolmogorov-Smirnov test statistics and their p-values (in parentheses) are shown. Crop reports include Acreage & Prospective Plantings, Crop Progress, Feed Outlook, Grain Stocks, Oil Crops Outlook, and WASDE. Livestock reports include Cattle, Cattle on Feed, Hogs and Pigs, and Livestock, Dairy, and Poultry Outlook. Asterisks (*) represent significance at the 10% level.

Table 4. Henriksson-Merton Test Results

	Soybeans	Soybean Meal	Soybean Oil	Corn	Feeder Cattle	Live Cattle	Lean Hogs
Acreage & Prospective Plantings	28.707* (0.000)	11.794* (0.001)	19.979* (0.000)	27.103* (0.000)	8.315* (0.004)	0.079 (0.779)	0.389 (0.533)
Crop Progress	0.202 (0.653)	0.398 (0.528)	0.141 (0.708)	1.933 (0.164)	1.024 (0.312)	7.540* (0.006)	2.566 (0.109)
Feed Outlook	0.252 (0.615)	0.001 (0.971)	0.003 (0.960)	0.536 (0.464)	0.063 (0.802)	2.836* (0.092)	1.788 (0.181)
Grain Stocks	39.194* (0.000)	19.554* (0.000)	18.521* (0.000)	40.775* (0.000)	4.144* (0.042)	0.148 (0.701)	0.098 (0.754)
Oil Crops Outlook	0.262 (0.608)	0.024 (0.878)	0.810 (0.368)	0.132 (0.716)	0.016 (0.900)	0.913 (0.339)	3.010* (0.083)
WASDE	19.502* (0.000)	12.660* (0.000)	13.484* (0.000)	32.683* (0.000)	2.602 (0.107)	1.130 (0.288)	0.004 (0.951)
Cattle	6.816* (0.009)	0.306 (0.580)	0.031 (0.861)	1.108 (0.293)	0.893 (0.345)	0.019 (0.891)	3.915* (0.048)
Cattle on Feed	2.205 (0.138)	1.906 (0.167)	1.197 (0.274)	0.453 (0.501)	8.049* (0.005)	2.344 (0.126)	0.134 (0.714)
Hogs and Pigs	3.633* (0.057)	5.684* (0.017)	0.331 (0.565)	7.515* (0.006)	1.619 (0.203)	0.047 (0.828)	7.511* (0.006)
Livestock, Dairy, and Poultry Outlook	0.982 (0.322)	0.031 (0.860)	3.007* (0.083)	0.244 (0.621)	0.105 (0.746)	1.436 (0.231)	0.069 (0.792)
ALL	8.867* (0.003)	4.575* (0.032)	1.766 (0.184)	14.473* (0.000)	5.170* (0.023)	2.269 (0.132)	4.075* (0.044)

Notes: Henriksson-Merton test statistics and their p-values (in parentheses) are shown. Asterisks (*) represent significance at the 10% level.

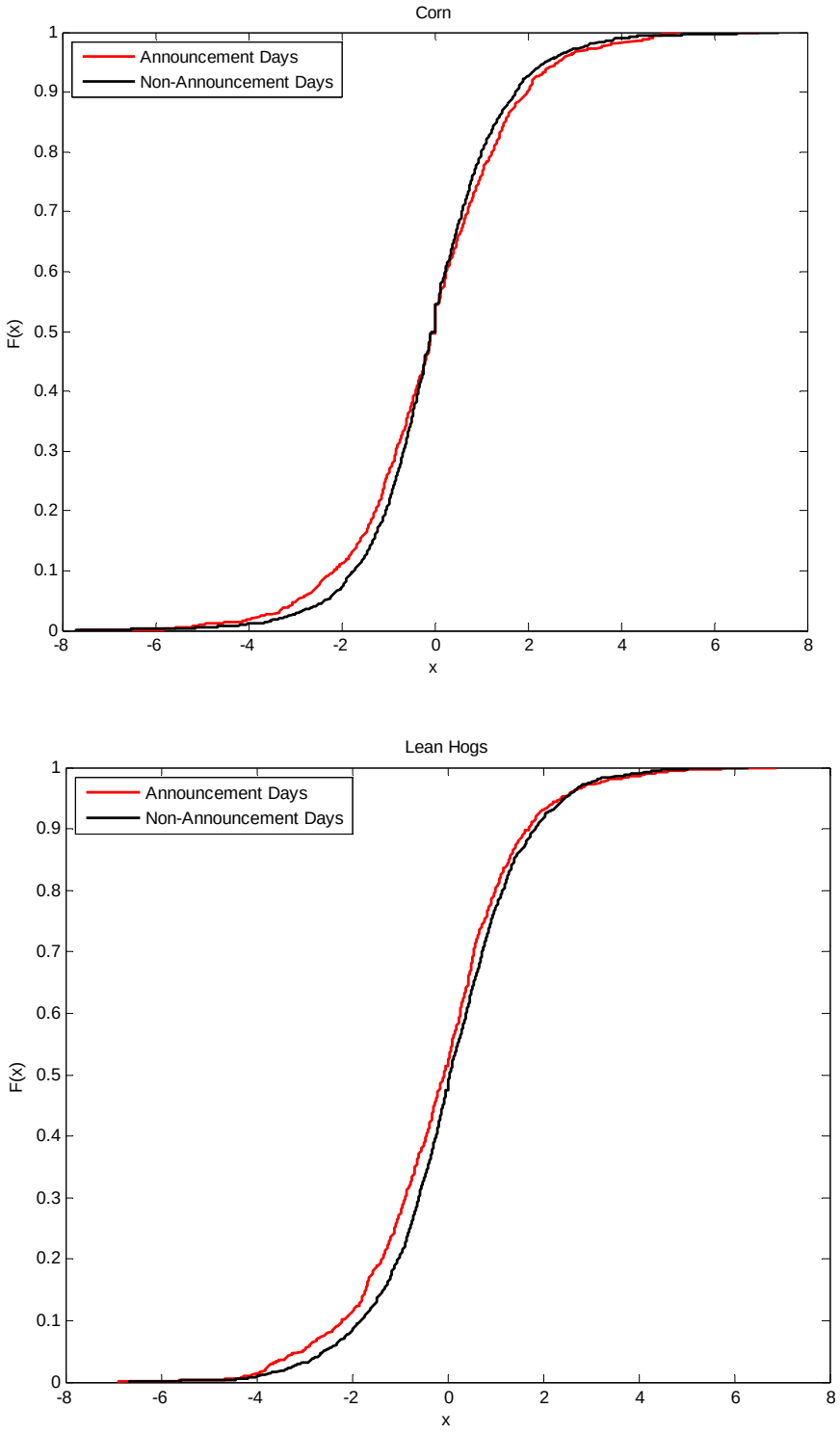

Figure 1. Statistically Different Empirical Cumulative Distribution Functions on Announcement vs. Non-Announcement Days

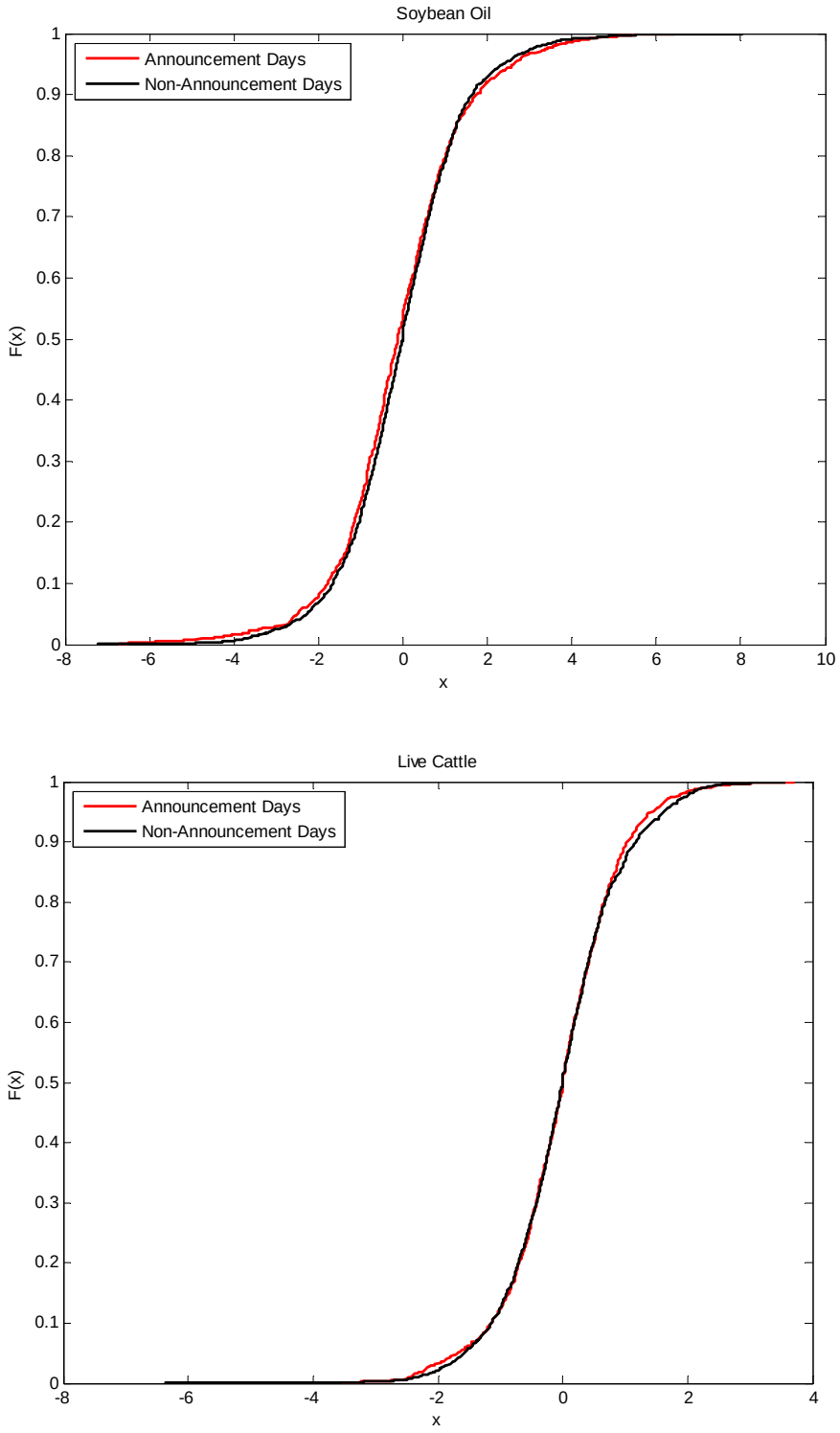

Figure 2. Statistically Indifferent Empirical Cumulative Distribution Functions on Announcement vs. Non-Announcement Days