The Value of USDA Outlook Information: An Investigation Using Event Study Analysis

by

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Practioner's Abstract

The economic value of public situation and outlook information has long been a subject of debate. The purpose of this paper is to investigate the economic value of USDA WASDE reports in corn and soybean markets. The investigation is based on event study analysis, with the "events" consisting of the release of all monthly USDA WASDE reports for corn and soybeans from 1985 through 1998. The WASDE reports during the sample period are divided into two groups: one that represents "pure" outlook information and one that represents a "mix" of situation and outlook information. The statistical tests can be placed into two categories: mean price reaction and volatility reaction. Overall, the results suggest that USDA outlook information has a significant impact in corn and soybean markets. The most notable impact is found in options markets, where implied volatility consistently declines after the release of WASDE reports. For the group of monthly reports containing only outlook information, implied volatility for both corn and soybeans was lower on the report day than on the previous day about 60 percent of the time. The difference in mean implied volatility on the day of the report and on the previous day for both corn and soybeans was significantly different from zero. The average magnitude of the drop was between about two- and three-tenths of a percentage point (of annualized implied volatility), which would appear to be an economically non-trivial decrease. Hence, it can be concluded that USDA outlook information reduces the uncertainty of market participants' expected distribution of future prices. This reduction in market uncertainty is unambiguously welfare-enhancing.

Key words: *situation and outlook, information, event study, price reaction, volatility reaction*

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Agricultural markets are characterized by pervasive uncertainty regarding prices and quantities that will prevail in the future. The uncertainty can be attributed largely to a combination of a highly inelastic demand for food and a production technology that is subject to vagaries of nature such as weather, pests, and biological lags. This combination of factors results in a set of market prices that may vary substantially within a year and from year-to-year.

The objective of public situation and outlook programs is to facilitate effective decision-making in this uncertain agricultural environment, where effective decision-making is defined as economic actions that result in higher profits, utility, and social welfare than otherwise would occur (Freebairn, 1978). The situation component of public programs is devoted to the production and collection of data, such as crop size, livestock inventories and producer acreage intentions. The outlook component is directed towards interpretation of the data and economic analysis.

The economic value of public situation and outlook information has long been a subject of debate. This debate has become more intensive in recent years for several reasons, including the changing structure of agriculture, the growth of private firms that provide relatively low cost information and market analysis of the type traditionally provided by public programs and evolving priorities within the USDA. Most pointedly, some agricultural economists (e.g. Just, 1983) have argued that public situation and outlook programs can be downsized or eliminated because private firms now perform the functions historically provided by public programs.

In response to this ongoing debate, a large number of empirical studies investigate the economic benefits of public situation information (e.g. *Crop Production Reports* and *Hogs and Pigs Reports*). Most of these empirical studies use a variant of event study methodology. The basic notion of an event study is simple: in an efficient market, if prices react to the announcement of information ("the event"), then the information is valuable to market participants (Campbell, Lo, and MacKinlay, 1997). Price reaction tests have been applied in over 30 event studies of USDA situation reports (e.g., Sumner and Mueller, 1989; Colling and Irwin, 1990; Grunewald, McNulty, and Biere, 1993; Baur and Orazem, 1994). With only a few exceptions, event studies find a significant market price reaction to the release of USDA situation reports. These results suggest that USDA situation information generates economic welfare benefits.

It is somewhat surprising to find that only one event study investigates the economic value of public outlook information. Fortenbery and Sumner (1993) analyze the economic value of monthly USDA *World Agricultural Supply and Demand Estimate* (WASDE*) Reports* in corn and soybean markets over 1985 through 1989. It is a commonly held belief of market participants and observers that WASDE estimates function as the "benchmark" to which other private and public estimates are compared.[1] Fortenbery and Sumner did not find evidence of significant price reaction to the release of WASDE reports. At the same time, they recognized the limitations of the study, in particular, a relatively small data period with generally depressed

prices. Other possible limitations of the study include the time horizon used to detect price reaction and the use of only new crop futures prices in the analysis.

Given the limited nature of previous research, ongoing debates, and traditional importance of USDA outlook programs, further investigation of the economic value of USDA outlook information is needed. The purpose of this paper is to investigate the economic value of USDA WASDE reports in corn and soybean markets. The investigation will be based on event study analysis, with the "events" consisting of the release of all monthly USDA WASDE reports for corn and soybeans from 1985 through 1998. Following Fortenbery and Sumner, the WASDE reports during the sample period will be divided into two groups: one that represents "pure" outlook information and one that represents a "mix" of situation and outlook information. The sample period incorporates a variety of supply/demand conditions and different agricultural policy regimes. The large sample size and variability in market conditions should substantially enhance the power of statistical tests.

The statistical tests employed in the paper can be placed into two categories: mean price reaction and volatility reaction. These categories are based on the notion that information may affect both the mean (price level) and volatility (uncertainty) of the expected distribution of futures prices (McNew and Espinosa, 1994). Both parametric and non-parametric statistical tests will be used to determine the significance of price and volatility reaction to the release of WASDE reports.

The second section of the paper reviews the empirical literature on the value of situation and outlook information. The third section presents the data and procedures used in the present study. The fourth section reports the results of the empirical analysis. The fifth and final section presents a summary and conclusions.

Previous Studies of the Value of Situation and Outlook Information

A limited number of studies attempt to provide direct empirical estimates of the welfare benefits of public situation and outlook information (Hayami and Peterson, 1972; Freebairn, 1976; Bradford and Kelejian, 1978; Antonovitz and Roe, 1984). In these studies, a theoretical supply/demand structure for a market is proposed, parameter estimates are obtained, and then social welfare is estimated under different information or expectation assumptions. As a group, these empirical studies suggest the social welfare value of public situation and outlook information substantially exceeds the cost.

A much larger number of studies investigate the indirect welfare benefits of public situation and outlook programs. The evidence is indirect because measures indirectly related to welfare, such as price impact in futures markets, are examined. Given the technical difficulties associated with direct welfare estimation, it is probably not surprising that most empirical studies of the value of situation and outlook information use the indirect approach. Most empirical studies of the indirect type use a variant of event study methodology. The basic notion of an event study is simple: in an efficient market, if prices react to the announcement of information ("the event"), then the information is valuable to market participants (Campbell, Lo, and MacKinlay, 1997). More specifically, in an agricultural context, information is valuable if it

affects the mean (price level) and/or volatility (standard deviation) of the expected distribution of futures prices (McNew and Espinosa, 1994).

Hypothetical examples of the possible impacts on the expected harvest-time distribution of new crop corn futures prices are shown in Figure 1. Note that the expectation is formed at planting time. Panel A illustrates the case where WASDE information impacts only the mean of the expected price distribution. This is reflected in the market as an increase in the price of the new crop corn futures price from the pre-WASDE level of $2.00 per bushel to the post-WASDE level of $2.15 per bushel.[2] In other words, the unanticipated information in the WASDE report is "bullish" and the new crop futures price increases $0.15 per bushel immediately following release of the report. Panel B illustrates the case where WASDE information impacts only the volatility (standard deviation) of the expected price distribution. This is reflected in the market as a decrease in the implied volatility of options on the new crop corn futures contract from the pre-WASDE level of $0.40 per bushel to the post-WASDE level of $0.35 per bushel. Hence, the unanticipated information in the WASDE report reduces the uncertainty of market participants regarding the expectation of the new crop future price at harvest by $0.05 per bushel. Panel C shows the case where both the mean increases and volatility decreases due to the release of WASDE information. The mean shift is the same as in Panel A and the volatility shift is the same as in Panel B. Finally, Panel D shows the case where WASDE information does not change either the mean or volatility of the expected distribution of new crop futures prices at harvest.

Price reaction tests based on the concepts discussed above have been applied in over 30 studies of USDA situation reports (e.g., Sumner and Mueller, 1989; Colling and Irwin, 1990; Grunewald, McNulty, and Biere, 1993; Baur and Orazem, 1994). *Crop Reports* and *Hogs and Pigs Reports* are the most frequently studied of the situation reports. With the exception of the studies by Fortenbery and Sumner (1993) and McNew and Espinosa (1994), tests focus exclusively on detecting mean price reaction in futures markets. The findings with respect to mean price reaction are surprisingly consistent given the variety of sample periods and test procedures used. With only a few exceptions, studies find a significant price reaction in futures markets to the release of the USDA situation reports. These results suggest that USDA situation reports generate substantial social welfare benefits, in the sense of impacting market participants' assessment of the mean of expected price distributions. While more limited in number, the studies of volatility impact suggest that USDA situation reports reduce market participants' uncertainty regarding the expected distribution of futures prices.

It is somewhat surprising to find that only one event study includes separate analysis of the market impact of public situation versus outlook information.[3] Fortenbery and Sumner (1993) first analyze the economic value of NASS production reports in corn and soybean futures markets over 1969-1989, and consistent with other studies, find a significant mean price reaction. Next, they investigate the economic value of monthly WASDE reports in corn and soybean markets over 1985 through 1989. Since NASS production reports and WASDE reports began to be released simultaneously in January 1985, Fortenbery and Sumner subdivide the monthly releases into two groups. The first group consists of WASDE reports during August through November, when both WASDE reports and NASS production reports are released. Releases during these months can be thought of as a "mix" of situation and outlook information. The

second group consists of WASDE reports during December through July; release months that Fortenbery and Sumner assert do not coincide with the release of NASS production reports. Reports during these months can be thought of as "pure" outlook information.[4]

Based on *t*-tests and non-parametric tests, Fortenbery and Sumner did not find evidence of significant price reaction to the release of WASDE reports during December through July releases. They concluded, "…that USDA reports no longer provide news to markets. Perhaps market participants have become sufficiently skilled to anticipate the information forthcoming, and thus no market reaction is detected." (p. 171) At the same time, they recognized the limitations of their study, "The lack of a report effect is found over a relatively small data period, and one of generally depressed prices. It cannot be ruled out that the results are sensitive to the data period studied" (p. 172). Other possible limitations of the study include the use of close-to-close returns instead of close-to-open returns and the use of only one futures contract (December corn and November soybeans) in the analysis.

Data

The "events" to be analyzed in this paper include the release of all USDA WASDE Reports for corn and soybeans over 1985 through 1998. As a result, a total of 168 events will be analyzed for both corn and soybeans. All but a few of the release dates occur between the 9th and 12th of the month. One important change in the release schedule for WASDE Reports occurred during the sample period. Monthly reports between January 1985 and April 1994 were released at 3:00 pm EST, after the end of the daytime trading session at the Chicago Board of Trade (CBOT). Monthly reports between May 1994 and December 1998 were released at 8:30 am EST, before the daytime trading session at the CBOT.[5]

Following Fortenbery and Sumner, WASDE reports during the sample period are divided into two groups: one that represents "pure" outlook information and one that represents a "mix" of situation and outlook information. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). Note that the classification of release months is consistent across the entire sample, with the exception of January, February and July. The variation for January and February is due to the release of NASS final production estimates in February 1985 and 1986, as compared to January for the remainder of the sample. The variation for July is due to the release of NASS corn and soybean production estimates during 1985-1989. The July estimates were discontinued in 1990.

Corn and soybean futures prices for CBOT contracts nearest-to-maturity, but maturing in the calendar month after a given release month, are collected for six days before the release of each WASDE report, the day of release and six days after the release of each WASDE report, or a total of 13 days for each release. Both opening and closing futures prices are collected for each event over the January 1985 through December 1998 sample period. Nearest-to-maturity (nearby) contracts are used for two reasons. First, nearest-to-maturity contracts typically are the

most heavily traded, and hence, liquid contracts. Second, theory suggests that nearby contracts for storable commodities fully reflect the price impact of both old and new crop information (Working, 1948). This is important because both old crop and new crop information on corn and soybeans is released in most WASDE reports. For these reasons, it seems reasonable to argue that the best measurement of price impact can be derived from nearest-to-maturity contracts for each release. The specific futures maturity matched to each WASDE release is presented in Table 1. Finally, note the contrast with the procedure used by Fortenbery and Sumner. They collect data only for December contracts for corn and November contracts for soybeans, arguing that this permits consideration of the impact of WASDE reports on a single harvest contract. However, as noted above, this ignores the fact that most WASDE reports contain both old and new crop information.

Price limits represent a potentially important issue in event studies of futures price reaction. The limits for CBOT corn and soybean futures contracts may prevent prices from immediately reflecting the full impact of new information in WASDE reports. If limits are hit frequently enough, statistical test results could be seriously biased. Fortunately, the incidence of limit price moves in the sample for this study is quite small. In corn, there are only seven limit price moves on WASDE report release days out of a total of 168 release days, or 4.2 percent of the time. Only 19 limit moves in corn are observed out of a total of 1,680 pre- and post-release days, or 1.1 percent of the time. In soybeans, there are six limit price moves on WASDE report release days out of a total of 168 release days, or 3.6 percent of the time. Only 11 limit moves in soybeans are observed out of a total of 1,680 pre- and post-release days, or 0.6 percent of the time. The small incidence of limit price moves suggests that price changes are not substantially constrained by limits during the sample period considered here. Hence, any bias in statistical tests due to price limits should be negligible. Thus, following Sumner and Mueller (1989) and Fortenbery and Sumner (1993), no adjustment is made to the futures price data to account for price limits.

Premiums for CBOT soybean options are collected for each event in the full sample period of January 1985 through December 1998. However, premiums for CBOT corn options are collected for the slightly smaller sample period of March 1985 through December 1998. The reason for the smaller sample is that corn options did not begin trading at the CBOT until February 1985. Soybean options began trading in November 1984. For both corn and soybeans, premiums for the nearest-to-the money put and call options on contracts nearest-to-maturity, but maturing in the calendar month after a given release month, are collected for six days before the release of a WASDE report, the day of release and six days after the release of a WASDE report, or a total of 13 days for each release. Consistent with the reasoning applied to futures data, premiums for nearest-to-maturity options are collected. The specific options maturity matched to each WASDE release is presented in Table 1. In contrast to the futures price data, only daily closing premiums are collected for each day. This is done for two reasons. First, implied volatilities derived from the option premiums are not expected to vary considerably over a trading day, lessening the need to examine both opening and closing premium data. Second, option databases containing opening, high, low and closing premiums are very large, and therefore, difficult to manipulate. The reason nearest-to-the-money strike prices are selected will be discussed in the next section.

Statistical Tests

The statistical tests presented in this section can be placed into two categories: mean price reaction and volatility reaction. These categories are based on the notion that information may affect both the mean (price level) and volatility (uncertainty) of the expected distribution of futures prices (McNew and Espinosa, 1994). Both parametric and non-parametric statistical tests are used to determine the significance of mean price and volatility reaction to the release of WASDE reports.

Mean Price Reaction Tests

The basic idea with respect to testing mean price impact is to examine whether the variability of corn and soybean futures prices immediately after the release of WASDE reports is larger than "normal." In an efficient market, variability that is significantly larger than normal indicates that WASDE reports contain valuable new information. Testing this hypothesis requires careful definition of the measure of normal variability and the measure of variability immediately after the release of WASDE reports. To begin, note that a time index (*t*) and an event index (*i*) are needed. The time index is $t = -6, -5, ..., -1, 0, +1, ..., +4, +5$, with zero indicating the daytime trading session at the CBOT (henceforth, "session") immediately following the release of a given WASDE report, a negative index number indicating sessions before the given release and a positive number indicating sessions after release. For example, +5 indicates the session is five trading days after the day 0 trading session.[6] The event index is $i = 1, ..., 168$, with one indicating the release of the January 1985 WASDE report and 168 indicating the release of the December 1998 WASDE report.

Efficient market theory suggests that the impact of WASDE reports, if any, should be reflected instantaneously in futures prices as soon as a trading session begins. Since WASDE reports are released either after the close of trading (before May 1994) on the release date or before the opening of trading (May 1994 and after) on the release date, close-to-open price changes that span the release time of WASDE reports will best reflect the immediate reaction of corn and soybean futures prices. Hence, the main price reaction results for this study will be based on close-to-open measures of futures price changes. Price reaction measured on a close-to-close basis, as in previous studies, may mask the market's reaction to WASDE reports due to the added variability associated with other information that becomes available to the market during the trading day.

Two measures of the relative change in futures prices are used in the mean price reaction tests. For corn and soybeans, the raw close-to-open return for a given WASDE release is computed as follows,

$$r^{o}_{t,i} = \ln(p^{o}_{t,i} / p^{c}_{t-1,i}) \cdot 100 \qquad t = -6, ..., 0, ..., +5 \tag{1}$$

where $p^{o}_{t,i}$ is the opening price of the nearest-to-maturity corn or soybeans futures contract for session *t* and event *i* and $p^{c}_{t-1,i}$ is the closing price of the nearest-to-maturity corn or soybeans

futures contract for session *t-1* and event *i*. The absolute close-to-open return is computed as follows,

$$\left|r^{o}_{t,i}\right| = \left|\ln(p^{o}_{t,i} / p^{c}_{t-1,i}) \cdot 100\right| \qquad t = -6,...,0,...,+5 \tag{2}$$

with definitions the same as for equation (1). Note that for a given event, five raw or absolute returns are computed previous to the release of a WASDE report, one raw or absolute return is computed for the report release session and five raw or absolute returns are computed after the release.

In order to test the sensitivity of mean price reaction results to the time frame for computing returns, returns are also computed on a close-to-close basis. For corn and soybeans, the raw close-to-close return for a given WASDE release is computed as follows,

$$r^{c}_{t,i} = \ln(p^{c}_{t,i} / p^{c}_{t-1,i}) \cdot 100 \qquad t = -6,...,0,...,+5 \tag{3}$$

where $p^{c}_{t,i}$ is the closing price of the nearest-to-maturity corn or soybeans futures contract for session *t* and event *i* and $p^{c}_{t-1,i}$ is the closing price of the nearest-to-maturity corn or soybeans futures contract for session *t-1* and event *i*. The absolute close-to-open return is computed as follows,

$$\left|r^{c}_{t,i} =\right| = \left|\ln(p^{c}_{t,i} / p^{c}_{t-1,i}) \cdot 100\right| \qquad t = -6,...,0,...,+5 \tag{4}$$

with definitions the same as for equation (3).

Three statistical tests are used to determine whether WASDE reports change market participants mean price expectation. Multiple tests are used in order to test the sensitivity of the results to the selection of test statistic. Each test requires the specification of a measure of variability for the period immediately following release of WASDE reports and for a period of "normal" variability. For each test, variability for the period immediately following release of WASDE reports is based on session 0 returns (henceforth, report returns). Similar to Sumner and Mueller (1989) and Fortenbery and Sumner (1993), normal variability is based on the five session returns previous to release of WASDE reports (henceforth, pre-report returns) and the five session returns after release (henceforth, post-report returns). With this background the individual statistical tests can be specified. Note that the tests are specified only for close-to-open measures of returns. Test specifications are the same for close-to-close returns; simply substitute close-to-close returns for close-to-open returns.

The first test is simply a conventional *F*-test of the ratio of the variance for raw report returns to the variance for raw pre- and post report returns. The raw close-to-open variance for report returns is computed as,

(5)
$$\hat{\sigma}_R^2 = \frac{1}{N-1}\sum_{i=1}^{N}(r_{0,i}^o - \overline{r}_R^o)^2$$

where N is the number of total number of WASDE report releases included in the estimation, $r_{0,i}^o$ is the raw close-to-open report return for the i^{th} release and $\overline{r}_R^o$ is the estimate of the mean of raw close-to-open report returns across the N releases. The raw close-to-open variance for pre- and post-report returns is computed as,

(6)
$$\hat{\sigma}_{NR}^2 = \frac{1}{N-1}\sum_{i=1}^{N}\sum_{t=-6}^{+5}(r_{t,i}^o - \overline{r}_{NR}^o)^2 \qquad t \neq 0$$

where N is the number of total number of WASDE reports included in the estimation, $r_{t,i}^o$ is the t^{th} raw close-to-open pre- or post-release return for the i^{th} report and $\overline{r}_{NR}^o$ is the estimate of the mean of raw close-to-open returns across the $N \cdot 10$ pre- and post-release returns. The F-statistic is computed as follows,

(7)
$$F = \frac{\hat{\sigma}_R^2}{\hat{\sigma}_{NR}^2}$$

where the sampling distribution of the F-statistic under the null hypothesis of equal variances follows an F distribution with $N-1$ numerator degrees of freedom and $(N \cdot 10)-1$ denominator degrees of freedom (Anderson, Sweeney and Williams, 1996, pp.413-414).

The second test is a paired t-test of the difference between the mean absolute report return and the mean absolute pre- and post-report return. Assuming independent samples and equal population variances for report and pre- and post-report absolute returns, the appropriate t-statistic is,

(8)
$$t^e = \frac{\left|\overline{r}_R^o\right| - \left|\overline{r}_{NR}^o\right|}{\sqrt{\hat{s}_p^2\left(\frac{1}{N} + \frac{1}{N \cdot 10}\right)}}$$

where $\left|\overline{r}_R^o\right|$ is the mean absolute close-to-open report return, $\left|\overline{r}_{NR}^o\right|$ is the mean close-to-open absolute pre- and post-report return and $\hat{s}_p^2$ is the pooled estimate of the variance of the difference in the means. The estimate of $\hat{s}_p^2$ is given by,

(9)
$$\hat{s}_p^2 = \frac{(N-1)\hat{s}_R^2 + (N \cdot 10 - 1)\hat{s}_{NR}^2}{N + (N \cdot 10) - 2}$$

where $\hat{s}_R^2$ is the estimated variance of mean absolute close-to-open report returns and $\hat{s}_{NR}^2$ is the estimated variance of mean absolute close-to-open pre- and post-report returns. Under the null hypothesis of no difference in the means, the sampling distribution of t^e follows a *t*-distribution with $N+(N\cdot 10)-2$ degrees of freedom (Anderson, Sweeney and Williams, 1996, pp.380-381). Since it may be unreasonable to assume that population variances for report and pre- and post-report absolute returns are equal, an alternative version of the paired *t*-test also is estimated that does not make this assumption. The alternative *t*-statistic is computed as,

(10)
$$t^{ne} = \frac{\left|\bar{r}_R^o\right| - \left|\bar{r}_{NR}^o\right|}{\sqrt{\frac{\hat{s}_R^2}{N} + \frac{\hat{s}_{NR}^2}{N\cdot 10}}}$$

where all of the variables are defined above. The formula for the degrees of freedom for t^{ne} is complex and can be found in Steel and Torrie (1980).

A concern with the paired *t*-tests presented above is that they assume the underlying population of absolute returns is normally distributed. This cannot be true because absolute returns may not be negative. A non-parametric test of the difference in means that does not assume normality is the Mann-Whitney test. The first step of the test is to pool all the absolute close-to-open report returns and pre- and post-report returns. Next, the absolute returns are ranked from smallest to largest (1 to $N+N\cdot 10$). If absolute returns are the same (tied) the average of the ranks that would have been assigned to them had there been no ties is assigned to each return. The Mann-Whitney test statistic is computed as,

(11)
$$MW = \sum_{i=1}^{N} R\left(\left|r_{0,i}^o\right|\right)$$

where $R\left(\left|r_{0,i}^o\right|\right)$ is the rank of the i^{th} absolute close-to-open report return. If the ranks of absolute report returns are larger than expected based on a random distribution of ranks, the Mann-Whitney test statistic will be "large," and the null hypothesis that the mean of absolute report returns is equal to the mean of absolute pre- and post-report returns can be rejected. Note that when N and $N\cdot 10$ are greater than or equal to ten, the sampling distribution of *MW* is approximately normal (Anderson, Sweeney and Williams, 1996, pp.760-763). The test statistic under this assumption is,

(12)
$$Z_{MW} = \frac{MW - \mu_{MW}}{\sigma_{MW}}$$

where the formula for the mean is,

(13)
$$\mu_{MW} = \frac{1}{2}N\left(N+N\cdot 10+1\right)$$

and the standard deviation is,

(14) $$\sigma_{MW} = \sqrt{\frac{1}{2} N^2 \cdot 10\left(N + N \cdot 10 + 1\right)}\,.$$

Volatility Reaction Tests

Volatility reaction tests are a relatively new addition to the event study literature. The only application of a volatility test in the agricultural event study literature is the study by McNew and Espinosa (1994). In design, volatility reaction tests are similar to mean reaction tests: volatility is measured for a pre-report period and compared to volatility for a post-report period. If WASDE reports reduce the uncertainty of market participants' price expectations, volatility should be lower for the post-report period.

This study follows McNew and Espinosa (1994) and measures volatility as the volatility implied from settlement premiums for the nearest-to-the money put and call options on contracts nearest-to-maturity, but maturing in the month after a given release month. Implied volatility is averaged for puts and calls for a particular release. Note that implied volatility is the volatility that approximately equates an observed option premium with the theoretical value predicted by an option pricing model. The option pricing model used to derive the implied volatilities is the Black (1976) model for European options on futures contracts. *FinancialCad* software is used to compute the implied volatilities on an annualized basis. Since options on futures contracts are of the American type, the use of a European pricing model for eliciting implied volatilities can potentially introduce a small upward bias in the volatility estimate due to the early exercise premium of American options. However, this bias has been found to be small for short-term options that are at-the-money (e.g., Whaley, 1986; Shastri and Tandon, 1986). Furthermore, studies examining alternative weighting schemes for implied volatility (calculating implied volatility as the average implied volatility across various strike prices) have found that implied volatilities taken from the nearest at-the-money options provide the most accurate volatility estimates (e.g., Beckers, 1981; Mayhew, 1995). At- or near-the-money options tend to contain the most information regarding volatility because they are usually the highest volume contract. In addition, Jorion (1995) notes that the averaging of implied volatilities from both puts and calls helps to reduce measurement error.

Three statistical tests are used to determine whether WASDE reports change market participants' expectation about the uncertainty of future prices. Multiple tests are again used in order to test the sensitivity of the results to the selection of test statistic. The tests will be presented assuming the comparison is between implied volatility the session before a WASDE report is released (session –1) and the release session (session 0). Other comparisons, such as session –1 and session +1, are also made, but only comparisons for session –1 and session 0 are presented due to space considerations. With this background the individual statistical tests can be specified.

The first test is simply a *Z*-test of the proportion of WASDE releases when implied volatility declines relative to the session before release. The initial step is to compute the following indicator variable,

(15) $$I_i = \begin{cases} 1 \text{ if } IV_{0,i} - IV_{-1,i} < 0 \\ 0 \text{ if } IV_{0,i} - IV_{-1,i} \geq 0 \end{cases}$$

where $IV_{0,i}$ is the implied volatility for the i^{th} WASDE report release session and $IV_{-1,i}$ is the implied volatility for the session before the report release session. The sample estimate of the proportion is,

(16) $$\overline{p} = \frac{K}{N}$$

where $K = \sum_{i=1}^{N} I_i$ is the number of release months when implied volatility declines after WASDE releases and *N* is the total number of releases in the sample. The sampling distribution of the proportion estimator, $\overline{p}$, is binomial with an expected value of *p* and a standard error of $\sqrt{p(1-p)/N}$, where *p* is the true value of the proportion in the population (Anderson, Sweeney and Williams, 1996, pp. 257-259). So long as $N \cdot p \geq 5$ and $N \cdot (1-p) \geq 5$, the sampling distribution of $\overline{p}$ is approximately normal. The form of the test statistic based on the above assumptions is,

(17) $$Z = (\overline{p} - p_0) \Big/ \sqrt{p_0(1-p_0)/N}$$

where p_0 is the assumed value of *p* under the null hypothesis. The remaining issue is the expected proportion (p_0) under the null hypothesis. The obvious null value is 0.5, the same as the result of flipping a coin and showing heads (or tails). Setting $p_0 = 0.5$, the test statistic is,

(18) $$Z = (\overline{p} - 0.5) \Big/ \sqrt{0.25/N}\,.$$

The second test is a paired *t*-test of the difference between mean implied volatility on report release sessions and the session before release. Since this is a matched-sample design, the test is based on implied volatility differences defined below,

(19) $$d_i = IV_{0,i} - IV_{-1,i}$$

where $IV_{0,i}$ is the implied volatility for the i^{th} WASDE report release session and $IV_{-1,i}$ is the implied volatility for the session before report release. The test statistic is then computed as,

(20)
$$t^d = \frac{\bar{d}}{\sqrt{\hat{s}_d^2}}$$

where $\bar{d}$ is the estimated mean difference in implied volatilities across the *N* release dates in the sample and $\hat{s}_d^2$ is the estimated variance of the implied volatility differences. The *t*-statistic follows a *t*-distribution with *N-1* degrees of freedom (Anderson, Sweeney and Williams, 1996, pp. 385-386).

A concern with the matched-sample paired *t*-test just presented is that it assumes the underlying population of implied volatilities is normally distributed. However, it is well-known that the sampling distribution of variance or standard deviation estimators is non-normal. The Wilcoxon signed-rank test is a non-parametric matched-sample test that does not assume normality. The first step of the test is to compute the implied volatility differences, d_i, as shown in equation (19). The second step is to take the absolute value of the implied volatility differences. The third step is to rank the absolute differences from smallest to largest (1 to N). If differences are the same (tied) the average of the ranks that would have been assigned to them had there been no ties is assigned to each difference. The fourth step is to sign the ranks of the absolute differences based on the sign of original implied volatility differences (d_i). Then, the Wilcoxon signed-rank test statistic is computed as,

(21)
$$W = \sum_{i=1}^{N} SR\left(|d_i|\right)$$

where $SR\left(|d_i|\right)$ is the signed rank of the absolute difference in implied volatility between the i^{th} WASDE report release session and the session before report release. If the sum of the signed ranks is a large negative number, then implied volatility on WASDE release sessions compared to the session before release is smaller than expected based on a random distribution of signed ranks, and the null hypothesis that the mean implied volatility on report release session is equal to the mean on the session before report release can be rejected. Note that when N is greater than or equal to ten, the sampling distribution of *W* is approximately normal (Anderson, Sweeney and Williams, 1996, pp.753-756). The test statistic under this assumption is,

(22)
$$Z_W = \frac{W - \mu_W}{\sigma_W}$$

where the formula for the mean is,

(23)
$$\mu_W = 0$$

and the standard deviation is,

(24) $$\sigma_W = \sqrt{\frac{1}{6}N(N+1)(2N+1)}\,.$$

Mean Price Reaction Test Results

The results of the mean price reaction tests are presented in Tables 2 through 13. Results for both corn and soybeans are presented based on close-to-open returns and close-to-close returns. The results are also presented for the entire study period, January 1985 through December 1998, and for two sub-periods, January 1985 through December 1989 and January 1990 through December 1998. Each table contains the results of all three statistical tests: *F*-test, paired *t*-test, and the Mann-Whitney non-parametric test. Finally, the tests are presented for each month and for months grouped according to whether the monthly report contained outlook and situation information (WASDE and NASS) or only outlook information (WASDE). The outlook only months are divided in two groups, depending on whether the reports were released prior to harvest or after harvest. For reports with both outlook and situation information, it is not possible to identify the separate price impacts of the two types of information.

Five general observations can be made about the tests of mean price reaction. First, the price impact of the monthly reports is generally more significant for those reports that contain both outlook and situation information (WASDE and NASS). Second, the post- harvest outlook only reports (WASDE) generally have a more significant impact on price reaction than pre-harvest outlook only reports. Third, a more significant impact is found when measuring price reaction on a close-to-open basis than on a close-to-close basis. Fourth, there are some differences in price response during the two sub-periods of the study. Fifth, the three test statistics generally yielded very similar results.

The *F*-test, which is the ratio of average price variance on report days to the average variance on non-report days, revealed some significant differences in price behavior on report and non-report days. For the group of reports that contain outlook and situation information, there is significantly more price variation on report release sessions than on pre- and post-report sessions. This is true for the entire study period and for each of the sub-periods, although the difference is larger in the later time period (January 1990 through December 1998). For all periods, the largest differences in price variation occur in January, August, and October. For the group of reports that contained only outlook information, no significant difference in price variation is found for the entire study period or for either sub-period. However, a significant difference is found for the group of post-harvest outlook only reports, except during the early time period (January 1985 through December 1989).

The paired *t*-test of mean absolute return (on a percentage basis) on report and pre- and post-report sessions, yielded results very similar to the *F*-test of differences in price variation. However, under the assumption of unequal population variances for report and non-report absolute returns, no significant difference in means is found for the group of reports containing only outlook information, even in the post-harvest period. Percentage differences in absolute means are generally small for the outlook only reporting months. However, the difference is

significant or nearly significant for the group of post- harvest reports in the January 1990 through December 1998 period.

The non-parametric test (Mann-Whitney) of differences in mean absolute returns yielded essentially identical results to those of the paired *t*-tests. Only the group of reports that contained outlook and situation information generated significant differences in mean absolute return for report and non-report days. However, some of the individual pre-harvest monthly reports that contained only outlook information generated significant differences.

Using close-to- close returns for the analysis resulted in the identification of fewer statistically significant differences in price reaction on report and pre- and post-report sessions, both in terms of price variance and mean absolute return. No significant differences were found for the group of reports that contained only outlook information. As a group, even reports containing both outlook and situation information generated no evidence of differences in price reaction on report and non-report days in the period from January 1985 through December 1989. This is consistent with the findings of Fortenbery and Sumner (1993). Only two of the individual monthly reports (depending on which test is used) generated differences in price response for report and pre- and post-report sessions during that period.

The results of the statistical tests for soybeans were similar to those for corn, with a few important differences. For the entire study period, all three tests revealed significant differences in price response on report and pre- and post-report sessions for the group of outlook only reports in the post harvest period. The differences were not significant in the early time period, but were relatively large in the period from January 1990 through December 1998. The April reports appear to account for most of the difference, although the *F*-test confirmed significant differences between price variance on report and non-report days during February and March. That is true for the entire study period and in particular the latter part of the period.

On a close-to-close basis, the statistical tests revealed significant differences in price response on report and non-report days only for that group of reports that contained outlook and situation information (WASDE and NASS). The exception was that the paired *t*-test of mean absolute return under the assumption of unequal population variance found a significant difference for the June report, particularly in the early part of the study period.

Volatility Reaction Test Results

The results of the volatility reaction tests are presented in Tables 14 through 19. The tests are based on the comparison of implied volatility in the corn and soybean options markets (settlement prices of nearest-to-the money put and call options) for the report release session and the session before release. In parallel with the mean price reaction analysis, the tests are conducted on observations for the entire study period, January 1985 (March 1985 for corn) through December 1998 and two sub-periods, January (March) 1985 through December 1989 and January 1990 through December 1998. Results are presented for each month and for months grouped according to whether the monthly report contained situation and outlook information (WASDE and NASS) or only outlook information (WASDE). The outlook only months were further divided into pre-harvest and post-harvest groups.

For the group of monthly reports containing only outlook information, the implied volatility was lower on the report release session than on the previous session 57 percent of the time. That proportion, however, was not significantly different from 50 percent. For such reports during the pre-harvest period, however, the implied volatility was lower on report day 65 percent of the time, which is significantly greater than 50 percent at the 10 percent level. Of those pre-harvest reports, the May report resulted in lower implied volatility on report day 79 percent of the time. The proportion was 100 percent in the March 1985 through December 1989 period. For the group of reports containing outlook and situation information, implied volatility was lower on report session 77 percent of the time. That proportion was 82 percent in the later time period.

The paired *t*-test of differences in mean implied volatility yielded slightly different results. In particular, for that group of reports containing only outlook information, the difference in mean implied volatility on report release sessions and on the previous session was significant at the 5 percent level. The average magnitude of the drop was three-tenths of a percentage point (of annualized implied volatility), which would appear to be an economically non-trivial decrease. The outlook only difference was dominated by the May report, where implied volatility dropped an average of just under one percentage point. As a group, however, the post-harvest outlook only reports did not generate a significant difference in mean implied volatility on the report release session as compared to the previous session. No significant difference in mean implied volatility for outlook only reports is found in the early part of the study period. In addition, the group of reports containing outlook and situation information did not generate significant differences in mean implied volatility in the early part of the study period.

The Wilcoxon non-parametric test of differences in mean implied volatility yielded identical results to those of the paired *t*-test, except in the early part of the study period. For that period, the Wilcoxon test shows significant differences in the mean implied volatility on report release sessions and the previous session for that group of reports that contain both outlook and situation information. Interestingly, for individual months, a significant difference is found only for May, an outlook only report month.

For soybeans, the volatility reaction tests find more significant differences in implied volatility for report sessions and sessions one day earlier than is the case for corn. For the entire study period, the implied volatility on the session for outlook only reports as a group was lower than the implied volatility on the previous session 60 percent of the time. For the group of pre-harvest reports, the proportion was 64 percent. Both the paired *t*-test and the Wilcoxon non-parametric test find significant differences in mean implied volatility for the group of post-harvest outlook only reports. The average magnitude of the drop was over two-tenths of a percentage point (of annualized implied volatility), which, again, would appear to be an economically non-trivial decrease. The largest difference is associated with the July report, where implied volatility dropped an average of just over five-tenths of a percentage point. Significant differences in implied volatility associated with the group of outlook only reports is not found by any of the tests in the early part of the study period.

Summary and Conclusions

The economic value of public situation and outlook information has long been a subject of debate. This debate has become more intensive in recent years for several reasons, including the changing structure of agriculture, the growth of private firms that provide relatively low cost information and market analysis of the type traditionally provided by public programs and evolving priorities within the USDA. In response to this ongoing debate, a large number of empirical studies investigate the economic benefits of public situation information (e.g. *Crop Production Reports* and *Hogs and Pigs Reports*). Most of these empirical studies use a variant of event study methodology. The basic notion of an event study is simple: in an efficient market, if prices react to the announcement of information ("the event"), then the information is valuable to market participants (Campbell, Lo, and MacKinlay, 1997).

It is surprising that only one previous event study investigates the economic value of public outlook information. Fortenbery and Sumner (1993) analyze the economic value of monthly USDA *World Agricultural Supply and Demand Estimate* (WASDE*) Reports* in corn and soybean markets over 1985 through 1989. It is a commonly held belief of market participants and observers that WASDE estimates function as the "benchmark" to which other private and public estimates are compared. Fortenbery and Sumner did not find evidence of significant price reaction to the release of WASDE reports.

Given the limited nature of previous research, ongoing debates, and traditional importance of USDA outlook programs, further investigation of the economic value of USDA outlook information is needed. The purpose of this paper is to investigate the economic value of USDA WASDE reports in corn and soybean markets. The investigation is based on event study analysis, with the "events" consisting of the release of all monthly USDA WASDE reports for corn and soybeans from 1985 through 1998. Following Fortenbery and Sumner, the WASDE reports during the sample period are divided into two groups: one that represents "pure" outlook information and one that represents a "mix" of situation and outlook information.

The statistical tests employed in the paper can be placed into two categories: mean price reaction and volatility reaction. These categories are based on the notion that information may affect both the mean (price level) and volatility (uncertainty) of the expected distribution of futures prices (McNew and Espinosa, 1994). Both parametric and non-parametric statistical tests are used to determine the significance of price and volatility reaction to the release of WASDE reports.

For both corn and soybeans, the following observations can be made about the tests of mean price reaction. First, the price impact of the monthly reports is generally more significant for those reports that contain both outlook and situation information. Second, the post- harvest outlook only reports generally have a more significant impact on price reaction than pre-harvest outlook only reports. Third, a more significant impact is found when measuring price reaction on a close-to-open basis than on a close-to-close basis. Fourth, there are differences in price response during the early part of the sample period compared to the latter part. Fifth, the different test statistics generally yielded very similar results.

The following observations can be made about the tests of volatility reaction. First, for the group of monthly reports containing only outlook information, implied volatility for both corn and soybeans was lower on the report session than on the previous session about 60 percent of the time. Second, for that group of reports containing only outlook information, the difference in mean implied volatility on the report session and the previous session for both corn and soybeans was significantly different from zero. The average magnitude of the drop was between about two- and three-tenths of a percentage point (of annualized implied volatility), which would appear to be an economically non-trivial decrease. Third, the outlook only difference in corn was largest for the May report, where implied volatility dropped an average of just under one percentage point. Fourth, the outlook only difference in soybeans was largest for the July report, where implied volatility dropped an average of just over five-tenths of a percentage point.

Overall, the results of this study suggest that USDA outlook information has a significant impact in corn and soybean markets. The most notable impact is found in options markets, where implied volatility consistently declines after the release of WASDE reports. Hence, it can be concluded that USDA outlook information reduces the uncertainty of market participants' expectation of the future distribution of prices. This reduction in market uncertainty is unambiguously welfare-enhancing. Quantifying the economic value of this reduction in market uncertainty represents an interesting area for further research.

References

Allen, P.G. "Economic Forecasting in Agriculture." *International Journal of Forecasting* 10(1994):81-135.

Anderson, D.R., D.J. Sweeney and T.A. Williams. *Statistics for Business and Economics, Sixth Edition*. West Publishing Company: Minneapolis/St. Paul, 1996.

Antonovitz, F. and T. Roe. "The Value of Rational Expectations Forecast in a Risky Market: A Theoretical and Empirical Approach." *American Journal of Agricultural Economics* 66(1984):717-723.

Baur, R.F. and P.F. Orazem. "The Rationality and Price Effects of USDA Forecasts of Oranges." *Journal of Finance* 49(1994):681-696.

Beckers, S. "Standard Deviations Implied in Option Prices as Predictors of Future Stock Price Variability." *Journal of Banking and Finance* 5(1981):363-382.

Black, F. "The Pricing of Commodity Contracts." *Journal of Financial Economics* 3(1976):167-179.

Bradford, D.F. and H.H. Kelejian. "The Value of Information for Crop Forecasting with Bayesian Speculators: Theory and Empirical Results." *Bell Journal of Economics* 9(1978):123-144.

Campbell, J. Y., Lo, A. W., and MacKinlay, A. C. *The Econometrics of Financial Markets*. Princeton University Press, 1997.

Colling, P.L. "Do Japanese Corn and Soybean Futures Markets Respond to the USDA Crop Production Report?" ." *Proceedings of the 1993 NCR-134 Applied Commodity Price Analysis, Forecasting, and Market Risk Management Conference*. Department of Economics, Iowa State University, pp. 211-225.

Colling, P.L. and S.H. Irwin. "The Reaction of Live Hog Futures Prices to USDA *Hogs and Pigs Reports*." *American Journal of Agricultural Economics* 71(1990):84-94.

Fortenbery, T. R. and D.A. Sumner. "The Effects of USDA Reports in Futures and Options Markets." *Journal of Futures Markets* 13(1993):157-173.

Freebairn, J.W. "The Value and Distribution of the Benefits of Commodity Price Outlook Information." *Economic Record* 52(1976):199-212.

Freebairn, J.W. "An Evaluation of Outlook Information for Australian Agricultural Commodities." *Review of Marketing and Agricultural Economics* 46(1978):294-314.

Garcia, P., S.H. Irwin, R.M. Leuthold, and L. Yang. "The Value of Public Information in Commodity Futures Markets." *Journal of Economic Behavior and Organization* 32(1997):559-570.

Grunewald, O., M.S. McNulty, and A.W. Biere. "Live Cattle Futures Response to Cattle on Feed Reports." *American Journal of Agricultural Economics* 75(1993): 131-137.

Hayami, Y. and W. Peterson. "Social Returns to Public Information Services: Statistical Reporting of U.S. Farm Commodities." *American Economic Review* 62(1972):119-130.

Jorion, P. "Predicting Volatility in the Foreign Exchange Market." *The Journal of Finance* 50(1995):507-528.

Just, R.E. "The Impact of Less Data on the Agricultural Economy and Society." *American Journal of Agricultural Economics* 65(1983):872-881.

Mayhew, S. "Implied Volatility." *Financial Analysts Journal* 54(1995):8-19.

McNew, K.P. and J.A. Espinosa. "The Informational Content of USDA *Crop Reports*: Impacts on Uncertainty and Expectations in Grain Futures Markets." *Journal of Futures Markets* 14(1994):475-492.

Shastri, K. and K. Tandon. "On the Use of European Models to Price American Options on Foreign Currency." *Journal of Futures Markets* 6(1986):93-108.

Sumner, D.A., and R.A.E. Mueller. "Are Harvest Forecast News? USDA Announcements and Futures Market Reactions." *American Journal of Agricultural Economics* 71(1989):1-8.

Vogel, F.A. and G.A. Bange. "Understanding USDA Crop Forecasts." Miscellaneous Publication No. 1554, US Department of Agriculture, National Agricultural Statistics Service and Office of the Chief Economist, World Agricultural Outlook Board, March 1999.

Whaley, R. "Valuation of American Futures Options: Theory and Empirical Tests." *Journal of Finance* 41(1986):127-150.

Working, H. "Theory of Inverse Carrying Charge in Futures Markets." *Journal of Farm Economics* 30(1948):1-28.

Endnotes

[1] The monthly WASDE reports provide a commodity-by-commodity and country-by-country (selected countries) marketing year balance sheet of supply, consumption, and stocks. For the US corn and soybean crops (and other domestic crops) the balance sheet contains a projection of marketing year average farm price—typically projected in a range. From May through July prior to harvest, the projection of domestic production is based on National Agricultural Statistics Service (NASS) estimates of planted acreage and expert judgment about potential average yield. Trend yield analysis, weather patterns, and weekly crop condition reports provide input for the average yield projection. From August forward, NASS production estimates are used in the balance sheet. Consumption forecasts are based on a wide array of information sources and analytical techniques. Foreign production estimates, which impact export prospects, rely on weather analysis, agricultural attaché reports, satellite imagery, and other public and private information sources. Specific projections of consumption by category are based on historical patterns of consumption, formal demand models, and expert judgment. The price projection reflects a simultaneous consideration of supply, consumption, and stocks. See Vogel and Bange (1999) for a detailed description of the WASDE estimation process.

[2] Of course, the impact of unanticipated information in the WASDE Report could just as easily cause price to decline. The choice of a bullish scenario for presentation was arbitrary.

[3] There is not an obvious reason for the inattention paid to the outlook component of public programs. In fact, it is not unreasonable to argue that economists ought to be at least as interested in the value of outlook, because it is the primary outlet for economic analysis in public programs.

[4] It appears that Fortenbery and Sumner included some announcement months in their "pure" outlook group that actually should have been placed in the "mixed" group. This is most obvious for January announcements, when "final" NASS estimates of corn and soybean production typically are released. It turns out there are other possible mis-classifications due to the changing schedule of NASS releases during the 1985-1989 period. These will be discussed in detail in the next section.

[5] An interesting discussion of the background for the change in release times can be found in Colling, Heifner and Plato (1993).

[6] The time index is specified for "trading sessions" instead of the more conventional "trading days" because of a change in WASDE release times during the sample. Between January 1985 and April 1994, WASDE reports were released at 3:00 pm EST, after the close of trading on the release date. If "day 0" is defined as the release date in this case, an inconsistency would be created because the impact of the WASDE release would be reflected in "day +1" returns, as report returns are computed using the opening futures price the day after release. Between May 1994 and December 1998, WASDE reports were released at 8:30 am EST, before the start of trading on the release date. If "day 0" is defined as the release date in this case, no inconsistency would be created as the impact of the WASDE release would be reflected in "day 0" returns, as report returns are computed using the opening futures price the day of release. To avoid the inconsistency created for WASDE releases before May 1994, the time index is specified using trading sessions, with session 0 the first session after the release of a WASDE report. This definition is not affected by the changing release time of WASDE reports.

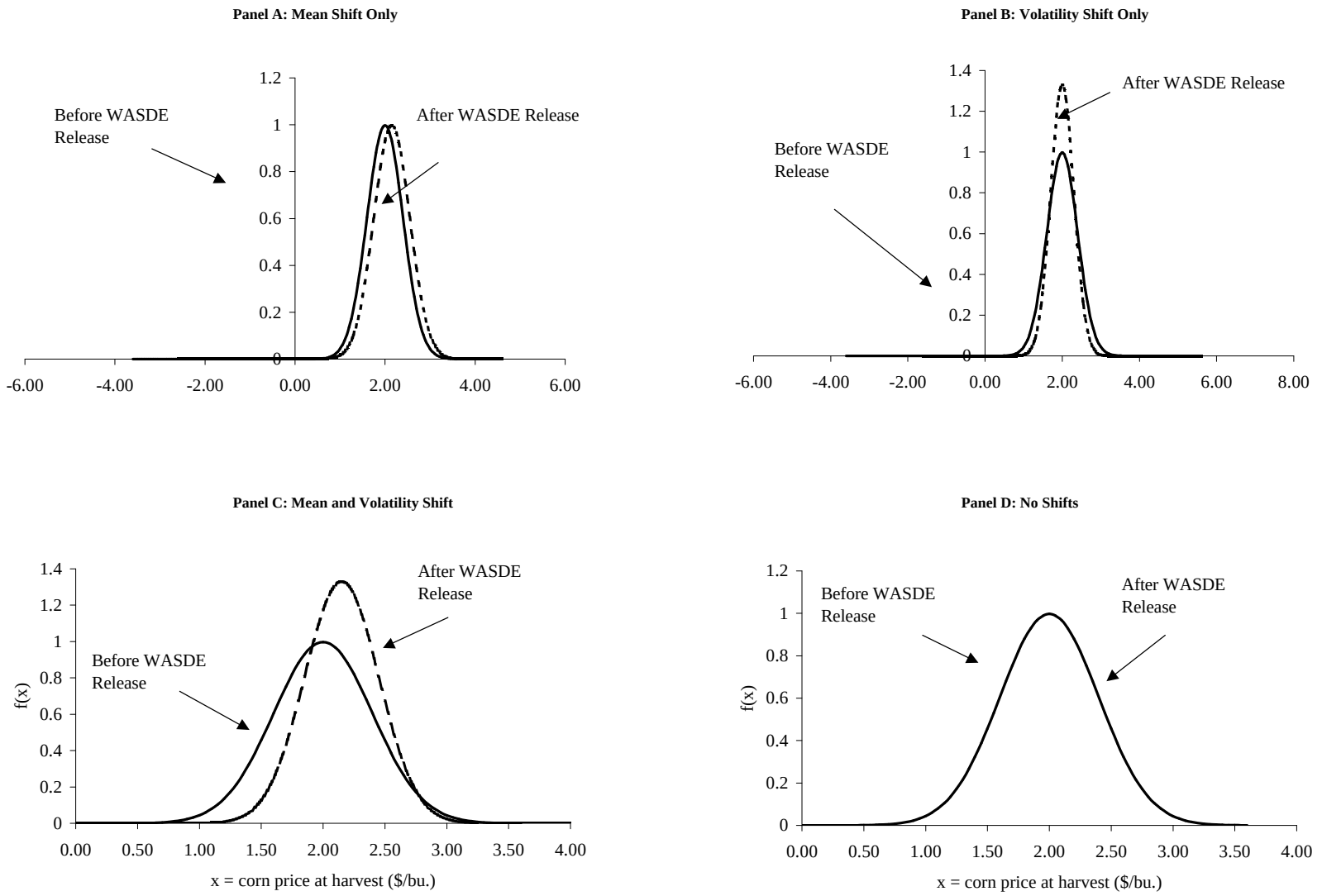

Figure 1. Hypothetical Examples of the Expected Distribution of the Harvest-Time Price of New Crop Corn Futures Prices Before and After Release of WASDE Reports, Expectation Formed at Planting Time

Table 1. Futures and Options Contracts Used in Market Impact Tests

Month of WASDE Release	Corn Futures Contract	Soybean Futures Contract	Corn Options Contract	Soybean Options Contract
January	March	March	March	March
February	March	May	May	May
March	May	May	May	May
April	May	May	July	July
May	July	July	July	July
June	July	July	September	August
July	September	August	September	September
August	September	September	December	November
September	December	November	December	November
October	December	November	December	January
November	December	January	March	January
December	March	January	March	March

Note: All contracts refer to Chicago Board of Trade futures or options contracts.

Table 2. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Open Returns, January 1985-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	0.51	0.53	0.95	0.03	0.46	0.03	0.49	-1.05	
WASDE and NASS	3.22	0.52	6.15 **	0.84	10.27 **	0.84	5.55 **	-6.66	**
Pre-harvest WASDE	0.93	1.14	0.81	-0.05	-0.33	-0.05	-0.37	-0.13	
Post-harvest WASDE	0.24	0.13	1.84 **	0.08	2.14 **	0.08	1.66	-1.48	
January	3.97	0.18	21.85 **	1.19	8.05 **	1.19	3.02 **	-3.45	**
February	0.21	0.05	4.28 **	0.17	3.73 **	0.17	2.21 **	-2.44	**
March	0.13	0.12	1.14	0.02	0.35	0.02	0.26	-0.31	
April	0.48	0.23	2.06 **	0.18	1.58	0.18	1.23	-1.91	*
May	0.21	0.46	0.45	-0.07	-0.48	-0.07	-0.85	-0.35	
June	1.26	1.36	0.93	-0.02	-0.08	-0.02	-0.08	-0.48	
July	1.73	2.10	0.82	-0.03	-0.11	-0.03	-0.12	-0.09	
August	5.32	0.73	7.32 **	1.25	5.81 **	1.25	3.03 **	-3.54	**
September	1.65	0.32	5.17 **	0.41	3.17 **	0.41	1.41	-1.15	
October	2.89	0.34	8.49 **	0.89	5.78 **	0.89	2.77 **	-3.60	**
November	2.53	0.32	7.86 **	0.72	4.50 **	0.72	2.25 **	-3.38	**
December	0.11	0.11	1.01	-0.03	-0.44	-0.03	-0.40	-0.87	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 3. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Open Price Changes, January 1985-December 1989

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	0.49	0.60	0.82	0.01	0.10	0.01	0.11	-0.91	
NASS and WASDE	2.22	0.65	3.40 **	0.52	3.85 **	0.52	2.50 **	-3.35	**
Pre-harvest WASDE	1.32	1.49	0.88	0.01	0.03	0.01	0.03	-0.71	
Post-harvest WASDE	0.10	0.13	0.72	0.01	0.23	0.01	0.29	-0.54	
January	3.95	0.23	17.34 **	0.95	3.75 **	0.95	1.42	-1.73	*
February	0.10	0.06	1.73	0.02	0.23	0.02	0.16	-0.03	
March	0.02	0.11	0.22	-0.15	-1.39	-0.15	-2.42 **	-1.93	*
April	0.24	0.27	0.87	0.11	0.53	0.11	0.88	-1.29	
May	0.14	0.55	0.25	-0.13	-0.49	-0.13	-1.01	-0.07	
June	2.65	2.37	1.12	0.15	0.24	0.15	0.25	-0.85	
July	1.85	2.61	0.71	0.02	0.04	0.02	0.04	-0.03	
August	7.11	0.45	15.87 **	1.60	5.65 **	1.60	2.25 *	-2.84	**
September	0.36	0.17	2.12 *	0.10	0.84	0.10	0.66	-0.61	
October	0.42	0.32	1.29	0.15	0.76	0.15	1.10	-1.51	
November	0.40	0.15	2.67 **	0.22	1.97 *	0.22	2.12 *	-2.02	**
December	0.09	0.07	1.29	0.13	1.46	0.13	1.23	-1.27	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 4. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Open Returns, January 1990-December 1998

	F -test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t* -test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F* -statistic	Difference in Means	*t* -statistic	Difference in Means	*t* -statistic	*Z* -statistic	
WASDE	0.53	0.51	1.04	0.04	0.51	0.04	0.52	-0.67	
NASS and WASDE	3.93	0.44	8.97 **	1.05	10.36 **	1.05	5.05 **	-5.70	**
Pre-harvest WASDE	0.83	1.01	0.82	-0.07	-0.46	-0.07	-0.50	-0.53	
Post-harvest WASDE	0.31	0.13	2.49 **	0.12	2.51 **	0.12	1.68	-1.43	
January	3.22	0.16	20.36 **	1.32	7.26 **	1.32	2.59 **	-3.10	**
February	0.29	0.04	6.54 **	0.26	4.78 **	0.26	2.62 **	-3.12	**
March	0.16	0.12	1.32	0.12	1.34	0.12	0.92	-0.91	
April	0.61	0.21	2.88 **	0.22	1.61	0.22	1.00	-1.32	
May	0.27	0.42	0.63	-0.03	-0.19	-0.03	-0.30	-0.51	
June	0.72	0.78	0.92	-0.12	-0.48	-0.12	-0.42	-1.36	
July	1.52	1.84	0.83	-0.06	-0.18	-0.06	-0.21	-0.10	
August	5.06	0.88	5.75 **	1.06	3.58 **	1.06	2.00 *	-2.33	**
September	2.29	0.40	5.70 **	0.59	3.14 **	0.59	1.34	-1.00	
October	4.30	0.35	12.26 **	1.30	6.44 **	1.30	2.93 **	-3.32	**
November	3.88	0.42	9.33 **	1.00	4.21 **	1.00	2.09 *	-2.60	**
December	0.07	0.13	0.53	-0.12	-1.51	-0.12	-1.54	-2.08	**

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 5. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Close Returns, January 1985-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	1.08	1.50	0.72	-0.05	-0.58	-0.05	-0.72	-0.37	
NASS and WASDE	3.44	1.49	2.31 **	0.47	4.47 **	0.47	3.20 **	-2.72 **	
Pre-harvest WASDE	1.68	2.54	0.66	-0.13	-0.69	-0.13	-0.90	-0.10	
Post-harvest WASDE	0.70	0.81	0.86	0.00	-0.05	0.00	-0.06	-0.44	
January	4.51	0.84	5.35 **	0.95	4.79 **	0.95	2.66 **	-3.01 **	
February	0.91	0.82	1.11	0.14	0.81	0.14	0.99	-1.70 *	
March	0.80	0.83	0.97	0.08	0.45	0.08	0.50	-0.69	
April	0.35	1.06	0.33	-0.38	-2.11 **	-0.38	-3.07 **	-2.26 **	
May	1.56	1.53	1.02	0.14	0.58	0.14	0.56	-0.67	
June	1.20	2.78	0.43	-0.31	-0.96	-0.31	-1.74 *	-0.20	
July	2.28	3.94	0.58	-0.52	-1.40	-0.52	-1.65	-1.66 *	
August	5.42	1.83	2.96 **	0.58	2.15 **	0.58	1.28	-0.41	
September	2.82	1.28	2.21 **	0.46	2.21 **	0.46	1.35	-0.75	
October	1.61	1.27	1.26	0.18	0.87	0.18	0.92	-1.07	
November	3.40	0.84	4.04 **	0.73	3.98 **	0.73	2.38 **	-2.91 **	
December	0.82	0.56	1.45	0.11	0.87	0.11	0.77	-0.64	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 6. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Close Returns, January 1985-December 1989

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions
				Equal Variance		Unequal Variance		
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic
WASDE	2.25	1.94	1.16	0.03	0.16	0.03	0.19	-0.99
NASS and WASDE	1.09	1.46	0.74	-0.04	-0.19	-0.04	-0.17	-1.10
Pre-harvest WASDE	2.20	2.83	0.78	0.06	0.14	0.06	0.19	-0.95
Post-harvest WASDE	0.60	0.73	0.82	0.01	0.08	0.01	0.09	-0.53
January	3.38	1.09	3.12 **	0.52	1.35	0.52	0.84	-0.91
February	0.18	0.99	0.18	-0.33	-1.08	-0.33	-2.54 **	-0.91
March	0.39	0.56	0.70	0.20	0.85	0.20	0.69	-0.78
April	0.39	0.75	0.51	-0.20	-0.75	-0.20	-1.06	-0.57
May	2.37	1.70	1.40	0.56	1.17	0.56	1.00	-1.32
June	1.74	3.87	0.45	-0.44	-0.66	-0.44	-1.30	-0.09
July	1.74	4.63	0.38	-0.98	-1.37	-0.98	-1.55	-2.06 **
August	6.84	2.03	3.37 **	0.49	1.03	0.49	0.57	-0.28
September	1.24	1.27	0.98	-0.19	-0.59	-0.19	-0.44	-1.00
October	0.21	1.26	0.17	-0.31	-1.01	-0.31	-2.35 **	-0.92
November	1.44	0.77	1.86	0.33	1.26	0.33	1.63	-1.68 *
December	1.27	0.58	2.19 *	0.29	1.28	0.29	1.07	-1.08

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 7. Mean Price Reaction Tests Results for WASDE Reports, Corn, Close-to-Close Returns, January 1990-December 1998

	F -test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t* -test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F* -statistic	Difference in Means	*t* -statistic	Difference in Means	*t* -statistic	*Z* -statistic	
WASDE	1.05	1.50	0.70	-0.09	-0.83	-0.09	-1.05	-0.18	
NASS and WASDE	4.23	1.18	3.60 **	0.81	6.72 **	0.81	4.23 **	-4.52	**
Pre-harvest WASDE	1.50	2.35	0.64	-0.20	-0.99	-0.20	-1.27	-0.54	
Post-harvest WASDE	0.74	0.86	0.86	-0.01	-0.12	-0.01	-0.14	-0.20	
January	4.91	0.72	6.82 **	1.19	5.33 **	1.19	2.66 **	-3.11	**
February	1.33	0.72	1.85 *	0.41	1.87 *	0.41	2.16 *	-2.57	**
March	0.87	0.97	0.90	0.01	0.05	0.01	0.06	-0.28	
April	0.35	1.23	0.29	-0.48	-2.03 **	-0.48	-2.87 **	-2.29	
May	1.08	1.44	0.75	-0.09	-0.37	-0.09	-0.42	-0.28	
June	1.07	2.04	0.53	-0.23	-0.72	-0.23	-1.14	-0.29	
July	2.63	3.51	0.75	-0.26	-0.63	-0.26	-0.74	-0.46	
August	5.19	1.71	3.03 **	0.62	1.92 *	0.62	1.12	-0.74	**
September	3.84	1.29	2.98 **	0.82	3.12 **	0.82	1.87 *	-1.76	
October	2.21	1.27	1.74 *	0.45	1.68 *	0.45	1.75	-2.01	**
November	4.64	0.88	5.25 **	0.96	3.91 **	0.96	2.10 *	-2.47	**
December	0.67	0.56	1.20	0.02	0.10	0.02	0.09	-0.11	**

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 8. Mean Price Reaction Tests Results for WASDE Reports, Soybeans, Close-to-Open Returns, January 1985-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	0.40	0.40	1.00	0.09	1.57	0.09	1.80 *	-2.86	**
NASS and WASDE	3.18	0.52	6.14 **	0.84	10.07 **	0.84	5.61 **	-7.14	**
Pre-harvest WASDE	0.64	0.83	0.77	0.04	0.33	0.04	0.44	-1.60	
Post-harvest WASDE	0.25	0.12	2.09 **	0.12	3.28 **	0.12	2.47 **	-2.45	**
January	2.40	0.17	14.23 **	0.76	6.35 **	0.76	2.50 **	-2.95	**
February	0.13	0.08	1.79 **	0.02	0.42	0.02	0.31	-0.41	
March	0.25	0.10	2.60 **	0.13	1.88 *	0.13	1.09	-1.14	
April	0.34	0.12	2.82 **	0.26	3.70 **	0.26	3.14 **	-3.45	**
May	0.37	0.33	1.13	0.13	1.10	0.13	1.35	-1.86	*
June	0.44	0.76	0.57	-0.11	-0.60	-0.11	-0.81	-0.42	
July	1.81	1.99	0.91	0.17	0.57	0.17	0.71	-1.86	*
August	4.51	1.07	4.21 **	1.08	4.19 **	1.08	3.03 **	-3.36	**
September	1.09	0.30	3.59 **	0.52	4.48 **	0.52	2.72 **	-3.07	**
October	6.29	0.18	34.00 **	1.38	8.19 **	1.38	2.85 **	-3.60	**
November	2.41	0.18	13.75 **	0.71	5.52 **	0.71	2.25 **	-3.15	**
December	0.13	0.15	0.90	0.01	0.10	0.01	0.11	-0.36	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 9. Mean Price Reaction Tests Results, Soybeans for WASDE Reports, Close-to-Open Returns, January 1985-December 1989

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	0.34	0.38	0.89	0.08	0.89	0.08	1.11	-1.94	*
NASS and WASDE	2.02	0.62	3.28 **	0.49	3.64 **	0.49	2.40 **	-2.71	**
Pre-harvest WASDE	0.76	0.87	0.88	0.14	0.56	0.14	0.82	-1.81	*
Post-harvest WASDE	0.15	0.13	1.14	0.06	0.96	0.06	0.93	-1.10	
January	2.46	0.17	14.41 **	0.80	4.58 **	0.80	1.85	-2.14	**
February	0.03	0.11	0.31	-0.09	-0.80	-0.09	-1.28	-0.70	
March	0.14	0.06	2.12 *	0.07	0.74	0.07	0.56	-0.76	
April	0.24	0.11	2.12 *	0.15	1.38	0.15	1.40	-1.68	*
May	0.76	0.56	1.36	0.29	1.05	0.29	1.58	-2.28	**
June	0.91	1.10	0.83	-0.02	-0.04	-0.02	-0.06	-0.44	
July	2.71	2.47	1.10	0.24	0.40	0.24	0.42	-1.41	
August	7.64	0.52	14.67 **	1.68	5.24 **	1.68	2.25 *	-2.11	**
September	0.65	0.16	4.03 **	0.26	2.05 **	0.26	1.18	-1.32	
October	0.49	0.24	2.06	0.16	0.98	0.16	0.74	-0.72	
November	0.08	0.18	0.46	-0.05	-0.36	-0.05	-0.56	-0.06	
December	0.01	0.15	0.07	-0.03	-0.26	-0.03	-0.55	-0.21	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 10. Mean Price Reaction Tests Results for WASDE Reports, Soybeans, Close-to-Open Returns, January 1990-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	0.43	0.41	1.05	0.09	1.29	0.09	1.42	-2.13	**
NASS and WASDE	3.99	0.45	8.82 **	1.07	10.25 **	1.07	5.24 **	-6.99	**
Pre-harvest WASDE	0.62	0.81	0.77	0.00	0.02	0.00	0.03	-0.76	
Post-harvest WASDE	0.30	0.11	2.73 **	0.15	3.39 **	0.15	2.29 **	-2.15	**
January	2.52	0.17	14.89 **	0.74	4.62 **	0.74	1.73	-2.02	**
February	0.19	0.06	3.40 **	0.08	1.38	0.08	0.74	-0.09	
March	0.32	0.11	2.80 **	0.17	1.74 *	0.17	0.94	-0.91	
April	0.42	0.12	3.48 **	0.32	3.53 **	0.32	2.85 **	-3.00	**
May	0.22	0.21	1.09	0.05	0.42	0.05	0.46	-0.58	
June	0.25	0.55	0.46	-0.17	-0.89	-0.17	-1.22	-0.80	
July	1.49	1.68	0.89	0.13	0.40	0.13	0.58	-1.34	
August	3.16	1.36	2.32 **	0.74	2.09 **	0.74	2.03 *	-2.59	**
September	1.16	0.38	3.05 **	0.66	4.10 **	0.66	2.58 **	-2.88	**
October	9.97	0.16	63.35 **	2.06	9.47 **	2.06	3.14 **	-3.85	**
November	3.82	0.18	21.81 **	1.13	6.74 **	1.13	2.62 **	-4.01	**
December	0.18	0.15	1.23	0.03	0.30	0.03	0.30	-0.33	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 11. Mean Price Reaction Tests Results for WASDE Reports, Soybeans, Close-to-Close Returns, January 1985-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
				Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	1.03	1.35	0.77	-0.05	-0.58	-0.05	-0.69	-0.06	
NASS and WASDE	3.76	1.47	2.55 **	0.56	5.18 **	0.56	3.66 **	-3.35	**
Pre-harvest WASDE	1.38	2.14	0.64	-0.15	-0.89	-0.15	-1.17	-0.27	
Post-harvest WASDE	0.82	0.83	0.99	0.01	0.18	0.01	0.18	-0.23	
January	3.53	0.87	4.06 **	0.55	2.82 **	0.55	1.50	-0.95	
February	1.24	0.73	1.70 *	0.17	1.10	0.17	0.88	-0.74	
March	0.14	0.98	0.14	-0.15	-0.83	-0.15	-1.48	-0.15	
April	1.02	0.84	1.21	-0.01	-0.08	-0.01	-0.07	-0.41	
May	1.72	1.34	1.29	0.35	1.57	0.35	1.47	-1.63	
June	0.82	2.28	0.36	-0.47	-1.72 *	-0.47	-2.74 **	-1.59	
July	1.74	3.94	0.44	-0.43	-1.22	-0.43	-1.54	-1.16	
August	3.79	1.92	1.98 **	0.51	1.88 *	0.51	1.62	-1.74	*
September	1.71	1.30	1.32	0.10	0.50	0.10	0.42	-0.15	
October	6.48	0.87	7.43 **	1.13	5.21 **	1.13	2.46 **	-2.14	**
November	4.43	1.10	4.02 **	0.85	4.10 **	0.85	2.54 **	-2.84	**
December	0.74	0.69	1.08	0.06	0.44	0.06	0.45	-0.50	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 12. Mean Price Reaction Tests Results, Soybeans for WASDE Reports, Close-to-Close Returns, January 1985-December 1989

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions			Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions
				Equal Variance		Unequal Variance		
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic	Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic
WASDE	0.93	1.37	0.68	-0.07	-0.47	-0.07	-0.59	-0.08
NASS and WASDE	2.73	1.86	1.47 *	0.22	1.16	0.22	1.02	-0.64
Pre-harvest WASDE	1.24	2.50	0.50	-0.33	-0.95	-0.33	-1.43	-0.72
Post-harvest WASDE	0.79	0.80	0.98	0.06	0.45	0.06	0.43	-0.56
January	4.97	1.00	4.96 **	0.86	2.55 **	0.86	1.20	-0.85
February	1.30	1.03	1.25	0.07	0.24	0.07	0.17	-0.09
March	0.07	0.67	0.10	0.04	0.15	0.04	0.26	-0.73
April	0.50	0.53	0.94	-0.02	-0.10	-0.02	-0.10	-0.04
May	1.84	2.03	0.90	0.20	0.42	0.20	0.56	-0.91
June	0.28	2.93	0.10	-0.86	-1.66	-0.86	-3.50 **	-1.87 *
July	2.77	5.33	0.52	-0.47	-0.66	-0.47	-0.66	-0.85
August	2.86	2.00	1.43	0.05	0.12	0.05	0.10	-0.10
September	1.17	1.14	1.03	0.00	-0.01	0.00	-0.01	-0.03
October	2.61	0.92	2.84 **	0.39	1.20	0.39	0.82	-0.67
November	2.91	1.08	2.69 **	0.45	1.20	0.45	0.80	-0.81
December	0.60	0.78	0.77	0.19	0.75	0.19	1.02	-1.29

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 13. Mean Price Reaction Tests Results for WASDE Reports, Soybeans, Close-to-Close Returns, January 1990-December 1998

	F-test of Difference in Return Variance on Report Sessions and Pre/Post Report Sessions				Paired *t*-test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions				Mann-Whitney Non-Parametric Test of Difference in Mean Absolute Return for Report Sessions and Pre/Post Report Sessions	
					Equal Variance		Unequal Variance			
Report Group	Variance Report Sessions	Variance Pre/Post Report Sessions	*F*-statistic		Difference in Means	*t*-statistic	Difference in Means	*t*-statistic	*Z*-statistic	
WASDE	1.09	1.33	0.82		-0.04	-0.38	-0.04	-0.44	-0.02	
NASS and WASDE	4.52	1.20	3.76	**	0.78	6.20 **	0.78	3.76 **	-3.88	**
Pre-harvest WASDE	1.47	1.98	0.74		-0.08	-0.42	-0.08	-0.52	-0.06	
Post-harvest WASDE	0.83	0.84	0.98		-0.01	-0.10	-0.01	-0.10	-0.15	
January	2.80	0.81	3.48	**	0.38	1.60	0.38	0.89	-0.72	
February	1.06	0.57	1.88	*	0.23	1.29	0.23	1.05	-1.23	
March	0.17	1.15	0.14		-0.26	-1.03	-0.26	-1.85 *	-0.65	
April	1.34	1.02	1.32		-0.01	-0.04	-0.01	-0.03	-0.57	
May	1.86	0.96	1.94	*	0.43	1.91 *	0.43	1.32	-1.10	
June	1.07	1.88	0.57		-0.25	-0.81	-0.25	-1.10	-0.54	
July	1.16	3.14	0.37		-0.41	-1.08	-0.41	-1.89 *	-0.63	
August	4.72	1.88	2.50	**	0.77	2.20 **	0.77	1.91 *	-2.28	**
September	2.00	1.40	1.43		0.16	0.60	0.16	0.45	-0.22	
October	9.20	0.83	11.04	**	1.53	5.57 **	1.53	2.40 **	-2.12	**
November	5.35	1.11	4.83	**	1.07	4.39 **	1.07	2.59 **	-3.10	**
December	0.75	0.64	1.18		-0.01	-0.03	-0.01	-0.03	-0.24	

Note: Returns are computed as the difference in the natural logarithm of prices times 100. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 14. Volatility Reaction Tests Results for WASDE Reports, Corn, March 1985-December 1998

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.57	92	1.25		-0.30	-2.49	**	-2.38	**
NASS and WASDE	0.77	74	4.65	**	-0.87	-3.64	**	-4.10	**
Pre-harvest WASDE	0.65	37	1.81	*	-0.57	-2.44	**	-2.49	**
Post-harvest WASDE	0.51	55	0.13		-0.12	-0.97		-0.76	
January	0.62	13	0.83		-0.18	-0.26		-0.31	
February	0.69	13	1.39		-0.25	-0.68		-0.87	
March	0.50	14	0.00		-0.17	-0.75		-0.53	
April	0.50	14	0.00		0.07	0.42		-0.47	
May	0.79	14	2.14	**	-0.98	-2.52	**	-2.20	**
June	0.57	14	0.53		-0.30	-1.28		-1.10	
July	0.64	14	1.07		-0.32	-0.53		-0.72	
August	0.71	14	1.60		-0.75	-1.03		-1.22	
September	0.86	14	2.67	**	-1.57	-3.84	**	-2.79	**
October	0.86	14	2.67	**	-1.36	-4.12	**	-2.79	**
November	0.79	14	2.14	**	-0.67	-1.48		-1.85	*
December	0.36	14	-1.07		-0.16	-0.80		-0.24	

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 15. Volatility Reaction Tests Results for WASDE Reports, Corn, March 1985-December 1989

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.52	29	0.19		-0.15	-0.77		-0.41	
NASS and WASDE	0.69	29	2.04	**	-0.62	-1.51		-2.11	**
Pre-harvest WASDE	0.70	10	1.26		-0.65	-1.48		-1.48	
Post-harvest WASDE	0.42	19	-0.69		0.12	0.75		-0.72	
January	0.50	4	0.00		1.38	0.99		-0.73	
February	0.75	4	1.00		-0.23	-0.61		-0.73	
March	0.40	5	-0.45		0.21	0.53		-0.67	
April	0.40	5	-0.45		0.11	0.32		-0.40	
May	1.00	5	2.24	**	-1.30	-1.82		-2.02	**
June	0.40	5	-0.45		-0.01	-0.03		-0.40	
July	0.80	5	1.34		-0.24	-0.18		-0.67	
August	0.60	5	0.45		-1.19	-0.89		-0.67	
September	0.60	5	0.45		-1.31	-1.50		-1.21	
October	0.80	5	1.34		-1.36	-3.59	**	-1.75	*
November	0.80	5	1.34		-0.55	-1.85		-1.48	
December	0.20	5	-1.34		0.24	1.05		-1.10	

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 16. Volatility Reaction Tests Results for WASDE Reports, Corn, January 1990-December 1998

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.59	63	1.39		-0.37	-2.43	**	-2.41	**
NASS and WASDE	0.82	45	4.32	**	-1.04	-3.53	**	-3.54	**
Pre-harvest WASDE	0.63	27	1.35		-0.54	-1.93	*	-1.97	*
Post-harvest WASDE	0.56	36	0.67		-0.24	-1.47		-1.30	
January	0.67	9	1.00		-0.87	-1.24		-0.89	
February	0.67	9	1.00		-0.26	-0.50		-0.65	
March	0.56	9	0.33		-0.38	-1.46		-1.13	
April	0.56	9	0.33		0.06	0.25		-0.41	
May	0.67	9	1.00		-0.80	-1.67		-1.48	
June	0.67	9	1.00		-0.46	-1.57		-1.24	
July	0.56	9	0.33		-0.36	-0.55		-0.53	
August	0.78	9	1.67	*	-0.51	-0.56		-1.01	
September	1.00	9	3.00	**	-1.71	-3.79	**	-2.67	**
October	0.89	9	2.33	**	-1.37	-2.81	**	-2.19	**
November	0.78	9	1.67	*	-0.73	-1.05		-1.24	
December	0.44	9	-0.33		-0.38	-1.48		-0.77	

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 17. Volatility Reaction Tests Results for WASDE Reports, Soybeans, January 1985-December 1998

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.60	93	1.97	**	-0.24	-1.86	*	-1.88	*
NASS and WASDE	0.81	75	5.43	**	-1.31	-5.49	**	-5.76	**
Pre-harvest WASDE	0.54	37	0.49		-0.26	-0.90		-0.66	
Post-harvest WASDE	0.64	56	2.14	**	-0.22	-2.46	**	-2.17	**
January	0.71	14	1.60		-0.72	-1.61		-1.54	
February	0.64	14	1.07		-0.22	-1.00		-0.97	
March	0.57	14	0.53		-0.14	-0.93		-0.60	
April	0.57	14	0.53		-0.28	-1.33		-0.85	
May	0.50	14	0.00		-0.30	-0.67		-0.53	
June	0.43	14	-0.53		-0.07	-0.15		-0.31	
July	0.71	14	1.60		-0.54	-1.05		-1.10	
August	0.93	14	3.21	**	-2.36	-3.70	**	-3.23	**
September	1.00	14	3.74	**	-2.01	-5.04	**	-3.30	**
October	0.79	14	2.14	**	-0.70	-2.94	**	-2.35	**
November	0.71	14	1.60		-0.97	-1.19		-1.98	**
December	0.79	14	2.14	*	-0.29	-2.36	**	-2.42	**

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 18. Volatility Reaction Tests Results for WASDE Reports, Soybeans, January 1985-December 1989

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.53	30	0.36		-0.09	-0.36		-0.03	
NASS and WASDE	0.77	30	2.92	**	-1.02	-3.98	**	-3.50	**
Pre-harvest WASDE	0.30	10	-1.26		0.27	0.41		-1.17	
Post-harvest WASDE	0.65	20	1.34		-0.26	-1.55		-1.08	
January	0.80	5	1.34		-0.47	-1.16		-1.21	
February	1.00	5	2.24	**	-0.79	-2.79	**	-2.02	**
March	0.40	5	-0.45		0.13	0.68		-0.67	
April	0.40	5	-0.45		-0.13	-0.30		-0.40	
May	0.40	5	-0.45		-0.61	-0.56		-0.13	
June	0.20	5	-1.34		1.14	2.00		-1.75	*
July	0.60	5	0.45		-0.60	-0.82		-0.67	
August	0.80	5	1.34		-1.97	-2.21	*	-1.75	*
September	1.00	5	2.24	**	-1.40	-2.44	*	-2.02	**
October	0.80	5	1.34		-0.74	-1.84		-1.48	
November	0.60	5	0.45		-0.82	-1.11		-0.94	
December	0.80	5	1.34		-0.41	-1.29		-1.21	

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.

Table 19. Volatility Reaction Tests Results for WASDE Reports, Soybeans, January 1990-December 1998

	Z-test of Proportion of Sessions When Implied Volatility on Report Release Session is Lower Than Session Before Report Release				Paired *t*-test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release			Wilcoxon Non-Parametric Test of Difference in Mean Implied Volatility on Report Release Session and Session Before Report Release	
Report Group	Proportion of Sessions	*T*	*Z*-statistic		Difference in Means	*t*-statistic		*Z*-statistic	
WASDE	0.63	63	2.14	**	-0.31	-2.06	**	-2.28	**
NASS and WASDE	0.84	45	4.62	**	-1.50	-4.19	**	-4.55	**
Pre-harvest WASDE	0.63	27	1.35		-0.46	-1.42		-1.37	
Post-harvest WASDE	0.64	36	1.67	*	-0.20	-1.89	*	-2.07	**
January	0.67	9	1.00		-0.85	-1.27		-1.13	
February	0.44	9	-0.33		0.10	0.40		-0.30	
March	0.67	9	1.00		-0.30	-1.46		-1.24	
April	0.67	9	1.00		-0.37	-1.49		-1.60	
May	0.56	9	0.33		-0.13	-0.31		-0.53	
June	0.56	9	0.33		-0.75	-1.34		-0.89	
July	0.78	9	1.67	*	-0.50	-0.71		-1.01	
August	1.00	9	3.00	**	-2.58	-2.90	**	-2.67	**
September	1.00	9	3.00	**	-2.35	-4.53	**	-2.67	**
October	0.78	9	1.67	*	-0.68	-2.16	*	-1.84	*
November	0.78	9	1.67	*	-1.05	-0.85		-1.48	
December	0.78	9	1.67	*	-0.22	-2.39	**	-2.31	**

Note: Implied volatility is computed as the annualized standard deviation of percentage price change. *T* indicates the number of observations. One star indicates significance at the ten-percent level. Two stars indicate significance at the five-percent level. The WASDE group represents "pure" outlook information and includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March through June and July (excluding 1985-1989). The NASS and WASDE group represents a "mix" of situation and outlook information and includes WASDE reports released in August through November, January (excluding 1985-1986) and February (1985-1986 only). The pre-harvest WASDE group includes WASDE reports released in May, June and July (excluding 1985-1989). The post-harvest WASDE group includes WASDE reports released in December, January (1985-1986 only), February (excluding 1985-1986), March and April.