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The value of public information in commodity futures markets

Philip Garcia[a], Scott H. Irwin[b,*], Raymond M. Leuthold[a], Li Yang[a]

[a] *University of Illinois at Urbana-Champaign, Urbana-Champaign IL, USA*
[b] *The Ohio State University, 322 Agricultural Administration Building, 2120 Fyffe Road, Columbus, OH 43210-1099, USA*

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Abstract

The informational value of U.S. Department of Agriculture (USDA) corn and soybean production forecasts is investigated for the period 1971–1992. Three tests of informational content are applied. Overall, the results suggest USDA corn and soybean forecasts provide valuable information to participants in commodity futures markets. This value does appear to have declined, especially since the mid-1980s.

JEL classification: G14; Q13; D80; D84

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1. Introduction

The public provision of commodity market information has a relatively long history in the United States, dating back more than a century (Allen, 1994). A steady stream of information on crop size, livestock inventories, grain exports, and a host of other statistics have been provided to commodity market participants. It is traditionally argued that such information is crucial to the efficient functioning of commodity futures markets (e.g. Hieronymus, 1971, pp.101–104). Consequently, it is not surprising that commodity information programs command substantial public resources. For example, the 1992 budget for the National Agricultural Statistics Service was $82.6 million (Christy, 1994),

* Corresponding author.

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which represented nearly 10% of all federal government expenditures for statistical agencies.

In recent years, the value of public commodity information programs has been challenged from several perspectives. First, private sector production and dissemination of commodity information has increased rapidly since the mid-1970s, and hence, it is argued that private information services can substitute for public programs (Just, 1983). Second, negative evidence regarding the value of public commodity information has been reported recently. For example, Fortenbery and Sumner (1993) find that corn and soybean futures prices do not react to the release of U.S. Department of Agriculture crop production forecasts after 1984. Third, budgetary pressures, particularly at the federal level, have forced a re-examination of the value of public information programs.

In this study, we provide new and extensive evidence on the economic value of public information in commodity futures markets. Specifically, the informational value of the U.S. Department of Agriculture (USDA) corn and soybean production forecasts is investigated. Several notable improvements are made relative to previous studies of USDA crop forecasts (e.g. Sumner and Mueller, 1989, French et al., 1989, Fortenbery and Sumner, 1993). Rather than concentrating on a single test of informational value, three tests are considered: (i) a relative forecast accuracy test, (ii) a price reaction test, and (iii) a willingness-to-pay test. Using a range of tests serves as a check on the robustness and consistency of results across different methodologies. In addition, USDA forecasts of corn and soybean production are compared directly to private forecasts. This should allow for more powerful tests of informational value. Finally, the sample period for the study extends through 1992, which provides sufficient observations to formally test whether the informational value of USDA crop forecasts has declined since the mid-1980s.

2. Forecast data

The data include USDA and private crop forecasts for corn and soybeans over the 1971–1992 period. Both USDA and private crop forecasts are made in August, September, October and November. Hence, there is a total of 88 observations for each crop.

The USDA collects crop information by survey, interview and observation as of the first of the month. The USDA releases its crop forecasts in the afternoon after the grain futures markets have closed on a given day during the second week of the month.[1] The final crop size number is released by the USDA in January of the following calender year, which is used to measure the actual crop size.

The private crop forecasts used in the analysis are prepared by Conrad Leslie and Sparks Companies, Inc. These forecasts are regarded as reliable and are widely-reported in the popular press. The two firms use different procedures and sources for estimating

[1] In 1994, the USDA began releasing crop forecasts before the opening of futures trading. Since this change occurred after the end of our sample, it does not affect the analysis.

crop size. Both firms typically release their forecasts publicly two or three days prior to the USDA announcement. This allows the market adequate time to incorporate this information and respond prior to the government report.

A simple average of the two forecasts is used to represent the market, or private, forecast of crop size.[2] An equal-weighting of private forecasts is justified on two counts. First, commodity forecasting studies report that more sophisticated weighting procedures generally do not outperform a simple average (e.g. Gerlow et al., 1993). Second, the correlation between the private forecasts is extremely high across all announcement months, ranging from 0.994 to 0.999, implying that composite forecasts will be insensitive to the selected weighting procedure.

Prior to directly testing for informational value, we examine tests of bias, efficiency, and measurement error for the USDA and private forecasts. The test results show that bias is minimal, forecasts' errors are uncorrelated, and little or no measurement error is detected in the forecasts.[3] Hence, USDA and private forecasts of corn and soybean production are reasonably accurate, given the available information at the time the forecasts are produced. Furthermore, as expected, the errors for both the USDA and private forecasts decline through the growing season. Errors are quite small by the time of November announcements. Finally, the results suggest that the private forecasts serve as good approximations to the true market expectations.

3. Relative forecast accuracy test

The first test of informational value was developed by Baur and Orazem (1994). They note that the social welfare value of a government supply forecast is proportional to the reduction in the market's supply forecast variance resulting from the introduction of the government forecast. Increased social welfare is predicated on improved efficiency as the government announcement moves the market price closer to the equilibrium price that would prevail if the final output were known with certainty.

To implement this test of relative forecast accuracy, a measure of the market's supply forecast variance prior to the announcement of the USDA crop report must first be estimated. This can be obtained from the following regression:

$$\mathrm{USDA}_{\mathrm{Final},t} = \alpha_0 + \alpha_1\,\mathrm{Market}_{i,t} + \nu_{i,t}, \tag{1}$$

where $\mathrm{USDA}_{\mathrm{Final},t}$ is the final production of corn or soybeans (million bushels) in crop year t ($t = 1971, \ldots, 1992$), $\mathrm{Market}_{i,t}$ is the private market forecast of final corn or soybean production announced in month i ($i =$ August, September, October and November) of crop year t, and $\nu_{i,t}$ is a standard, normal error term. Next, a measure of the market's supply forecast variance after the announcement of the USDA crop report is estimated. This can be obtained from the following 'full-information'

[2] There are occasional missing observations in the private forecast series (no series has more than three missing observations). Importantly, there is no case where both private forecasts are missing for a particular announcement. Hence, when an observation is missing for one private forecast, the other private forecast is substituted.

[3] These results are found in Garcia et al. (1994).

regression,

$$\mathrm{USDA}_{\mathrm{Final},t} = \alpha_0 + \alpha_1\,\mathrm{Market}_{i,t} + \alpha_2\,\mathrm{USDA}_{i,t} + \nu_{i,t}, \tag{2}$$

where $\mathrm{USDA}_{i,t}$ is the USDA forecast of final corn or soybean production announced in month i of crop year t. Note that the available information includes both the private market forecast and the announced USDA forecast.

The change in the adjusted R^2 between Eq. (2) and Eq. (1) provides a measure of the change in the market's supply forecast variance resulting from the USDA announcement. Specifically, define $\sigma_{i-1,t}$, $\sigma_{i,t}$, and σ_t, respectively, to be the variance of the market supply forecast before the USDA announcement, the variance of the market forecast after the announcement, and the actual supply variance. The difference in adjusted R^2 between the successive regressions is,

$$\overline{R}_{i,t} - \overline{R}_{i-1,t} = \frac{\sigma_{i-1,t} - \sigma_{i,t}}{\sigma_t}. \tag{3}$$

Hence, the difference in adjusted R^2 identifies the percentage reduction in the market's supply forecast variance related to the USDA announcement. The smaller the difference, the better the market's forecast of final production, and the less valuable is the USDA forecast in reducing the supply variance of the market.

Table 1 presents the results of the relative forecast accuracy test for corn and soybeans. The USDA's corn forecasts reduce forecast variance more than soybean forecasts, with the largest effect (about 2%) appearing in August. Note also that the reduction in the forecast variance in corn and soybeans for the latter three announcement months is negligible, as the change in adjusted R^2 is at most four-tenths of 1 percent. These findings suggest that the role of USDA forecasts in providing information is most important primarily in corn during the early stages of the production process. Otherwise, the test results suggest that the information in the USDA corn and soybean production reports is

Table 1
Relative forecast accuracy tests of the informational value of USDA corn and soybean production forecasts, 1971–1992

Commodity/announcement month	Adjusted R^2		Change
	Market Forecast Only	Market and USDA Forecasts	
Corn			
August	0.9041	0.9253	0.0212
September	0.9644	0.9674	0.0030
October	0.9804	0.9844	0.0040
November	0.9931	0.9954	0.0023
Soybeans			
August	0.9063	0.9037	−0.0026
September	0.9437	0.9527	0.0009
October	0.9678	0.9695	0.0017
November	0.9864	0.9879	0.0015

Note: The adjusted R^2 for Market Forecast Only is taken from Eq. (1) in the text while the adjusted R^2 for the Market Forecast and USDA Forecasts is taken from Eq. (2) in the text.

limited, with private market participants generating very close approximations of final production.[4]

An important issue is the changing informational value of USDA forecasts over time. To determine if time effects are present, August corn and soybean regressions are estimated using data before and after 1977.[5] The difference in the adjusted R^2s for the two sample periods suggest that a striking trend is present in the informational value of USDA forecasts. In the case of corn, the difference in adjusted R^2 is 0.1068 for the early sample period as compared to 0.0269 for the later sample period. In the case of soybeans, the difference in adjusted R^2 is 0.0471 for the early sample period whereas it is −0.0216 for the later sample period. These results suggests that the informational value of USDA forecasts is rather large during the early part of the sample (over 10% for corn) and then declines precipitously in the latter part. A similar, although less dramatic, trend exists for the other announcement months.

Overall, the trends in relative forecast accuracy suggest that private market participants have substantially improved their forecasting ability relative to the USDA over the sample period. This is consistent with large declines in the cost of information due to technological improvements in computers, communications equipment, remote-sensing satellites, etc. More specifically, the technological improvements may have changed the shape of the marginal cost of information curve (Stein, 1992). It is plausible to argue that the marginal cost curve was sharply convex during the early part of the sample period, but shifted downward and became substantially less convex due to the aforementioned technological changes. The relatively high marginal costs during the early part of the sample may have made it prohibitively expensive for private firms to collect precise crop information. The decline in marginal costs probably made it more economically feasible for many private firms to collect highly precise crop information.

4. Price reaction test

The second test of informational value is based on the Efficient Market Hypothesis (EMH). In an efficient market, prices reflect all available information (Fama, 1970). This implies that prices should react quickly when information enters the market. Furthermore, prices will react only to the unanticipated, or 'news,' component of the information. Under the EMH, a test of informational value is whether market prices react to

[4] The reductions in supply forecast variance for corn and soybeans are much smaller than Baur and Orazem report for oranges. They find reductions as large as 54%. To determine the source of the difference in results, relative forecast error tests were conducted using Baur and Orazem's information variable specification. The change in adjusted R^2 for corn and soybeans in August under this alternative specification is 0.4758 and 0.3911, respectively. These changes are several orders of magnitude larger than the changes based on observable market forecasts. This demonstrates that the difference in results between this study and Baur and Orazem's study is not due to inherent information differences between grain and orange markets. Instead, the difference is due to the different measures of market forecasts. Specifically, information variables lead to less accurate representations of market expectations, particularly for early-season announcements. This apparently leads to an over-statement of the informational value of USDA production forecasts.

[5] Two alternative breakpoints (1981 and 1984) were also considered. Results for these two break points were similar to the 1977 break point.

unanticipated information. If prices do not react to the announcement of the information, then the information is not valuable to the market.

Following French et al., 1989, Colling and Irwin (1990) and others, unanticipated information is defined as the difference between monthly private forecasts and USDA forecasts of corn and soybean production. Price reaction regressions are specified to include both own- and cross-market effects,

$$\Delta\mathrm{OWNP}_{i,t} = \phi_0 + \phi_1\,\mathrm{UXOWN}_{i,t} + \phi_2\,\mathrm{UXOTR}_{i,t} + \eta_{i,t} \tag{4}$$

where $\Delta\mathrm{OWNP}_{i,t}$ is the change in own-price (corn or soybeans) from the closing price on the day of the USDA announcement to the first non-limit open or closing price following the announcement, $\mathrm{UXOWN}_{i,t}$ is the difference between the other-crop USDA forecast and other-crop private forecast (e.g. soybeans in the corn equation, and vice-versa).[6] Prior to differencing, all data are transformed via natural logarithms; hence, the analysis is performed on a percentage basis. Consistent with previous research (e.g. French et al., 1989, Colling and Irwin, 1990, Baur and Orazem, 1994), the price reaction regressions are obtained by stacking all monthly observations for each commodity.[7] Preliminary regressions are run for both new crop futures contracts (November for soybeans and December for corn) and deferred contracts (May for both corn and soybeans). The results are quite similar, so we concentrate on the new crop contracts.[8]

To assess the potential difference in the effect of the USDA reports on price over time, we also estimate the following regression,

$$\Delta\mathrm{OWNP}_{i,t} = \phi_0 + \phi_1\,\mathrm{UXOWN}_{i,t} + \phi_2\,\mathrm{UXOTR}_{i,t} + \beta_1\,85\mathrm{OWN}_{i,t} + \beta_2\,85\mathrm{OTR}_{i,t} + \eta_{i,t} \tag{5}$$

where $85\mathrm{OWN}_{i,t}$ and $85\mathrm{OTR}_{i,t}$ are slope interaction terms which take on the value of $\mathrm{UXOWN}_{i,t}$ and $\mathrm{UXOTR}_{i,t}$, respectively, beginning in 1985 and zero otherwise. The 1985 date is consistent with the literature indicating minimal price reactions to USDA announcements in the latter portion of the data period (Fortenbery and Sumner, 1993). Note that β_1 and β_2 measure the change in the price response to own and other market unexpected information during the latter portion of the data. The null hypotheses that the own and other effects of the unexpected information are zero in the second period can be tested using H_{01}:~$\phi_1 + \beta_1 = 0$ and H_{02}:~$\phi_2 + \beta_2 = 0$, respectively.

The results of the estimation are presented in Table 2, and indicate that corn and soybean markets respond significantly to unanticipated changes in own supply. The signs of the coefficients are consistent with expectations, with own USDA forecasts larger

[6] The corn and soybean price regressions are estimated separately. Since they contain the same independent variables, there is no gain in efficiency in estimating the corn and soybean price equations jointly.

[7] Stacking aggregates the information contained in the individual months so that the price response can be more clearly discerned, and seems rather reasonable given the similar structure of demand and short time period between the prices. Here, Eq. (4) and Eq. (5) are estimated for each month separately in a seemingly unrelated (SUR) framework, allowing for contemporaneous correlation and testing for the homogeneity of the respective parameters across equations. Homogeneity testing could not reject the null hypothesis that the respective parameters were similar across months. Further details of the estimation and testing procedure are found in Garcia et al. (1994).

[8] For the new crop contracts, nine and four limit price moves, respectively, are present in the corn and soybean price change series.

Table 2
Price reaction tests of the informational value of USDA corn and soybean production forecasts, 1971–1992

Regression estimates	ϕ_0	ϕ_1	ϕ_2	β_1	β_2	Adj. R^2	H_{01}	H_{02}
Corn								
Model I	0.001	−0.640	−0.113			0.433		
	(0.632)	(−7.48)	(−1.43)					
Model II	0.001	−0.732	−0.098	0.352	−0.085	0.448	5.060	1.354
	(0.64)	(−7.35)	(−1.06)	(1.84)	(−0.479)		[0.027]	[0.248]
Soybeans								
Model I	0.001	−0.453	−0.216			0.311		
	(1.03)	(−4.32)	(−2.17)					
Model II	0.001	−0.309	−0.253	−0.442	0.168	0.330	12.563	0.179
	(0.93)	(−2.62)	(−2.19)	(−1.87)	(0.76)		[0.001]	[0.673]

Note: The null hypotheses are: H_{01}:$\sim\phi_1 + \beta_1 = 0$ and H_{02}:$\sim\phi_2 + \beta_2 = 0$, which are tested with an F-test. The numbers in paratheses are t-statistics and those in brackets are p-values.

(smaller) than private forecasts leading to decreases (increases) in prices. The cross-commodity effects are not as large in the two sets of equations, but are negative, indicating substitution effects. The cross-effect is somewhat stronger in the soybean market. The adjusted R^2 ranges from 0.433 to 0.448 for corn and 0.311 to 0.330 for soybeans. Hence, the USDA production forecasts explain roughly one-third to one-half of the price variance immediately after the announcement.

In the corn market, tests on differences in market price reactions post-1984 indicate that the effect of unanticipated changes in corn supply have a smaller, but still significant, effect on corn futures prices. Hence, the null hypothesis of 'no effect in the second period' is rejected for corn. The soybean effect in the corn market, which is modest initially, disappears in the second period, and the null hypothesis of 'no cross-effect in the second period' is not rejected. In the soybean market, again, the effects of unanticipated changes in other (corn) supply disappear in the second period. However, in contrast to the corn market, the soybean market is more strongly affected by unanticipated changes in own supply in the second period. That is, in the early period the coefficient is −0.309 while post-1984 the coefficient is −0.751.[9]

Overall, the price reaction tests suggest that USDA corn and soybean production forecasts have substantial informational value. The tests show that unanticipated changes in supply (primarily in own supply) affect corn and soybean futures prices. The price reaction tests indicate that USDA corn and soybean forecasts continue to be valuable after

[9] The sensitivity of the results is addressed by examining the effects of alternative breaks in the data (e.g. 1982 and 1986), and by using the first non-limit closing price after the announcement (as opposed to the first non-limit open or closing price) to measure price reaction. The use of alternative breaks in the data results in only modest changes in the parameters, but no qualitative change in the findings. The use of the first non-limit closing price to measure price reaction does not change the results of structural change hypothesis tests in the corn market. However, use of the first non-limit closing price changes the results in the soybean market, with this market being less affected by unanticipated changes in own supply in the second period.

the mid-1980s.[10] However, the magnitude of the price reaction after the mid-1980s varies by commodity, with the corn reaction declining and the soybean reaction increasing.

5. Willingness-to-pay test

The third test of informational value is based on the concept of willingness-to-pay (Carter and Galopin, 1993). The basic notion behind the test is that if a USDA forecast has informational value, a private futures trader would be willing-to-pay for the forecast before it becomes publicly available.

In this study, willingness-to-pay is investigated via a market timing test developed by Henriksson and Merton (1981). The Henriksson–Merton (HM) test is used instead of Carter and Galopin's trading profit test for two reasons. First, in contrast to a trading profit test, the HM test is not dependent upon a particular equilibrium asset pricing model. Second, the distribution of the HM test under the null is known, while it is not for a trading profit test. These factors suggest that the HM test is a more robust test of willingness-to-pay.

The HM test is based on the reasonable assumption that information has a positive value only if it causes rational investors to alter their expectations about the future. If there is no such alteration, the information already has been assimilated into the market; thus, the information has no positive value. Merton (1981) shows that directional accuracy is a sufficient statistic for market timing ability, and hence, informational value.

To implement the HM test, a market direction variable must be defined. Let $\mathrm{M}_{i,t}$ be defined as follows,

$$\mathrm{M}_{i,t} = 1, \quad \text{if } \mathrm{FP}_{i,nt} > \mathrm{FP}_{i,mt}, \tag{6a}$$

$$\mathrm{M}_{i,t} = 0, \quad \text{if } \mathrm{FP}_{i,nt} \leq \mathrm{FP}_{i,mt}, \tag{6b}$$

where $\mathrm{FP}_{i,nt}$ is the first non-limit opening or closing futures price after the USDA announcement in month i, year t and day n, and $\mathrm{FP}_{i,mt}$ is the closing futures price on the day of the USDA announcement. Next, define a forecast direction variable, $F_{i,t}$, such that

$$F_{i,t} = 1, \quad \text{if } \mathrm{USDA}_{i,t} < \mathrm{Market}_{i,t}, \tag{7a}$$

$$F_{i,t} = 0, \quad \text{if } \mathrm{USDA}_{i,t} \geq \mathrm{Market}_{i,t}, \tag{7b}$$

where, as before, $\mathrm{USDA}_{i,t}$ and $\mathrm{Market}_{i,t}$ are the USDA and private market forecasts in month i and crop year t. For the forecast direction variable, if the USDA forecast is less

[10] These results contrast with Fortenbery and Sumner's finding of no price reaction in the post-1984 period. The differnce in results may be due to somewhat different samples (Fortenbery and Sumner's sample ends in 1989), or the use of different tests to determine significant price reactions (Fortenbery and Sumner examine the variance of price changes after release of USDA forecasts). To determine the source of the difference in results, price reaction tests are conducted after truncating the sample at 1989. For both corn and soybeans, the results are unchanged across both specifications of price changes. Price reaction continues to be significant over the 1984–1989 period, suggesting that the difference between Fortenbery and Sumner's and our findings is largely due to the different tests used to determine the significance of price reactions. The test used by Fortenbery and Sumner appears to be less powerful in detecting price reactions than the test employed in this study. This is not surprising, since the test employed in the present study incorporates more information, specifically, expectations of market participants.

than (greater than) the private forecast, the unanticipated information is 'bullish' ('bearish') and the price is expected to increase (decrease).

Finally, probabilities for $F_{i,t}$ conditional upon the realized direction of price change, $M_{i,t}$, can be defined as

$$p_1 = \text{Prob}\,[F_{i,t} = 0 | M_{i,t} = 0], \tag{8a}$$

$$p_2 = \text{Prob}\,[F_{i,t} = 1 | M_{i,t} = 1]. \tag{8b}$$

Hence, p_1 is the conditional probability of correctly forecasting that price will decrease or stay constant, and p_2 is the conditional probability of correctly forecasting that price will increase. Merton (1981) shows that the sum of the conditional probabilities of correctly forecasting the direction of price change is a sufficient statistic for market timing value. More specifically, the sum of conditional probabilities p_1 and p_2 must exceed one for the forecasts to exhibit market timing value.

Henriksson and Merton (1981) derive a statistic to test the null hypothesis of 'no market timing value' (H_0:~$p_1 + p_2 = 1$). The test proposed by Henriksson and Merton is a Fisher exact test and, therefore, the uniformly most powerful unbiased test of this null hypothesis (Cumby and Modest, 1987). The confidence level associated with the rejection of the null hypothesis is based on the hypergeometric distribution.

Results of the market timing tests are presented in Table 3. The tests are based upon pooling observations across announcement months for each sample period. For the 1971–1992 sample, the results imply a strong rejection of the null hypothesis of no market timing for both USDA corn and soybean forecasts. The sum of the conditional probabilities is significantly greater than one for both corn and soybeans. This indicates that advance knowledge of the USDA forecasts, over the entire sample, would have allowed traders to correctly position themselves in the futures market.

Table 3
Willingness-to-pay tests of the informational value of USDA corn and soybean production forecasts, 1971–1992

Sample period/commodity	p_1	p_2	$p_1 + p_2$	HM Significance level
1971–1992				
Corn	0.70	0.68	1.39	0.001
Soybeans	0.73	0.53	1.26	0.017
1971–1984				
Corn	0.76	0.70	1.46	0.001
Soybeans	0.77	0.47	1.24	0.095
1985–1992				
Corn	0.60	0.65	1.25	0.287
Soybeans	0.67	0.65	1.31	0.156

Note: The forecasts are based only on the unexpected information for each commodity. The conditional probability of correctly forecasting that price will decrease or stay constant is p_1 and the conditional probability of correctly forecasting that price will increase is p_2. The reported significance is equal to one minus the Henriksson–Merton confidence level, and is used to test the null hypothesis of 'no market timing ability' (H_0:~$p_1 + p_2 = 1$).

Sub-period results indicate that market timing value has declined over time. The null hypothesis of no market timing for the 1971–1984 sample period is clearly rejected for corn and marginally rejected for soybeans. In contrast, the null hypothesis is not rejected for corn or soybeans over the more recent period of 1985–1992. The lack of significance over the latter period, however, should be interpreted with some caution. Low significance levels may be due to the low power of the HM test for samples sizes of less than 50 (Cumby and Modest, 1987).[11]

In general, the market timing results suggest that USDA corn and soybean forecasts have significant informational value. The USDA forecasts would have allowed traders to correctly position themselves in advance of announcement of the forecasts. A private trader, therefore, would be willing-to-pay for advance knowledge of the USDA forecasts. Willingness-to-pay does appear to have declined over time, particularly for corn.

6. Summary and conclusions

In this study, the informational value of U.S. Department of Agriculture (USDA) corn and soybean production forecasts is investigated for the period 1971–1992. Three tests of informational content are considered: (i) a relative forecast accuracy test, (ii) a price reaction test, and (iii) a willingness-to-pay test. Each test is based upon comparison of USDA production forecasts to private forecasts. This allows for more powerful tests of informational value.

Relative forecast accuracy tests suggest that USDA and private forecasts have similar accuracy, with the exception of corn during the early stages of the production process. The trends in relative forecast accuracy suggest that private market participants have substantially improved their forecasting ability relative to the USDA, especially since the mid-1980s. Price reaction tests show that the unanticipated component of USDA forecasts significantly affects corn and soybean futures prices. Willingness-to-pay tests indicate that advance knowledge of the USDA corn and soybean forecasts would allow traders to correctly position themselves in the futures market. Therefore, a trader would be willing to pay for advance knowledge of the USDA forecasts.

The results of the three tests appear to be somewhat contradictory regarding the informational value of USDA corn and soybean production forecasts. On the one hand, the relative accuracy of USDA and private forecasts generally is quite similar. On the other hand, corn and soybean futures prices react significantly to the release of USDA forecasts and a trader would be willing to pay for advance knowledge of USDA forecasts.

A plausible explanation for the difference in results is that market participants have different perceptions of the riskiness of USDA and private forecasts. As McNew and Espinosa (1994) note, participants that make trading decisions based on both expected return and risk would find economic value in crop information that changes their perception of risk but not expected return. Hence, even though the relative accuracy of

[11] The market timing results are sensitive to whether the post-announcement prices are based on the open or close of trading. The results in Table 3 are based on close to first non-limit opening or closing prices. If close to first non-limit closing prices are examined, the null hypothesis is not rejected in any case. This indicates that the economic value of advance knowledge of the USDA forecasts is quickly offset after the opening of trading.

USDA and private forecasts is similar, prices may react to the release of USDA forecasts. The reason is that USDA forecasts are perceived to be less risky than private forecasts. For the same reason, a trader may be willing to pay for advance knowledge of USDA forecasts.

Theory and empirical evidence provides support for this line of reasoning. Theoretical models (e.g. McNichols and Trueman, 1994) suggest that informed private traders may behave strategically with regard to the release of forecasts in advance of public announcements. Thus, it would be logical for commodity market participants to regard USDA forecasts as less risky than private crop forecasts. Empirical evidence confirms that USDA crop forecasts reduce the uncertainty of market participants' expectation of prices. Specifically, McNew and Espinosa (1994) report that the implied volatility of corn and soybean futures options declines significantly after the release of USDA forecasts.

In conclusion, the results of the present study suggest that USDA corn and soybean forecasts provide valuable information to commodity futures markets. The results also suggest that the informational value of USDA forecasts has declined since the mid-1980s. Further research is needed to better understand the sources of the decline and the reasons why the forecasts remain valuable to market participants.

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