Title: **Do Big Crops Get Bigger and Small Crops Get Smaller?**
Further Evidence on Smoothing in USDA Crop Production Forecasts

Authors:

Olga Isengildina-Massa, Scott H. Irwin, Darrel L. Good

Contact Author:

Olga Isengildina-Massa
Department of Applied Economics & Statistics
Clemson University
295 Barre Hall
Box 340313
Clemson, SC 29634-0313
Phone: 864-656-2440
Fax: 864-656-5776
E-mail: olga123@clemson.edu

Date of re-submission: October 9, 2008

Do Big Crops Get Bigger and Small Crops Get Smaller?
Further Evidence on Smoothing in USDA Crop Production Forecasts

Abstract

The purpose of this paper is to determine whether smoothing in USDA corn and soybean production forecasts is concentrated in years with relatively small and large crops. USDA crop conditions ratings and yield forecasts for major corn and soybean producing states over 1986/87 through 2007/08 are used in the analysis. Tests results from panel data regression models demonstrated that USDA corn yield forecasts, and to a lesser degree, soybean yield forecasts, do not fully incorporate information about crop conditions available at the time USDA forecasts are developed. The findings can be used by market participants to improve their interpretation and application of USDA production forecasts. For example, if the sum of good and excellent crop conditions ratings on August 1st is 20 (80), one can expect that state-level corn yield forecasts released in August will be subsequently revised downward (upward) by a total of about 2% (2.2%).

Do Big Crops Get Bigger and Small Crops Get Smaller?
Further Evidence on Smoothing in USDA Crop Production Forecasts

There's an old saying in this business that big crops get bigger and small crops get smaller…I guess I'm in the camp that believes the 10.3 million bushel [USDA] corn estimate is a little bit too high.

---Tom Mueller, Taylor Ridge, Illinois farmer (*Quad-City Business Journal*, 2005)

Introduction

Conventional analysis of forecast accuracy does not answer the question of how forecasts change during a forecasting cycle. Systematic under- and over- adjustments are revealed through analysis of forecast revisions. The framework for analysis of efficiency in forecast revisions was developed by Nordhaus (1987). In this context, systematic under-adjustments of the forecasts are termed "smoothing" and over-adjustments are called "jumpiness." Detection of systematic adjustments in forecasts is of interest because it implies that: (1) if forecast revisions are correlated, then forecasts do not efficiently incorporate all available information, and, therefore, may be improved and (2), knowledge about systematic adjustments can be used by market participants to compute adjusted forecasts.

Two previous studies examined the revisions process for U.S. Department of Agriculture (USDA) crop production forecasts. Gunnelson, Dobson, and Pamperin (1972) analyzed first and second revisions for seven U.S. crops over 1929-1970 and reported, "While a relatively high percentage of the revisions was successful, the revised forecasts tended to under compensate for the errors in the previous estimate. Thus, for example, if first crop forecasts underestimated or overestimated crop size, the first revision was likely to exhibit similar characteristics." (pp. 641-42). In a more recent study, Isengildina, Irwin and Good (2006) found that revisions to USDA corn and soybean crop production forecasts over 1970-2005 were under-adjusted, or "smoothed." The smoothing was revealed in positive correlations between adjacent monthly revisions and consistency in the direction of changes. For example, directional tests revealed that positive monthly revisions in corn forecasts were followed by positive revisions 79% of the time and negative revisions remained negative 56% of the time. In soybeans, positive and negative monthly revisions were followed by revisions in the same direction 66% of the time.

The evidence of smoothing in previous studies is consistent with beliefs of market participants that the USDA is slow in incorporating the latest information into crop production forecasts. As the quote at the beginning of the paper illustrates, many market participant also believe the smoothing is concentrated in years with relatively small and large crops. Previous studies of smoothing in USDA crop production forecasts estimate measures of the correlation between adjacent monthly revisions for all sample years (Gunnelson, Dobson, and Pamperin, 1972; Isengildina, Irwin, and Good, 2006). A different procedure is needed to determine whether revisions are concentrated in years with small and big crops. One approach is to classify small and large crop years based on deviations between trend and final yield (e.g., Wisner, Blue and Baldwin, 1998; Taylor, 2003). However, this method uses final yield estimates released at the end of the forecasting cycle. The challenge is to only use information on crop potential available at the time the USDA makes its forecasts. Several sources of public information are available, including private crop forecasts, weather and yield models, satellite imagery data, and crop condition ratings.

To the best of our knowledge, private yield forecasts are not available for a sufficiently long sample period to allow useful tests. In contrast, weekly USDA crop condition ratings are available since 1986. Since these ratings are released on a weekly basis during the growing season, they can be easily matched to the period when USDA collects data for its own forecasts. Crop conditions ratings may also be superior to crop weather models, as the ratings are more straightforward to interpret and may be a more accurate predictor of yield as they include factors other than weather that impact crop yields (such as insect and disease pressure). The ratings are widely used in crop yield forecasting by industry analysts and extension economists (e.g., Irwin, Tannura, and Good, 2008). Another benefit of using crop conditions ratings is that data are available at the state-level as well as the nationally-aggregated level. The availability of the state-level data provides the opportunity to pool data across major producing states to improve efficiency of statistical tests.

While previous studies have rigorously documented the presence of smoothing in USDA corn and soybean crop production forecasts, it is not known whether smoothing is concentrated in years with relatively small or large crops. Therefore, the purpose of this paper is to analyze whether crop conditions at the time the USDA develops crop yield forecasts can be used to predict subsequent revisions in the forecasts. The primary data used in this study are USDA crop conditions ratings and yield forecasts for major corn and soybean producing states over 1986/87 through 2007/08. Two panel data regression models are specified for the analysis. The first type estimates the relationship between crop conditions at the time USDA yield forecasts are developed and the following forecast revision. The second type estimates the relationship between crop conditions at the time USDA yield forecasts are developed and the sum of all following forecast revisions (equivalent to the forecast error). For comparison, national level regressions are also estimated.

If a relationship between smoothing and crop conditions is established, this information can be used by the USDA to adjust and improve their forecasts in small and large crop years. Additionally, the new evidence can be used by market participants to improve their understanding and application of USDA production forecasts.

Data

USDA forecasts of state and national corn and soybean yields over the 1986/87 through 2007/08 crop years are examined in this study. The sample starts in 1986/87 because crop conditions ratings are not available for all major corn and soybean producing states before this date. The USDA yield forecasts are released in August, September, October, and November of each year.[1] Isengildina, Irwin, and Good (2006) provide a detailed review of the USDA crop production forecasting process. USDA corn and soybean yield forecasts are considered fixed-event forecasts because the series of forecasts for a given state is related to the same terminal event, q_T^i, where T is the release month (January) for the final estimate of crop yield in the i^{th} year.[2] For a given state, the forecast of the terminal event for month t and the i^{th} year is denoted as q_t^i, where t = 1:August, 2:September, 3:October, 4:November, 5:January and i = 1986/87, …, 2007/08. The forecast revision at time t+1 is denoted as $v_{t+1}^i = q_{t+1}^i - q_t^i$ where t = 1,…,T, and I = 1986/87, …, 2007/08 (as illustrated in figure 1). In order to standardize for increasing yields over time, revisions are examined in log percentage form:

(1) $$v_{t+1}^{i} = 100 \times \ln\left(q_{t+1}^{i} \big/ q_{t}^{i} \right), \quad t = 1, \ldots, 4;\ i = 1986/87, \ldots, 2007/08,$$

where the forecasting cycle has a length of T=5, and the revision cycle has a length of T-1 = 4 months for both crops. Similarly, forecast errors for a given state, e_t^i, are calculated in the following form:

(2) $$e_{t}^{i} = 100 \times \ln\left(q_{T}^{i} \big/ q_{t}^{i} \right) \qquad t = 1, \ldots, 4;\ I = 1986/87, \ldots, 2007/08.$$

The USDA report containing weekly state and U.S. crop condition ratings is released at 4:00 PM on the first business day of each week, usually Monday, during the growing season, which for corn and soybeans spans from May through late September or early October. Several thousand "crop reporters" across the U.S. are asked each week to estimate the percentage of a particular crop that is in each of five condition categories ranging from very poor to excellent.[3] Previous research has shown that the sum of good and excellent ratings provides a good indication of crop conditions at various points of the growing season (Irwin, Good, and Tannura, 2008). In this study, we concentrate on the crop conditions rating available at the time the USDA yield forecasts are made, around the first of the month during August, September, and October. Therefore, the crop conditions indicator for a given state is calculated in the following form:

(3) $$c_{t}^{i} = \sum_{m=4}^{5} m, \qquad \text{m} = 1, \ldots, 5;$$

where c_t^i is the crop condition rating for the i^{th} crop year, released within three days before or after the first day of month t, and m is the percentage of crop classified as: 1 = very poor, 2 = poor, 3 = fair, 4 = good, and 5 = excellent. One of the benefits of using crop conditions ratings is that the expected yield can be predicted based on a continuous scale (from 0 implying bad crop conditions to 100 implying very good crop conditions), thus eliminating the need to classify crops into discrete categories, i.e., "good" or "bad."

Crop conditions ratings were collected for the 10 major producing states that typically supply about 80 percent of domestic corn or soybean production (including additional states leads to historical data availability problems for state level crop condition ratings): Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nevada, Ohio, South Dakota, and Wisconsin for corn, and Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, Ohio, South Dakota and Arkansas for soybeans.[4] State-level observations on soybean conditions were not available for Kansas and South Dakota prior to the 1990/91 crop year. In order to obtain a balanced panel, only data from 1990/91 through 2007/08 were used for estimation in soybeans. Therefore, a total of 220 observations were available for corn and 180 for soybeans.

Procedures

Previous studies demonstrated that forecast smoothing results in correlated forecast revisions and forecast errors larger than those of efficient forecasts (Isengildina, Irwin, and Good, 2006). If smoothing is concentrated in big and small crop years, the expected yield at the time USDA forecasts are developed should be correlated with subsequent forecast revisions and/or errors. Figure 2 provides a hypothetical example of this pattern in corn. Note that forecast yield revisions have the same sign when conditioned on the relative size of crops.

Using information about the expected yield of a crop, smoothing can be examined within a classical framework for testing forecast efficiency. Thus, if all available information about the expected yield is incorporated in the current yield forecast, the forecast is efficient and no smoothing takes place. If information about current crop conditions as an indicator of the expected yield is not fully incorporated into the current USDA yield forecast, it will be carried over into the future revision(s) of this forecast, indicating that the forecast is inefficient.

The first test of forecast revision efficiency is based on the following regression:

(4) $$v_{t+1}^i = \alpha + \beta c_t^i + \varepsilon_t^i ,$$

where all variables are as defined previously and e_t^i is a random error term. If $\beta = 0$, information on crop conditions at time t cannot be used to predict the subsequent revision at time $t+1$, and hence, the USDA yield forecast at t is efficient. If $\beta > 0$, favorable crop conditions ratings at t precede positive revisions of yield forecasts at $t+1$ and unfavorable crop conditions ratings at t precede negative revisions of yield forecasts at $t+1$, or big crops get bigger and small crops get smaller. If $\beta < 0$, unfavorable crop conditions ratings at t precede positive revisions of yield forecasts at $t+1$ and favorable crop conditions ratings at t precede negative revisions of yield forecasts at $t+1$, or big crops get smaller and small crops get larger. Note that tests based upon (4) reveal the presence of smoothing only for the nearest revision.[5]

An alternative test examines the relationship between crop conditions for the forecast released at time t and the sum of subsequent forecast revisions. Since the sum of all subsequent forecast revisions is equivalent to the forecast's error, this alternative regression can be written as,

(5) $$e_t^i = \alpha + \beta c_t^i + \varepsilon_t^i .$$

If $\beta > 0$, favorable crop conditions ratings at *t* precede positive revisions of yield forecasts for all subsequent revisions and unfavorable crop conditions ratings at *t* precede negative revisions of yield forecasts for all subsequent revisions. If $\beta < 0$, unfavorable crop conditions ratings at *t* precede positive revisions of yield forecasts for all subsequent revisions and favorable crop conditions ratings at *t* precede negative revisions of yield forecasts for all subsequent revisions. The intuition behind this test is that smoothing related to crop size may carry over to several future yield forecast revisions.

The two tests outlined in this section are applied to state level revisions and errors of USDA corn and soybean yield forecasts over 1986/87 through 2007/08 marketing years in order to establish whether smoothing in these forecasts is associated with big and small crop years.[6] For comparison, national level regressions are also estimated to demonstrate gains from pooling state level forecasts and crop conditions.

Results

The results of the state level analysis presented in table 1 are based on the 10 largest producing states for each commodity. The state level analysis pools the data across states and marketing years; therefore, several issues associated with panel data estimation were addressed. First, since errors in a given year were not independent across states, regressions were estimated using a cross-section SUR specification which allowed for conditional correlation between the contemporaneous residuals for states *i* and *j*, but restricted residuals in different time periods to be uncorrelated:

(6)
$$E(\varepsilon_{it}\varepsilon_{jt} \mid X_t^*) = \sigma_{ij}$$

$$E(\varepsilon_{is}\varepsilon_{jt} \mid X_t^*) = 0$$

for all i, j, s and t with $s \neq t$. Cross-section SUR is estimated using weighted least squares (sometimes referred to as the Parks estimator) which is a feasible GLS estimator for systems where the residuals are both cross-sectionally heteroscedastic and contemporaneously correlated.

We first test if the regression constant is consistent across states or whether cross-section fixed effects are present. A chi-squared test of the joint significance of the cross-section fixed effects is based on the estimation of an unrestricted specification which includes cross-section fixed effects and a restricted specification which omits the fixed effects. The tests failed to reject the null hypothesis that the cross-section fixed effects are redundant in all cases except November corn yield forecast revisions and October crop conditions (where fixed effects were significant at the 10 percent level). For consistency, results presented in table 1 do not include cross section fixed effects for any of the models.[7]

Similar tests were performed to test if time-series (period) fixed effects were present. Both tests rejected the null hypothesis that the time series fixed effects were redundant. Intuitively, time series fixed effects do not have much meaning in these regressions; therefore, it was decided to account for time-series variation through more general random effects. A central assumption in random effects estimation is that the random effects are uncorrelated with the explanatory variables. A Hausman (1978) test was employed to compare the fixed and random effects estimates of coefficients and the null hypothesis of no correlation was not rejected, suggesting that random effects are consistent and efficient (Wooldridge, 2002, p. 288). All estimations and statistical tests were performed in the *EViews 6* econometric software package.

Table 1 presents pooled estimation results for the state-level efficiency tests described in the previous section. The first four sets of results in each panel test whether crop conditions are correlated with the following forecast revision, as described in equation (4). The last three sets of results in each panel test whether crop conditions are correlated with forecast error (equivalent to all subsequent forecast revisions), as described in equation (5). As shown in panel A of table 1, all estimated coefficients on crop conditions are positive in corn, consistent with the hypothesis that smoothing in USDA yield forecasts is associated with the expected size of the crop. Coefficients associated with crop conditions and following forecast revisions in corn were statistically significant at the one percent level in November and at the ten percent level in January. Even more noteworthy, coefficients associated with crop conditions and forecast errors (sum of all subsequent forecast revisions) in corn were statistically significant for all three horizons tested.

Estimation results for soybeans are presented in panel B of table 1. All but one of the estimated coefficients on crop conditions was positive, which again is consistent with the hypothesis that smoothing in USDA yield forecasts is associated with the expected size of the crop. However, in contrast to corn, only two of the seven estimated coefficients on crop conditions were statistically significant. October crop conditions were significantly and positively correlated with November revisions and significantly and negatively correlated with January revisions. This result indicates that November soybean yield forecasts tended to over-react to October crop conditions information and the over-reaction was corrected in the January revision.

Table 2 presents results of efficiency tests specified in equations (4) and (5) using national-level data. These results show almost no evidence of correlation between smoothing and crop conditions. The only exception is evidence of over-reaction to October crop conditions in November soybean yield forecasts. The main limitation of this set of results is that by using the national level data the sample is limited to only 22 observations, which is not sufficient for detecting inefficiencies in these forecasts. These additional results demonstrate the benefits of pooling the state-level data to improve the power of statistical tests.

The test results presented in this section demonstrate that USDA corn yield forecasts, and to a lesser degree, soybean yield forecasts, do not fully incorporate information about crop conditions available at the time USDA forecasts are developed. These findings indicate that one can use crop conditions to form non-zero expectations about future forecast revisions and/or errors. For example, if the sum of good and excellent crop conditions ratings on August 1st is 20 (80), one can expect that state-level corn yield forecasts released in August will be subsequently revised downward (upward) by a total of about 2% (2.2%). Similarly, if the sum of good and excellent crop conditions ratings on August 1st is 20 (80), one can expect that state-level soybean yield forecasts released in August will be subsequently revised downward (upward) by a total of about 0.6% (2%).

While crop conditions generally can be used to predict part of future USDA yield forecast revisions and/or errors, from a purely statistical perspective, condition ratings explain a relatively small portion of future revisions, as demonstrated by the low R^2 of the regressions in table 1. This is not surprising since there is a multitude of other factors that dominate revisions, such as random sampling error and changing weather patterns. Nonetheless, the level of predictability appears to be economically non-trivial when considered relative to the size of new information contained in USDA forecasts. Using the data found in Good and Irwin (2006), the average absolute difference between private and USDA production forecasts in August is only about 2% for both corn and soybeans over 1970-2006. This average "surprise" is on the same order of magnitude as the predictable component of state-level corn and soybean yields when conditioned on high or low crop conditions ratings.

In light of the results, an interesting question is raised: Why are USDA yield forecast revisions related to crop conditions? Isengildina, Irwin, and Good (2006) interviewed officials responsible for compilation of USDA crop production forecasts to assess their views on potential sources of smoothing in production forecasts. The officials argued that correction for measurement error (Bradford and Kelejian, 1977; Gardner, 1992) or strategic behavior on the part of USDA analysts (Nordhaus, 1987; Batchelor and Dua, 1992; Scotese, 1994) was not likely to explain observed smoothing. The discussions instead suggested that smoothing may be related to the procedure used to translate information about plant fruit counts into objective yield indications. Specifically, the existing procedure does not take into account current crop growing conditions when forecasting the relationship between plant fruit counts and yield. Another source may be a conservative bias in farm operators' assessment of yield prospects, which may be more pronounced in small and big crop years.

Summary and Conclusions

The purpose of this paper is to determine whether smoothing in USDA corn and soybean production forecasts is concentrated in years with relatively small and large crops. The primary data used in this study are USDA crop conditions ratings and yield forecasts for major corn and soybean producing states over 1986/87 through 2007/08. Two panel data regression models are specified for the analysis. The first type estimates the relationship between crop conditions at the time USDA yield forecasts are developed and the following forecast revision. The second type estimates the relationship between crop conditions at the time USDA yield forecasts are developed and the sum of all following forecast revisions (equivalent to the forecast error).

All estimated coefficients on crop conditions were positive in corn, consistent with the hypothesis that smoothing in USDA yield forecasts is associated with the expected size of the crop. Coefficients associated with crop conditions and following forecast revisions in corn were statistically significant in two of four forecast horizons. Coefficients associated with crop conditions and forecast errors (sum of all subsequent forecast revisions) in corn were statistically significant for all three horizons tested. All but one of the estimated coefficients on crop conditions was positive in soybeans, which again is consistent with the hypothesis that smoothing in USDA yield forecasts is associated with the expected size of the crop. However, in contrast to corn, only two of the seven estimated coefficients on crop conditions were statistically significant.

The tests results demonstrated that USDA corn yield forecasts, and to a lesser degree, soybean yield forecasts, do not fully incorporate information about crop conditions available at the time USDA forecasts are developed. The findings can be used by market participants to improve their interpretation and application of USDA production forecasts. For example, if the sum of good and excellent crop conditions ratings on August 1st is 20 (80), one can expect that state-level corn yield forecasts released in August will be subsequently revised downward (upward) by a total of about 2% (2.2%). Similarly, if the sum of good and excellent crop conditions ratings on August 1st is 20 (80), one can expect that state-level soybean yield forecasts released in August will be subsequently revised downward (upward) by a total of about 0.6% (2%). Finally, the results indicate there is an opportunity for the USDA to incorporate crop conditions or similar information into the forecasting process to reduce or eliminate smoothing related to crop size.

The results of this study also raise the interesting question of whether market participants understand and anticipate the smoothing inherent in USDA corn and soybean production forecasts. The quote in the introduction suggests that market participants believe "big crops get bigger and small crops get smaller." If market participants are indeed aware of the smoothing process and account for it in forming expectations, economic welfare losses may be minimal. If instead market participants are unaware of or misunderstand the nature of the revisions process, welfare losses may result. The degree to which market participants actually use this knowledge in forming their own crop production forecasts is an interesting area for further research.

References

Batchelor, R., and P. Dua. "Conservatism and Consensus-Seeking among Economic Forecasters." *Journal of Forecasting* 11(1992):169-181.

Bradford, D.F., and H.H. Kelejian. "The Value of Information for Crop Forecasting in a Market System: Some Theoretical Issues." *Review of Economic Studies* 44(1977):519-531.

Gardner, B.L. "How the Data We Make Can Unmake Us: Annals of Factology." *American Journal of Agricultural Economics* 74(1992):1066-1075.

Good, D.L., and S.H. Irwin. "Understanding USDA Corn and Soybean Production Forecasts: An Overview of Methods, Performance and Market Impact over 1970-2005." AgMAS Project Research Report 2006-01, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 2006. [http://www.farmdoc.uiuc.edu/agmas/reports/06_01/AgMAS06_01.pdf]

Gunnelson, G., W. Dobson, and S. Pamperin. "Analysis of the Accuracy of USDA Crop Forecasts." *American Journal of Agricultural Economics* 54(November 1972):639-645.

Hausman, J.A. "Specification Tests in Econometrics." *Econometrica*, 46 (1978): 1251-1272.

Irwin, S., D. Good, and M. Tannura. "Forming Expectations About 2008 U.S. Corn and Soybean Yields—Application of Crop Weather Models that Incorporate Planting Progress." Marketing and Outlook Brief 2008-03, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, 2008. [http://www.farmdoc.uiuc.edu/marketing/mobr/mobr_08-03/mobr_08-03.pdf]

Isengildina, O., S.H. Irwin, and D.L. Good. "Are Revisions to USDA Production Forecasts Smoothed? *American Journal of Agricultural Economics.* 88(November 2006):1091-1104.

Nordhaus, W.D. "Forecasting Efficiency: Concepts and Applications." *Review of Economics and Statistics* 69(November 1987):667-674.

Scotese, C.A. "Forecast Smoothing and the Optimal Under-Utilization of Information at the Federal Reserve." *Journal of Macroeconomics* 16(1994):653-670.

Taylor, S.E. "Climate Trends and Agricultural Management." Working Paper, Department of Agronomy, Iowa State University, 2003. [http://ag.arizona.edu/ANS/swnmc/papers/2003/taylor.pdf]

Wisner, R.N., E.N. Blue, and E.D. Baldwin. "Pre-Harvest Marketing Strategies Increase Net Returns for Corn and Soybean Growers." *Review of Agricultural Economics* 20(1998):288-307.

Wooldridge, J.M. *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press, 2002.

Table 1. Pooled Estimation Results for Efficiency Tests of USDA Forecasts of State-Level Corn Yields, 1986/87-2007/08 and and Soybean Yields, 1990/91-2007/08 Marketing Years.

Dependent Variable	Independent Variable	Intercept	Coefficient	Standard Error	t-statistic	p-value	R-squared
Panel A: Corn							
September Revision	August 1st Crop Conditions	-0.562	0.009	0.013	0.713	0.477	0.003
October Revision	September 1st Crop Conditions	0.086	0.012	0.011	1.085	0.279	0.006
November Revision	October 1st Crop Conditions	-1.585	0.035	0.012	3.025	0.003	0.048
January Revision	October 1st Crop Conditions	-1.558	0.019	0.010	1.899	0.059	0.017
August Error	August 1st Crop Conditions	-3.394	0.070	0.028	2.475	0.014	0.033
September Error	September 1st Crop Conditions	-3.157	0.069	0.023	2.983	0.003	0.047
October Error	October 1st Crop Conditions	-3.644	0.062	0.018	3.516	0.001	0.064
Panel B: Soybeans							
September Revision	August 1st Crop Conditions	-2.907	0.045	0.023	1.174	0.242	0.008
October Revision	September 1st Crop Conditions	-0.286	0.020	0.018	0.430	0.668	0.001
November Revision	October 1st Crop Conditions	-1.130	0.038	0.014	2.341	0.020	0.033
January Revision	October 1st Crop Conditions	0.903	-0.016	0.010	-1.972	0.050	0.021
August Error	August 1st Crop Conditions	0.206	0.022	0.041	-0.175	0.861	0.000
September Error	September 1st Crop Conditions	-0.256	0.037	0.033	0.354	0.724	0.001
October Error	October 1st Crop Conditions	-0.631	0.030	0.019	0.949	0.344	0.006

Notes: N = 220 for corn and 180 for soybeans. The first four sets of results in each panel test whether crop conditions are correlated with the following forecast revision. The last three sets of results in each panel test whether crop conditions are correlated with forecast error (equivalent to all subsequent forecast revisions).

Table 2. Efficiency Test Results for USDA National Level Forecasts of Corn and Soybean Yields, 1986/87-2007/08 Marketing Years.

Dependent Variable	Independent Variable	Intercept	Coefficient	Standard Error	t-statistic	p-value	R-squared
Panel A: Corn							
September Revision	August 1st Crop Conditions	-0.357	0.006	0.024	0.240	0.813	0.003
October Revision	September 1st Crop Conditions	2.044	-0.020	0.031	-0.642	0.528	0.020
November Revision	October 1st Crop Conditions	-1.554	0.031	0.033	0.952	0.353	0.043
January Revision	October 1st Crop Conditions	0.837	-0.014	0.015	-0.902	0.378	0.039
August Error	August 1st Crop Conditions	0.407	0.013	0.081	0.156	0.878	0.001
September Error	September 1st Crop Conditions	2.900	-0.028	0.070	-0.400	0.693	0.008
October Error	October 1st Crop Conditions	-0.717	0.017	0.046	0.378	0.709	0.007
Panel B: Soybeans							
September Revision	August 1st Crop Conditions	0.451	-0.014	0.048	-0.295	0.771	0.004
October Revision	September 1st Crop Conditions	-1.074	0.034	0.074	0.465	0.647	0.011
November Revision	October 1st Crop Conditions	-1.702	0.044	0.027	1.627	0.119	0.117
January Revision	October 1st Crop Conditions	1.674	-0.030	0.016	-1.883	0.074	0.151
August Error	August 1st Crop Conditions	3.677	-0.043	0.112	-0.383	0.706	0.007
September Error	September 1st Crop Conditions	0.123	0.027	0.098	0.270	0.790	0.004
October Error	October 1st Crop Conditions	-0.028	0.015	0.037	0.400	0.693	0.008

Notes: N = 22 for corn and soybeans. The first four sets of results in each panel test whether crop conditions are correlated with the following forecast revision. The last three sets of results in each panel test whether crop conditions are correlated with forecast error (equivalent to all subsequent forecast revisions).

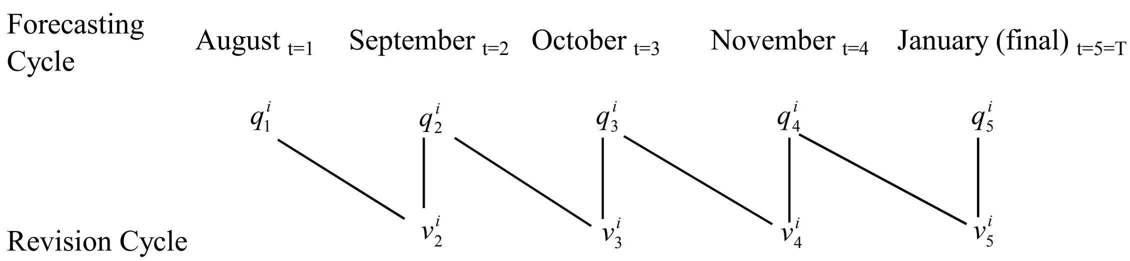

Figure 1. Corn and Soybean Yield Forecasting Cycle and Corresponding Revision Cycle for a Marketing Year.

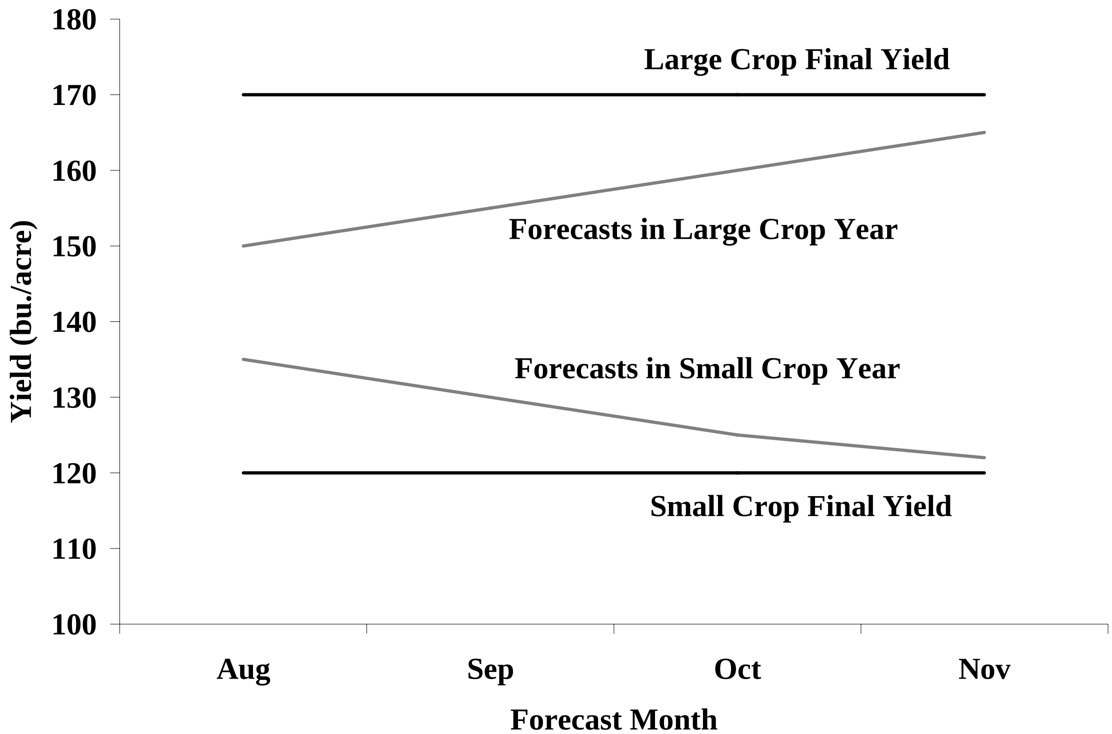

Figure 2. Hypothetical Example of USDA Forecast Smoothing in Large and Small Corn Crop Years

Endnotes

[1] The USDA also published corn and soybean yield forecasts for July until 1988. Since July forecasts were discontinued in 1988, no July yield forecasts are included in the analysis.

[2] Sometimes the January "final" estimates are subsequently revised. This happens most frequently in January following the end of the marketing year. Due to the sporadic nature and long time lag of the subsequent revisions they are not considered in this analysis. In addition, prior to 1986 "final" estimates were released in February rather than January.

[3] For further information on crop conditions ratings, see the fact sheet available at: http://www.nass.usda.gov/Surveys/Crop_Progress_and_Condition/index.asp.

[4] All data is available online from NASS QuickStats database (http://www.nass.usda.gov/QuickStats/) under "Crop Progress", "Forecasted Yield" and "Planted, Harvested, Yield, Production, etc."

[5] Since no new crop conditions ratings for corn and soybeans are available around the first of November, the impact of October crop conditions can be checked against both November and January revisions.

[6] Smoothing in Isengildina, Irwin and Good (2006) study was established for USDA forecasts of corn and soybean production. In this study we concentrate on yield forecasts because they are most directly associated with the hypothesized crop conditions effect.

[7] Including cross-section fixed effects did not have much effect on the parameter estimates.