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Does the Market Read Too Much into the USDA's March 1 and June 1 Corn Stocks Estimates?

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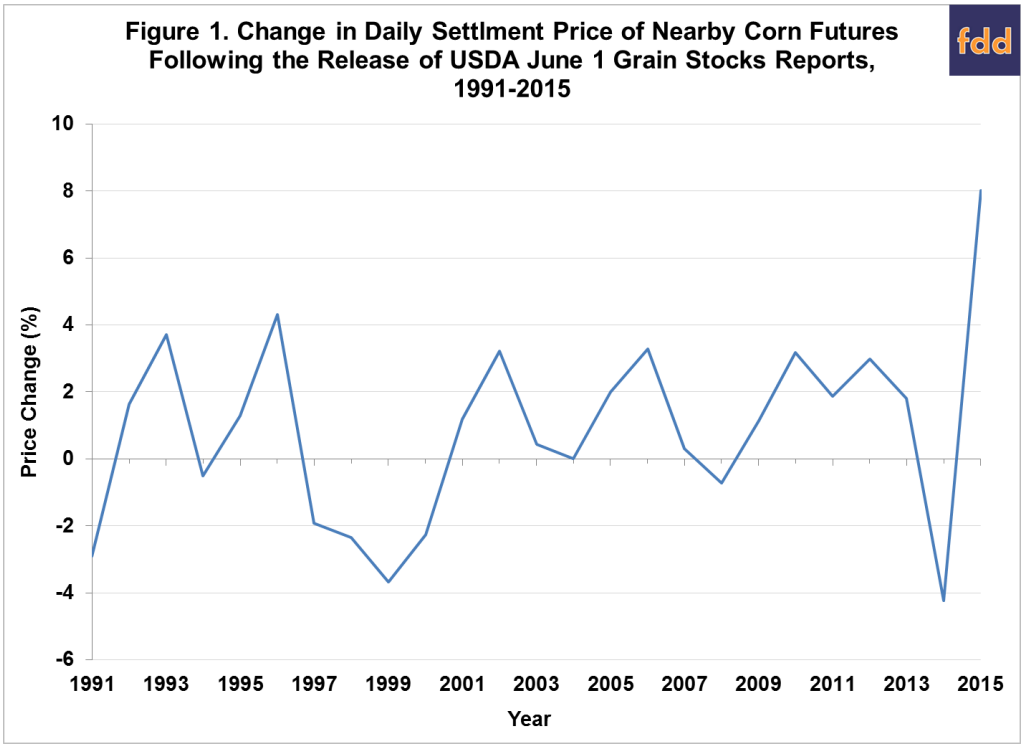
The USDA's Quarterly *Grain Stocks* reports provide important fundamental information to the corn market. Those reports reflect surveys of a large sample of corn producers and almost all commercial storage facilities in order to estimate the amount of corn in store at the end of each quarter of the marketing year (December 1, March 1, June 1, and September 1). The stocks estimate reveals the pace of corn consumption during the previous quarter and the magnitude of supplies available for consumption during the rest of the year, or in the case of the September 1 estimate, the magnitude of stocks carried forward to the new marketing year. The most important information revealed in the reports is the implied rate of domestic feed and residual use of corn during the previous quarter. As Figure 1 shows, in some instances, the revealed rate of consumption has provided a surprise to the corn market and has resulted in a substantial price reaction. While not all the price reaction can be attributed to the release of Grain Stocks reports because acreage and production reports are released at the same in some quarters, the impact of stocks report is obvious and has been the subject of considerable controversy in recent years (*farmdoc daily*, January 17, 2014; January 29, 2014; February 7, 2014; February 13, 2014; February 14, 2014; Irwin, Sanders, and Good, 2014). This raises the important question of whether the market correctly interprets information in the stocks reports. The corn market often seems to behave as if the magnitude of the surprise in the quarterly stocks estimate will be or should be fully reflected in changes in projected or actual levels of feed and residual use for the year. In this article, we examine changes in estimates of feed and residual usage of corn following USDA March 1 and June 1 stocks estimates and then ask how well the changes line up with an expectation of one-for-one changes with stock surprises.

Background

The pace of corn consumption in some categories of use can be monitored closely during the marketing year. For example, the USDA provides weekly estimates of export inspections and export sales and the Census Bureau provides monthly estimates of exports. Similarly, the USDA provides monthly estimates of the amount of corn consumed for ethanol production and the U.S. Energy Information Administration (EIA) provides weekly estimates of ethanol production which are then used to estimate weekly corn consumption for ethanol production. Timely estimates of the amount of corn used for domestic production of food and industrial products other than ethanol are not available, with estimates only

available on a quarterly basis in the USDA's Feed Outlook report. However, use in that category has a small trend increase, but otherwise is very consistent from year-to-year and quarter-to-quarter. Historical patterns of use during the marketing year, then, provide reasonably accurate estimates for the current year.



The one major category of use for which timely estimates is not available during the marketing year is the feed and residual category. The USDA does not survey users of corn to estimate feed consumption. Instead, the magnitude of feed and residual use is revealed on a quarterly basis by the USDA's *Grain Stocks* reports. Total consumption of corn during the quarter is calculated as follows:

Total Consumption = Beginning Stocks + Production + Imports – Ending Stocks.

Production is the USDA's January production estimate and enters the calculation only for the first quarter of the marketing year.

Feed and residual use of corn during the quarter is calculated as:

Feed and Residual Use = Total Consumption – Exports - Ethanol Use – Other Processing Uses.

Consumption for exports, ethanol use, and other processing uses are estimated based on available data as described above. Feed and residual use, then, is calculated as a residual after estimates of use in all other categories are accounted for. The level of feed and residual use, then, reflects actual feed use plus or minus unknown errors (if any) in the estimates of the beginning stock level, production, or estimates of use in the other categories plus any wastage in the corn marketing system.

Market participants use the process described above in an attempt to anticipate the magnitude of quarterly stocks reported by USDA. Participants make estimates of non-feed and residual uses of corn during the previous quarter based on the data described above and make projections of feed and residual use based on a variety of indicators. Those indicators include the USDA's projection of feed and residual use for the current year, feed and residual use during previous quarters of the current marketing year as available, the magnitude and quarterly pattern of feed and residual use in previous years, the inventory of livestock that was fed during the quarter, and the likely corn feeding rate per animal during the quarter implied by livestock production profitability, and competition from other feed ingredients.

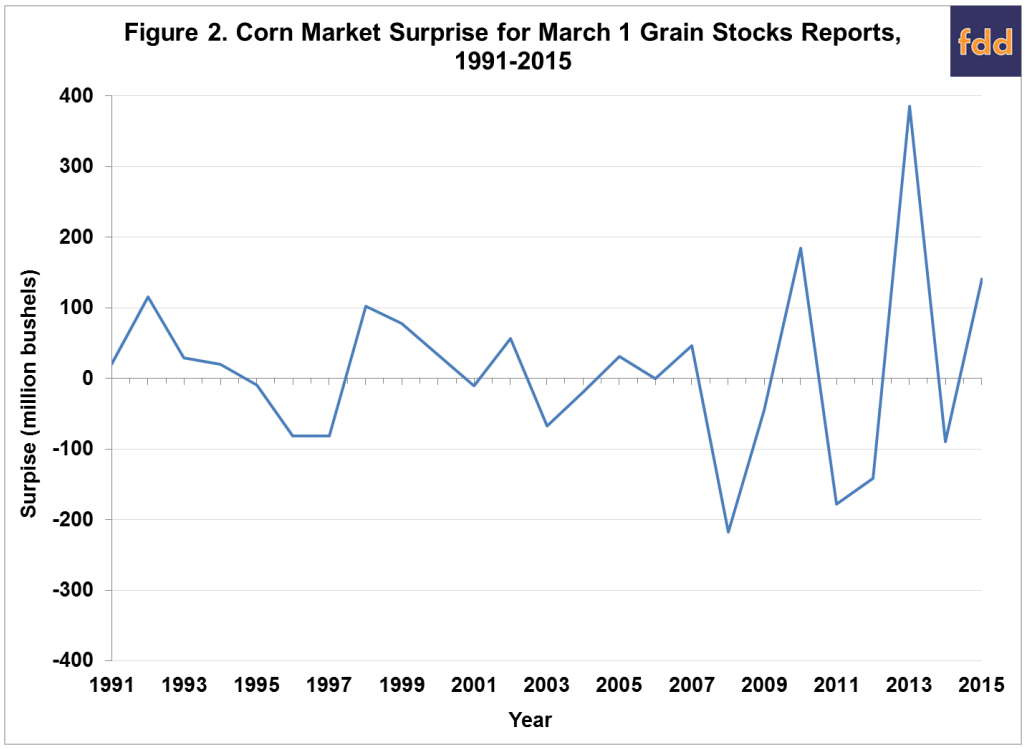
A number of market participants are surveyed by newswire services, such as Thompson/Reuters and Bloomberg, to ascertain the market's expectation, or "trade guess" for the soon-to-be released USDA

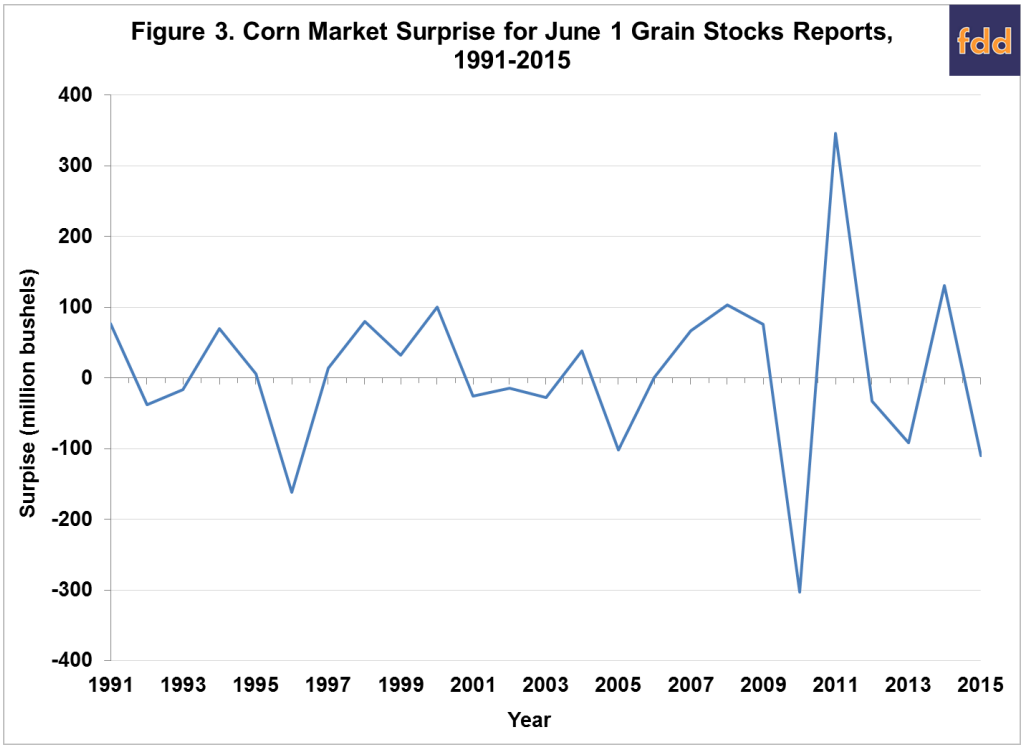
stock estimates. The individual guesses as well as the average guess are published prior to the release of the USDA estimates. If the USDA survey-based estimate of stocks at the end of the quarter differs from the expected level of stocks, the implication is that feed and residual use of corn during the quarter differed from expected use. The exception is for the first quarter of the marketing year. The expected magnitude of December 1 stocks reflects uncertainty about the actual magnitude of production. The "final" estimate of the size of the previous year's harvest is released on the same date as the December 1 *Grain Stocks* report. That final estimate almost always differs from the forecast of production that was made in November. To anticipate the magnitude of December 1 stocks, then, requires an estimate of use during the quarter and an expectation of the change in the size of crop estimate.

As indicated above, a surprise in the size of the quarterly corn stocks estimate implies a surprise in the level of feed and residual use of corn during the previous quarter. For December 1, March 1, and June 1 stocks estimates, a revealed rate of consumption that differs from the expected level implies that the previous USDA forecast of feed and residual use should be revised and/or that actual feed and residual use for the year will differ from the pre-report USDA forecast. Large surprises imply large revisions and potential price adjustments and *vice versa*.

Analysis

As we noted earlier, the corn market often seems to behave as if the magnitude of the surprise in the quarterly stocks estimate will be or should be fully reflected in changes in projected or actual levels of feed and residual use for the year. Is that expectation merited? Here, we examine USDA March 1 and June 1 stocks estimates over 1991-2015. For each report, we calculate the difference between the stocks estimates and the average trade guess. Figures 2 and 3 plot the corn market surprises for the March 1 and June 1 stock estimates, respectively. Note that the surprise is calculated as the USDA stocks estimate minus the average trade guess. A positive observation indicates that stocks were larger than expected (feed and residual use less than expected) and a negative observation means that stocks were smaller than expected (feed and residual use larger than expected). The March 1 surprise was generally in the range of +/- 100 million bushels from 1991-2007, but has since been in a much wider range of roughly -200 million to +400 million bushels. A similar pattern is evident for June 1 surprises.





The next step is to correlate the surprises to: 1) the difference in the marketing year feed and residual projection in the WASDE reports preceding and following the release of the stocks estimates (March/April and June/July), and 2) the difference between the USDA marketing year projection of feed and residual use prior to the release of the stocks estimates (March/June WASDE) and the final estimate of marketing year feed and residual use at the end of the year (November WASDE). We do not examine the same relationships for the December 1 stocks estimate due to the complication introduced by likely changes in the production estimates from the November forecast, as described above. In Figures 4 through 9, the magnitude of the surprise in the March 1 and June 1 stocks estimates is plotted on the horizontal axis. If the magnitude of the surprises in quarterly stocks estimate were reflected one-for-one in subsequent changes in WASDE forecasts of feed and residual use, or the difference between the WASDE forecast prior to the release of the stocks report and the final estimate of feed and residual use, the observations in Figures 4 through 9 would all fall on a line with a slope of -1 and an intercept of zero (stocks surprises and implied feed and residual usage surprises are identical but with opposite signs). In Figure 4, for example, a surprise of 100 million bushels in the March 1 stocks estimate implies that feed and residual use during the December-February quarter was 100 million less than expected. If that difference were fully reflected in the April WASDE report, the forecast of feed and residual use for the year would be 100 million bushels less than forecast in the March WASDE report.

The relationship between the March 1 stocks surprise and the change in the April WASDE forecast of feed and residual use (Figure 4) indicates that, as expected, a positive surprise is generally followed by a lower projection of feed and residual use and *vice versa*. However, the slope of the line (-0.49) indicates that the change in the feed and residual projection tends to be about half (in absolute terms) the size of the surprise in the stocks estimate. The fit is also relatively low, with an R2 of 0.52. The relationship between the March 1 stocks surprise and the difference between the March WASDE forecast and final estimate of feed and residual use (Figure 5) is not strong. The slope of the line (-0.35) indicates that the difference between actual feed and residual use and the March WASDE forecast is only 35 percent (in absolute terms) of the size of the surprise in the March1 stocks estimate. The widely scattered observations (R2 of only 0.07) suggests that the March 1 stocks surprise is not a good predictor of the difference between actual feed and residual use and the March WASDE forecast. This is not surprising since the marketing year is only half completed by March 1 and a number of factors other than feed and residual use during the second quarter of the marketing year will influence feed and residual use in the last half of the year. There are some large deviations between actual observations and the estimated fit in Figure 5. Excluding one of those large "outliers" (Figure 6) obviously improves the fit and suggests that the March 1 stocks estimate could be a slightly better predictor of the difference between actual feed and

residual use and the March WASDE forecast than implied by Figure 5. The difference has tended to be about 60 percent (in absolute terms) of the magnitude of the surprise.

Figure 4. Relationship Between March 1 Corn Stocks Surprise and Change in WASDE Feed and Residual Estimates from March to April, 1991 - 2015

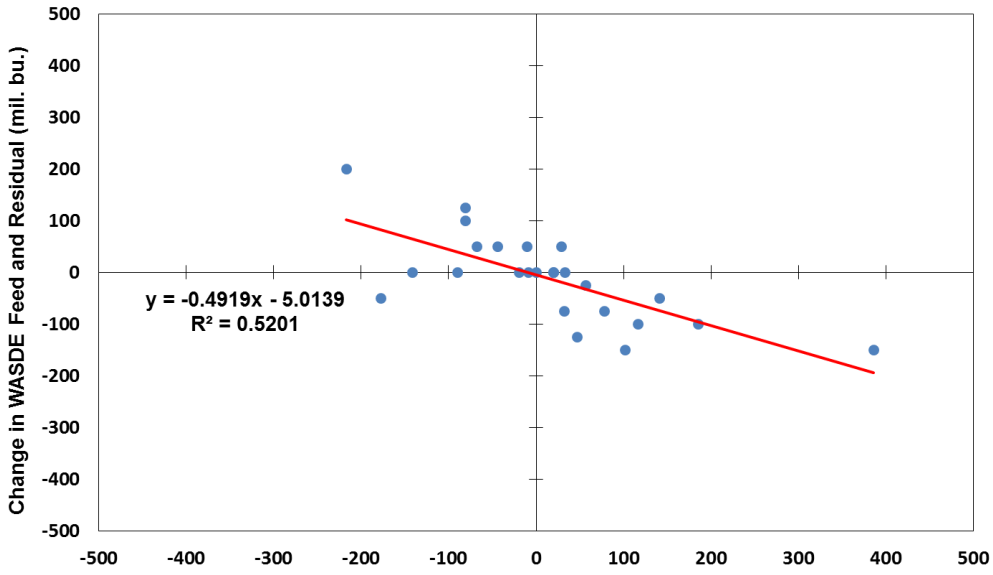
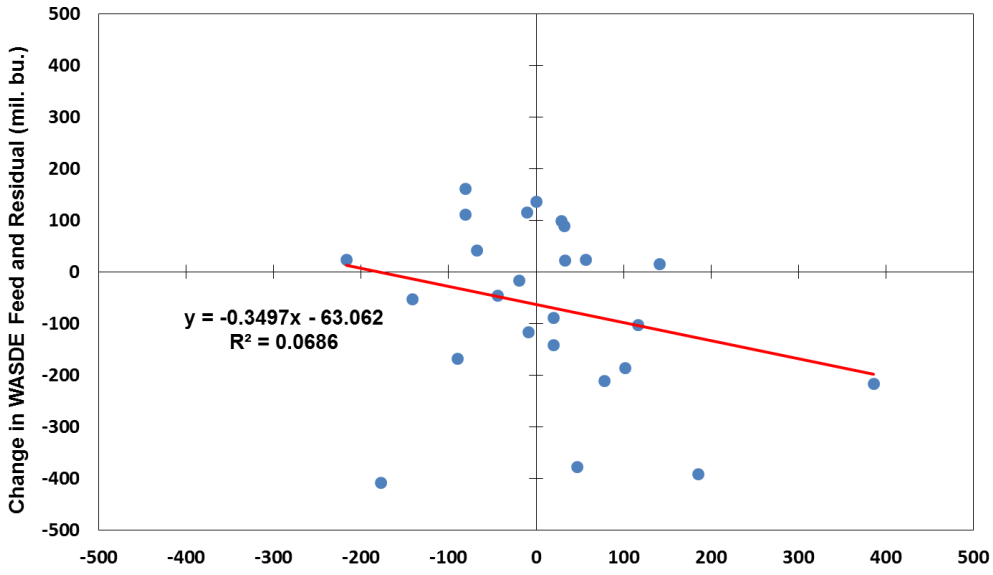
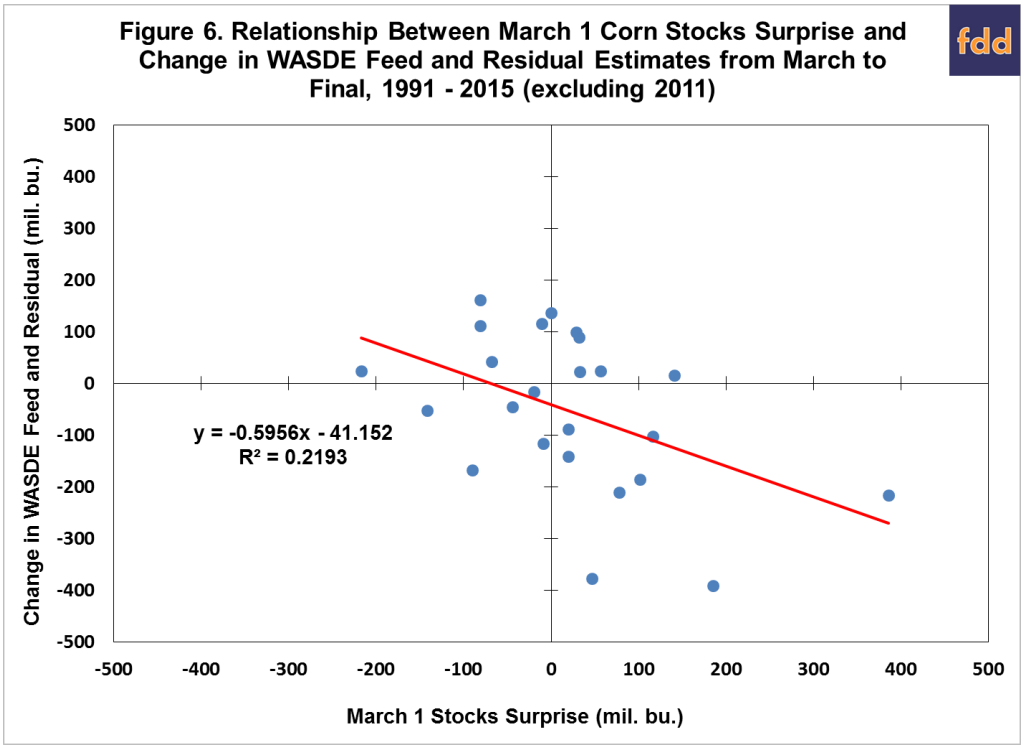
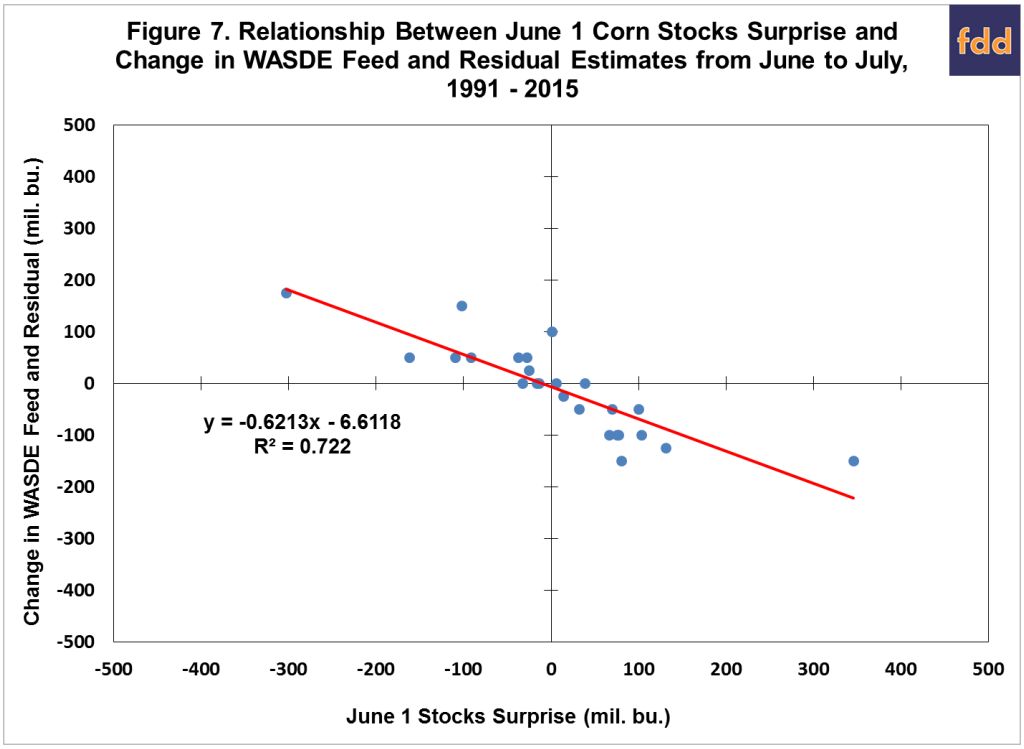


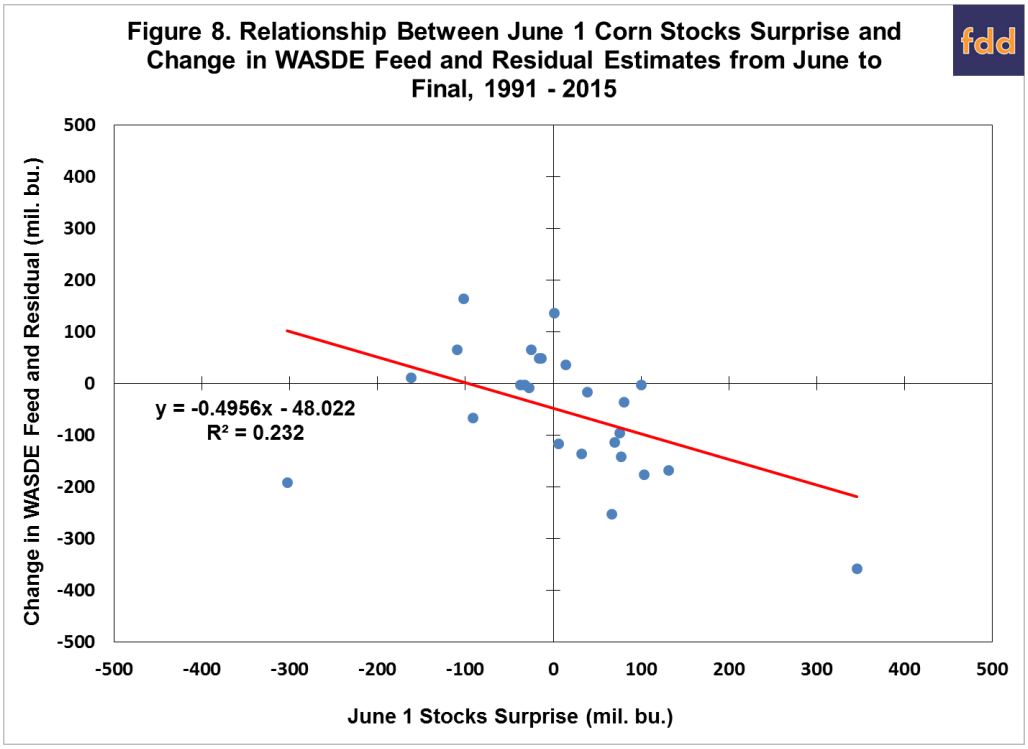
Figure 5. Relationship Between March 1 Corn Stocks Surprise and Change in WASDE Feed and Residual Estimates from March to Final, 1991 - 2015

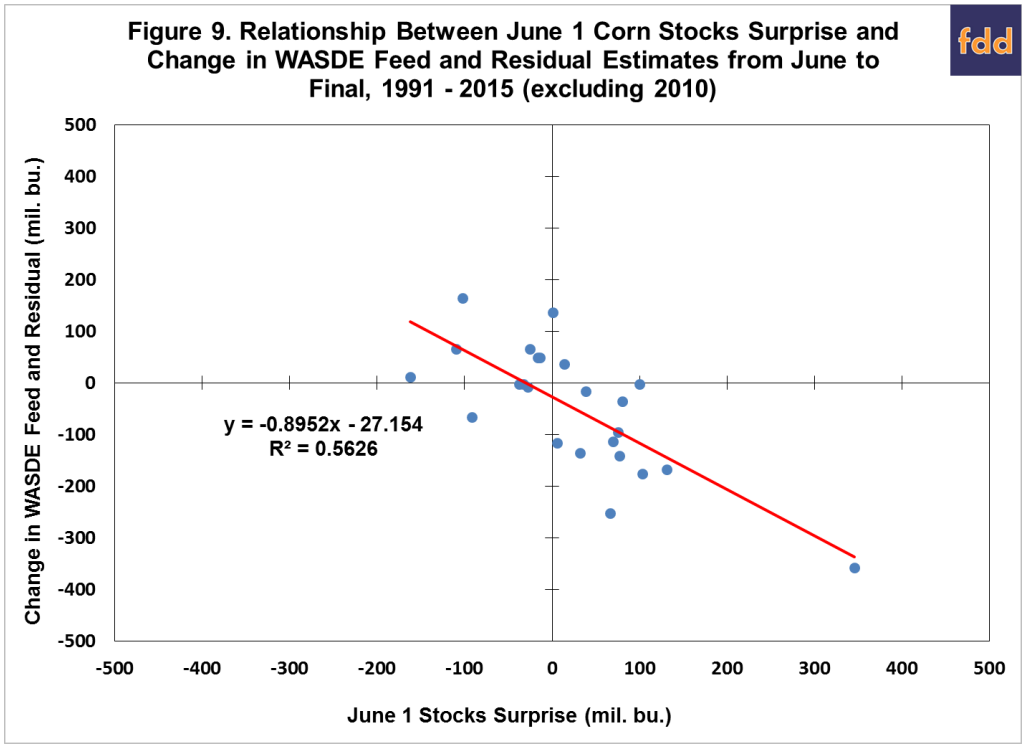




Figures 7 through 9 show the same analysis for the June 1 stocks report as described for the March 1 stocks report. Since the marketing year is nearer completion in June, the relationship between surprises in June 1 stocks estimates and both the changes in July WASDE feed and residual use projections and the differences between actual feed and residual use and the June WASDE forecast are expectedly much stronger than is the case for March 1. Still, the change in the feed and residual estimate in the July WASDE tends to be about 60 percent as large (in absolute terms) as the surprise in the June stocks estimate (Figure 7). The fit is respectable, with an R2 of 0.72. The difference between actual feed and residual use and the June WASDE forecast tends to be about half as large (in absolute terms) as the magnitude of the surprise in the June 1 stocks estimate (Figure 8), but the correlation is relatively low. Removing the large "outlier" of June 2010 substantially improves the R2 to 0.89 (Figure 9).







Implications

USDA estimates of March 1 and June 1 stocks estimates typically differ from the average trade guess, sometimes by a large margin. The corn market appears to often anticipate that the magnitude of the surprises will be fully reflected in either the projection of feed and residual use of corn in the subsequent WASDE report or in the difference between actual feed and residual use after the end of the marketing year and the projection of feed and residual use in the WASDE report preceding the release of the stocks estimate. History indicates that is generally not the case. There has been a lot of variation in the relationship between the magnitude of the surprises in the stocks estimates and the subsequent changes in projections or final estimates of feed and residual use (R2 of only 0.52). The change in feed and

residual estimates in the April WASDE report following the release of the March 1 stocks report has tended to be in the opposite direction of the surprise by about half the magnitude of the surprise. For June, the change has tended to be about 60 percent of the magnitude of the surprise and the fit between the magnitude of the surprise and the magnitude of the change in the feed and residual projection is relatively good (R2 of 0.72). So, surprises in the March 1 and June 1 corn stocks estimates clearly provide useful information about subsequent changes in USDA projections and final estimates of marketing year feed and residual use of corn. However, the corn market may have read too much into those surprises at times in the past as adjustments to USDA feed and residual use projections have tended to be smaller than the surprises in the stocks estimates and the magnitude of the adjustments relative to the magnitude of the stocks surprises have varied considerably. The upcoming June 30 *Grain Stocks* and July 12 WASDE reports will provide an opportunity to apply the lessons of history.

References

Irwin, S., D. Sanders, and D. Good. "The Role of Sampling Errors in Explaining Recent Surprises in USDA Corn Stocks Estimates: Part II." *farmdoc daily* (4):28, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 14, 2014.

Irwin, S., D. Sanders, and D. Good. "The Role of Sampling Errors in Explaining Recent Surprises in USDA Corn Stocks Estimates: Part I." *farmdoc daily* (4):27, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 13, 2014.

Irwin, S., D. Sanders, and D. Good. "Explanations for Recent Surprises in USDA Corn Stocks Estimates: How Well Do they Hold Up?" *farmdoc daily* (4):22, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 7, 2014.

Irwin, S., D. Sanders, and D. Good. "Is There a Problem with USDA Grain Stocks Estimates in Corn?" *farmdoc daily* (4):15, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 29, 2014.

Irwin, S., D. Sanders, and D. Good. "Evaluation of Selected USDA WAOB and NASS Forecasts and Estimates in Corn and Soybeans." *farmdoc daily* (4):8, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 17, 2014.

Irwin, S.H., D.R. Sanders, and D.L. Good. "Evaluation of Selected USDA WAOB and NASS Forecasts and Estimates in Corn and Soybeans." Marketing and Outlook Research Report 2014-01, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 2014.

USDA National Agricultural Statistics Service. *Grain Stocks* (quarterly). http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1079

USDA National Agricultural Statistics Service. *Grain Crushings and Co-Products Production*. http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1899

USDA Market News Service. *Grains Inspected and/or Weighed for Export*. https://www.ams.usda.gov/mnreports/wa_gr101.txt

USDA Foreign Agricultural Service. *Export Sales Reporting Program*. http://www.fas.usda.gov/programs/export-sales-reporting-program

USDA Foreign Agricultural Service. *Global Agricultural Trade System* (GATS). http://apps.fas.usda.gov/gats/default.aspx

U.S. Energy Information Administration. *Weekly U.S. Oxygenate Plant Production of Fuel Ethanol*. Released June 15, 2016, accessed June 16, 2016. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPOOXE_YOP_NUS_MBBLD&f=W

USDA Economic Research Service. *Feed Outlook*. http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1273