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Introduction

Short-term USDA balance sheet forecasts include six different asset categories (real estate, livestock and poultry, machinery and motor vehicles, crops stored, purchased inputs, and financial assets). The USDA forecast of farm sector total assets is the sum of its forecasts for these six different asset categories. We evaluate the USDA forecasts of farm sector total assets from the perspective of forecast consumers of the USDA's monthly *Agricultural Outlook.* More specifically, we test whether:

- forecast accuracy of farm sector total assets improved over 1986-2002;
- the updating processes result in more accurate predictions;
- past forecast errors provide a basis to issue better future forecasts; and
- the reliability of the USDA forecasts' exceeds that of forecasts issued by a CPI-based model.

How Accurate are USDA Forecasts?

Previous research on USDA forecast accuracy has emphasized forecasts of farm commodities. USDA evaluation of its own forecasts has generally concluded their forecast models are inefficient, with mixed results regarding forecast bias. As time progresses towards the date of the forecasted event, the number of unknown factors declines. Hence updating forecasts over time reflecting new information and improved data should result in better forecasts. Updating forecasts by the USDA has been shown to improve forecast accuracy. Surls and Gajewski found wheat forecasts the most accurate of the USDA's domestic grain production forecasts. Forecasts of domestic production were unbiased while forecasts of foreign coarse grain production were generally biased. They found dramatic improvements in forecast accuracy as forecasts were updated on a monthly basis. Forecasts of U.S. agricultural exports, although unbiased, experience a larger forecast error than forecasts of U.S. agricultural production. This is unsurprising given that forecasts of exports depend on predictions of exchange rates and the politically-drive decisions of many different countries. USDA forecasts of ending stocks, a residual between forecasts of production and use, have the largest forecast error. Denbaly et al. showed that monthly forecasts of seven components of the Bureau of Labor Statistic's food CPI series generated from an ARIMA model were more accurate than forecasts computed by the USDA.

Research in the academic community has generally arrived at similar conclusions as the USDA. Gunnelson, Dobson, and Pamperin found the USDA tends to underestimate annual crop size when forecasting potatoes, winter wheat, and spring wheat. They found USDA's first forecasts were superior to a naïve forecast and that updating forecasts improved accuracy. Baur and Orazem found the USDA's forecasts of orange production to be unbiased and efficient from 1973-1992. Irwin, Gerlow, and Te-ru Liu found no meaningful difference between the accuracy of forecasts issued by the USDA for livestock or those based on the futures price from 1980 through 1991. Kastens, Schroeder, and Plain found extension forecasts to be more accurate than USDA forecasts for livestock but not crops from 1983-1995. Forecasts from the American Agricultural Economics Association's (AAEA) Annual Outlook Survey are more accurate than USDA forecasts for both livestock and crops. Bailey and Brorsen found that the USDA

underestimated production and supply for beef and pork from 1982-1989. During 1990-1996 this bias disappeared and forecast variance declined such that USDA forecasts in the last few years of the study period were deemed as optimal forecasts. However, Sanders and Manfredo found that USDA forecasts quarterly forecasts of beef, pork, and poultry production over 1982 through 2000 did not improve over time, failed to incorporate information contained in past forecasts, and were inefficient. They did conclude that the USDA forecasts are unbiased and more accurate than those produced by a simple autoregressive time-series model. Egelkraut et al. found the USDA's forecast errors regarding monthly corn production are unbiased and generally smaller than those for two private forecast agencies from 1971-2000. Results were mixed for soybean production. Updating forecasts improved the USDA's forecast accuracy as the crop year progressed.

Data

Estimates or Actuals: Initial and Revised

The USDA issues its first, initial estimate of total farm sector assets for December 31st of each year about a year after the date being estimated. The lag between the December 31st date being estimated and the actual date the initial estimate is issued (i.e., published in *Agricultural* Outlook) ranged from 4 to 25 months from 1986-2001, averaging about 13 months. For example, the USDA's first or initial estimate of farm sector total assets for December 31, 2001 was issued in December 2002. Following the issuance of its initial estimate of total farm assets, the USDA continues to issue revised estimates in the future as more and better data become available. We contrast both the USDA's initial and most recently revised estimates of actual total farm assets as of December 31st for each year from 1986-2001 against the USDA's time series of predictions. *Agricultural Outlook* ceased publication in December 2002.

Predictions: Forecasts and Backcasts

The USDA issues its first prediction in the first quarter of the forecasted year. Predictions are updated over time throughout the forecasted year and usually continue well into the following year, ending just before the USDA publishes its first or initial estimate. We refer to predictions made before the December 31st date of the predicted year as forecasts. Predictions issued after the December 31st date are referred to in the paper as backcasts.

For example, the first prediction for the total farm sector assets for December 31, 2001 was presented at the World Agricultural Outlook Forum in late February 2001 and published in Agricultural Outlook in March 2001. This prediction is referred to in our paper as the first forecast. During 2001 the USDA issued three more forecasts for total assets for December 31, 2001 (in June, September, and December 2001). The initial prediction and the three updated predictions issued during 2001 for the level of total farm assets for December 31, 2001 are referred as forecasts. During 2002, the USDA issued three more predictions in April, August, and September for total farm assets for December 31, 2001. These three predictions issued in 2002 after the forecasted date (December 31, 2001) are backward-looking predictions or backcasts. In December, 2002, the USDA issued its first or initial estimate of total farm assets for December 31, 2001.

Thus 7 predictions for total farm assets on December 31, 2001 were issued over a 2-year period. The first 4 predictions were issued in March, June, September, and December of 2001. These four predictions are referred to as *forecasts.* The latter 3 predictions for total farm assets on December 31, 2001 were issued in April, August, and September of 2002. These latter 3 are

referred to as *backcasts*, in that they were issued after the forecasted date (December 31, 2001) but before the USDA issues its first estimate during December 2002.

From 1986 through 2001, 11 of the 16 first forecasts are issued in January of the forecast year, with a total of 14 being issued by March. The other two first forecasts were issued in June and October of the forecasted year. Predictions issued after the December of the forecast year are referred to in our paper as *backcasts*. The final backcast is usually issued late in the following year but still prior to the USDA's issuance of its initial estimate for the previous year. Two of the final 16 backcasts are issued in the first half of the following year. The other fourteen are issued in the latter half of the following year.

The USDA made as many as 8 forecasts for a particular year (1986) to as few as 4 forecasts for a particular year. There were a total of 91 forecasts made for the 16 different years from 1986-2001. About half of the 91 predictions are issued prior to December of each year (thereby being classified as forecasts) while the other half are issued after December of the year of the forecast (thereby being classified as backcasts).

Both the forecasts and estimates are obtained from various issues of the USDA's *Agricultural Outlook* from 1986 through 2002.

Evaluating Forecast Accuracy

Forecast Error (E) is defined as the difference between the USDA's estimate of actual total assets (A) and the USDA's prediction (F) of total farm assets; E = A - F. Forecast errors are calculated using both the initial estimate and a recent revised estimate of farm sector total assets.

Four statistics are used to measure the USDA's out-of-sample forecast performance of farm sector total assets: the mean error (ME), the mean absolute error (MAE), the root mean squared error (RMSE), and the mean absolute percentage error (MAPE). The larger these measures of forecast evaluation, the greater the model's typical forecast error and the less accurate and reliable is the model's forecasts.

The CBO uses *mean error* ME, the arithmetic average of all the forecast errors, to measure statistical bias in its forecasts. ME is likely to be small since positive and negative errors tend to offset each other. While ME indicates if there is systematic under- or over-forecasting, it indicates little about the size of the typical forecast error.

The CBO uses MAE and the RMSE to measure the accuracy of its forecasts. The MAE is the average of forecast errors without regard to arithmetic signs. The MAE measures the average distance between forecasts and actual values or estimates without regard to whether the forecasts are too high or too low. The RMSE is the square root of the arithmetic average of the squared errors. The RMSE also shows size of forecast error without regard to sign, but it gives a larger weight to larger forecast errors.

Each of the above statistics is a measure of accuracy whose size is affected by the scale of the data. This creates problems when making comparisons across different time periods. This problem in making comparisons over time can be handled by using the mean absolute percentage error (MAPE) measure. Both RMSE and MAPE are measures of dispersion of the forecast error and are the most commonly used criteria in forecast evaluations (Makridakis; Armstrong and

Collopy). RMSE is the most commonly used criteria in the agricultural economics literature (Allen).

Another means of evaluating a forecaster is the *informational efficiency* of its forecasts. If additional information at the forecaster's disposal when the forecast was made could have been used to improve the forecast, then the forecaster is regarded as informationally inefficient. For example, if an alternative model issues superior forecasts to Model X, then Model X can be said to be inefficient.

A commonly used means of measuring informational efficiency is to contrast the accuracy of forecasts issued by the forecast model of concern to those issued by other forecast models. For example, the Congressional Budget Office contrasts the bias and accuracy of its forecasts to those issued by the *Blue Chip Forecasts* and the Administration's forecasts. Another approach is to contrast forecasts issued by the model of concern to those issued by a naïve model. A naïve no-change model is one which assumes the best expectation of the next unknown value is the currently known value.

Econometric and univariate forecast models often do badly when contrasted to naïve models (Allen). Mechanical forecast models like the naïve model or various rules-of-thumb issue low-cost forecasts that do not require an expert's advice. A minimum criterion for expert forecasters is that they issue forecasts which are more accurate than those issued by a naive forecaster.

Evaluating USDA Forecasts of Farm Assets

Tomek notes that data provided by government agencies are subject to frequent revision. He suggests that models should be run with both the original and revised data sets to see what role, if any, data revisions play in appraising results. Following Tomek's suggestion, we test the accuracy of the USDA's forecasts using both the USDA's initial estimate and the most recently revised USDA estimates of total farm assets from 1986-2002.

We trisect the times series of estimates and forecasts into three periods (1986-1989; 1990-1995; and 1996-2001) in order to determine if the USDA has improved forecast accuracy over time. We compare USDA forecast accuracy to its backcast accuracy to determine if updating USDA predictions results in more accurate predictions. We use a rolling measure of bias in the USDA's forecasts to see if this information can be used to improve future USDA forecasts.

We contrast the USDA forecasts to the forecasts issued by a naive model that assumes each year's farm sector assets is equal to the most recently observed initial estimate of farm sector assets plus an inflation premium. The inflation factor represents the change in the CPI expected to occur between the two initial estimates of farm assets. The most recent one-, two-, or three-year change in the CPI that would have been known to the USDA forecasters at the time the naïve model makes its forecast is used as the expected inflation premium. The naive model issues its forecasts in January of the forecasted year. Due to the USDA lag between the date of the forecasted event and the date the initial estimate is published, there is at least a two-year difference between the most recently observed initial estimate and the forecasted estimate. For example, in January of 1990 the naive model uses the initial estimate for 1988 in its forecast for the December, 31, 1990 estimate of total assets. In January of 1990, the most recently observed two-year percentage change in the CPI is used to convert the 1988 initial estimate to obtain the naïve model's forecast for 1990. In 5 of the 14 forecasted years, there is a two-year lag. In seven of the

14 forecasted years, there is a three-year lag. In the 7 years that use a three-year lagged initial estimate to issue its forecast, the forecast is updated later in the year when the newer, two-year lagged initial estimate is issued by the USDA. The naïve model's forecasts for the initial estimates are the same as for the revised estimates. Because of the lag between the date of the forecasted event (December 31st of each year) and the USDA issuing the initial estimate, forecasts are for the years 1988-2001.

We also contrast the USDA's backcasts to backcasts issued by a naive model. This naive model's backcasts for total farm assets are issued in February of the following year and are updated only twice, once in 1994 (September) and again in 2000 (March). In 1994 and 2000, this one-year lagged initial estimate was not yet available, hence the first backcast is the initial estimate two years before the backcasted year plus the two-year inflation rate. When the initial estimate for the year preceding the backcasted year becomes known later in the year, the backcast is updated by substituting the one-year lagged initial estimate and a one-year inflation premium is added.

For 13 of the 15 backcasts, the first backcast by the naive model is based on the initial estimate of the year preceeding the backcasted year plus the actual inflation rate (which is known by the date of the backcast) between those years. Seventeen forecasts in all are issued by the naive model over 1987-2001 with the initial backcast occurring in February for 1988-2001 and in March for 1987.

Results

USDA Forecast Accuracy 1986-2002

Table 1a shows the four forecast criteria for the three periods where the revised estimate of farm sector total assets is our forecasted "actual." The column heading "FOR" gives the number of forecasts evaluated in each of the three periods. A decline in the forecast evaluation scores indicates an improvement in forecast accuracy over time.

The four statistical evaluation results do not indicate an improvement in forecast performance over time. The best period for all four forecast criteria was 1990-1995. However, the MAPE (4.5) for 1996-2001 is smaller than the MAPE (4.95) for 1986-1989, indicating some improvement over time when the increase in the total assets over time is taken into account.

Table 1b shows the same patterns exists when the initial estimate of farm sector total assets is used as our "actual." These scores are lower than their equivalent scores in Table 1a, indicating that the USDA forecasts are a more accurate indicator of the USDA's initial estimate than its later revised estimate.

Updating USDA Forecasts

Tables 2a and 2b indicate whether updating forecasts improves forecast accuracy. An improvement in forecast accuracy is indicated when "Backcasts" show lower forecast error scores than "Forecasts." Table 2a shows the four forecast evaluation scores for forecasts and backcasts for the revised estimate and 2b for the initial estimate. All four measures of forecast error are relatively lower for the USDA backcasts.

USDA Forecast Bias

Forecast bias is evidenced when the average of the historical forecast errors differs from zero; i.e., ME = 0. The mean errors (ME) in Tables 1a and 1b are positive and large in magnitude for all three periods except the first period in Table 1b. A positive ME indicates that the forecasts are on average too low. For example, the ME = 27.59 in Table 1a means that from 1996-2001 the USDA's forecast for the revised estimate from 1996-2001 was on average $27.59 billion too low. Given that farm sector total assets averaged over $1.1 trillion dollars over 1996-2001, this means that the USDA bias was only about 2.5 percent below average.

Does Accounting for Bias Improve USDA Forecast Accuracy?

We test whether past bias can be used to improve USDA's future predictions. Each time a new initial estimate is issued, the forecast error is updated, creating a rolling measure of the USDA's average forecast error or bias across time. Note that for this test we cannot use previously estimated bias to forecast the first year (1986), since it has no previous forecast error by which to adjust the USDA forecast. Hence the first period represents 15 bias-adjusted forecasts made from 1987-1989.

In order to better contrast the relative forecast performance of the models with and without the adjustment for bias, Tables 3a and 3b present the ratios of the forecast evaluation scores with adjustment for bias to without adjustment for bias. A ratio less than unity indicate adjusting for bias reduces error in the USDA forecasts. A ratio greater than unity indicates adjusting for bias increases error in USDA forecasts. A ratio equal to unity indicates the bias adjustment has no effect on the USDA forecast performance.

Table 3 shows the results of using the bias or average forecast error incurred in earlier period forecasts to adjust forecasts for the next estimate. Ratios greater than unity for forecasts of both the revised (Table 3a) and initial (Table 3b) estimate of farm sector total assets indicate early adjustments for bias increase forecast error in contrast to no adjustment from 1987-1989. However, in the second period (1990-1995) the ratio begins to fall below 1.0, indicating that adjusting the USDA's forecasts for previously observed bias slightly improved forecast performance. By the third period (1996-2001) the ratios are below unity and even smaller than the second period. Forecast accuracy increases as we increase the number of forecast errors used to calculate the USDA's bias-adjustment factor. The results suggest that future forecasts by the USDA may benefit by adjusting for systematic forecast error observed in earlier periods.

Forecasting the Initial Estimate: USDA versus CPI-Based Model

Table 4a contrasts USDA forecasts to CPI-based forecasts for the USDA initial estimate of total farm sector assets. USDA-I represent only the USDA first forecast for the initial estimate. These first forecasts are issued as early as January of the forecast year and no later than March. Eleven first forecasts were issued in January, one in February, and two in March. Naive-I represents the first forecast issued of the initial estimate by the naive model. The first forecast issued by the naive model for December 1988 was in March 1988 while all subsequent 13 first forecasts for each subsequent year from 1989-2001 are issued in January of the forecasted year.

The first two rows in Table 4a show that the first forecasts from the naive model outperform forecasts made by the USDA. The RMSE for the USDA-I is 56.83 whereas it is 46.28 for Naive-I. MAPE for the USDA-I model is 4.47 whereas it is only 3.70 for the Naive-I.

USDA-II represents all forecasts throughout the forecast year made prior to the December 31 date. Updates are issued as early as April and as late as December. The average update is issued about August. A total of forty forecasts, 14 first and 26 updates, were issued by the USDA from 1988-2001. Naive-II issues updated forecasts only in those years in which a newer initial estimate is made by the USDA later during the forecast year. This occurs in seven of the fourteen years. Updates are issued as early as April and as late as November, with the average update in the years with updating occurring in August. Hence a total of 21 forecasts, 14 initial and 7 updates, are issued by the naive model from 1988-2001.

The last two rows in Table 4a show that while both the USDA and the naïve model improve with the inclusion of updating forecasts, the naïve model (Naïve-II) outperforms the USDA model (USDA-II). The naïve model without any updating (Naïve I) outperforms the USDA's combined first and updated forecasts (USDA II).

Backcasting the Initial Estimate: USDA versus CPI-Based Model

Table 4b contrasts backcasts by the naive model to those issued by the USDA for the initial estimate. The naïve model outperforms the USDA forecaster for early backcasts. USDA-I and Naive-I in Table 4b show the results for backcasts made within the first quarter of the year (except for 2000 when the USDA issued its first forecast in April). The RMSE and MAPE for the USDA I forecaster are 32.24 and 2.34 percent versus the hurdle model's 30.32 and 2.23 percent.

However, when all of the backcasts issued by the USDA are compared to the all of the backcasts issued by the naive model, the USDA's backcasts are more reliable. The RMSE and MAPE for the USDA (USDA II) are 27.75 and 1.82 percent versus 30.09 and 2.27 percent for the naïve forecaster. Twenty four of the USDA's 40 backcasts (60 percent) are made after April. Only one more backcast is issued by the hurdle model after the first quarter. The addition of the more-informed, later backcasts by the USDA are the reason the evaluation scores for the USDA's over the full year (USDA-II) are superior to the hurdle model's (Hurdle II). This may reflect that the USDA is now making updated forecast based on some of the actual data which it will use to make its estimates of total farm sector assets. While the USDA manages to reduce and even eliminate the forecast gap between itself and the naïve model over time, it is not until late in the year following the forecasted date that the naïve model's superiority is overcome.

Predicting the Revised Estimate: USDA versus CPI-Based Model

Tables 5a and 5b show the same test models run on forecasts of the revised estimate. Table 5a shows the naive model outperforms the USDA both with and without updated forecasts included. RMSE and MAPE scores are considerably lower for the naive model for both the early-year forecasts as well as the full-year forecasts. Table 5b again shows the same occurs for the backcasts as well. Unlike the backcasts of the initial estimate (Table 4b), updating backcasts of the revised estimate does not improve the USDA's reliability in contrast to the naïve model. Interestingly, knowledge of some of the data used to make the USDA's initial estimate does not improve USDA forecast accuracy vis-à-vis a naïve model regarding the future revised data.

Conclusions

Based on our analysis of the USDA's forecasts of the farm sector's total assets from 1986-2002 as published in the USDA's Agricultural Outlook:

(1) USDA predictive accuracy has not improved over time

Four different statistical forecast error criterion (rmse, mae, mape, and mean error) indicate that USDA forecast accuracy did not improve from 1986-2002. Previous research has shown similar results for other private and public sector agencies' forecasts of other economic and financial variables.

(2) Updating improves USDA predictive accuracy

One test of informational efficiency is that as time progresses toward knowledge of the forecasted actual number, forecast accuracy should improve. That the USDA improves its accuracy when it updates its earlier forecasts indicates there are informational gains to USDA forecast consumers from its updating process.

(3) USDA predictions could benefit somewhat by incorporating past errors

Past research shows that measuring and incorporating past bias rarely translates into better future forecasts. However, in the case of USDA predictions of farm sector total assets, we show a reduction in future forecast error would have occurred if the USDA adjusted its predictions by the bias (mean error) in its earlier forecasts. While the reduction in forecast error was marginal, it increased over time.

(4) USDA prediction errors exceeds those of a CPI-based model

Our research showed the USDA could have improved its forecast accuracy had it accounted for inflationary expectations from 1986-2002. However, future research would be necessary to determine whether the use of inflationary expectations would have shown the same improvements in earlier periods.

Following the results presented in this paper, future forecast models of farm sector total assets might consider incorporating the information contained in inflationary expectations. The accuracy of CPI-based forecasts is a useful minimum hurdle for any economic model used to forecast nominal values. Further improvements in forecast accuracy might also be achieved through evaluating the accuracy of predictions of the six different asset categories that comprise farm sector total assets.

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Table 1a

Scores for USDA Predictions of Revised Estimates of Total Farm Assets

Period	ME	MAE	RMSE	MAPE	PREDS
1996-2001	27.59	52.04	61.65	4.5	32
1990-1995	15.44	21.26	25.64	2.36	32
1986-1989	32.35	38.53	42.90	4.95	27

Table 1b

Scores for USDA Predictions of Initial Estimates of Total Farm Assets

Period	ME	MAE	RMSE	MAPE	PREDS
1996-2001	28.63	42.94	54.52	3.71	32
1990-1995	11.70	17.89	23.39	1.98	32
1986-1989	-2.10	18.14	24.95	2.44	27

Notes:
ME: mean error
MAE: mean absolute error
RMSE: root mean squared error
MAPE: mean absolute percentage error
PREDS: number of quarterly predictions evaluated for the period

Source: *Agricultural Outlook*; Economic Research Service/U.S. Department of Agriculture.

Table 2a

Predictive Accuracy Scores for Revised Estimates of Total Farm Assets 1986-2002

	ME	MAE	RMSE	MAPE	PREDS
Backcasts	17.31	30.26	36.09	3.16	45
Forecasts	31.98	44.00	53.92	4.58	46

Table 2b

Predictive Accuracy Scores for Initial Estimate of Farm Assets 1986-2002

	ME	MAE	RMSE	MAPE	PREDS
Backcasts	6.22	17.81	26.64	1.83	45
Forecasts	20.70	35.54	46.04	3.60	46

Notes:
ME: mean error
MAE: mean absolute error
RMSE: root mean squared error
MAPE: mean absolute percentage error
PREDS: number of quarterly predictions evaluated for the period

Source: *Agricultural Outlook*; Economic Research Service/U.S. Department of Agriculture.

Table 3a

Ratios of Scores for Revised Estimates with and without Adjustment for Bias

Period	ME	MAE	RMSE	MAPE	PREDS
1996-2002	0.61	0.94	0.94	0.95	32
1990-1995	0.56	0.99	1.00	0.99	32
1987-1989	1.17	1.16	1.17	1.16	15

Table 3b

Ratios of Scores for Initial Estimates with and without Adjustment for Bias

Period	ME	MAE	RMSE	MAPE	PREDS
1996-2002	0.63	0.97	0.96	0.97	32
1990-1995	0.91	0.98	0.99	0.98	32
1987-1989	2.36	1.37	1.22	1.38	15

Notes:
ME: mean error
MAE: mean absolute error
RMSE: root mean squared error
MAPE: mean absolute percentage error
PREDS: number of quarterly predictions evaluated for the period
Ratio = score with adjustment for bias divided by score with unadjusted USDA prediction

Source: *Agricultural Outlook*; Economic Research Service/U.S. Department of Agriculture.

Table 4a

USDA and Naïve Forecasts on Revised Estimates of Total Farm Assets 1988-2002

	ME	MAE	RMSE	MAPE	PREDS
USDA - I	30.29	49.89	62.05	5.00	14
Naïve – I	24.55	37.05	46.88	3.75	14
USDA – II	32.60	45.91	55.98	4.64	39
Naïve – II	23.98	34.51	43.48	3.55	21

Table 4b

USDA and Naïve Forecasts on Initial Estimates of Total Farm Assets 1988-2002

	ME	MAE	RMSE	MAPE	PREDS
USDA - I	24.79	45.52	56.83	4.47	14
Naïve – I	19.05	37.62	46.28	3.70	14
USDA – II	25.48	38.24	48.59	3.76	39
Naïve – II	17.36	32.45	41.72	3.20	21

Note 1:
ME: mean error
MAE: mean absolute error
RMSE: root mean squared error
MAPE: mean absolute percentage error
PREDS: number of quarterly predictions evaluated for the period

Note 2
USDA I is the initial forecast issued by the US Department of Agriculture for total farm assets at the beginning of the year. USDA II represents all forecasts issued by the USDA in the year of the forecast date. Naïve I is the initial forecast issued by the CPI-adjusted model for total farm assets at the beginning of the year. Naïve II represents all forecast issued by the CPI-adjusted model in the year of the forecast date.

Source: *Agricultural Outlook*; Economic Research Service/U.S. Department of Agriculture.

Table 5a

USDA and Naïve Backcasts on Initial Estimates of Total Farm Assets 1987-2002

	ME	MAE	RMSE	MAPE	PREDS
USDA – I	8.04	23.24	32.24	2.34	15
Naïve – I	12.5	23.33	30.32	2.23	15
USDA – II	8.64	18.4	27.75	1.82	39
Naïve - II	14.29	23.84	30.09	2.27	17

Table 5b

USDA and Naïve Backcasts on Revised Estimates of Total Farm Assets 1987-2002

	ME	MAE	RMSE	MAPE	PREDS
USDA – I	16.66	35.39	41.38	3.62	15
Naïve – I	27.07	25.49	35.46	2.52	15
USDA – II	16.20	31.14	37.26	3.14	39
Naïve - II	22.57	28.29	36.05	2.81	17

Note 1
ME: mean error
MAE: mean absolute error
RMSE: root mean squared error
MAPE: mean absolute percentage error
PREDS: number of quarterly predictions evaluated for the period

Note 2
USDA I is the initial backcast issued by the US Department of Agriculture for total farm assets at the beginning of the year following the forecast date. USDA II represents all backcasts issued by the USDA in the year following the forecast date. Naïve I is the initial backcast issued by the CPI-adjusted model for total farm assets at the beginning of the year following the forecast date. Naïve II represents all forecast issued by the CPI-adjusted model in the year following the forecast date.

Source: *Agricultural Outlook*; Economic Research Service/U.S. Department of Agriculture.