How Informative are the USDA Baseline Projections?

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Introduction

United States Department of Agriculture (USDA) has recently released the baseline projections about the US agricultural sector for the next ten years until 2031/32 (USDA Office of Chief Economist, 2022). The baseline report contains information about factors influencing agricultural markets for the next decade, including projections of commodity prices, production, global agricultural trade, and aggregate indicators such as farm income. The baselines provide a neutral conditional scenario against which alternative policies can be evaluated, and they have been widely used in formulating policy. For example, the commodity projections in the USDA baselines serve as an important input to estimate farm program costs while preparing the President's budget. The baseline projections are also crucial in the context of recovery from the ongoing Covid pandemic and the trade wars during the previous years as policymakers weigh their policy options. The availability of such long-term information is crucial for legislation such as the 2023 Farm Bill.

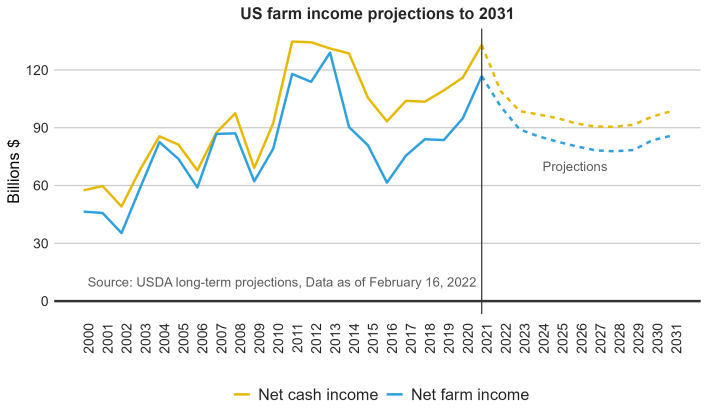

Figure 1: Projections of US net farm income and net cash income, 2022–2031

Projections of US farm income and major field crops

After increasing for two consecutive years, US net farm income and net cash income are projected to decrease in 2022. Net farm income is projected to decrease by 13.5 percent, from $116.8 billion in 2021 to $101 billion in 2022. On the other hand, net cash farm income is projected to decrease by 18.1 percent from $133 billion in 2021 to $109 billion in 2022. The decline in farm income can be attributed to lower government payments, including Covid-19 related payments. Both measures of farm income are projected to decline through 2028 before increasing for the years 2029-2031.

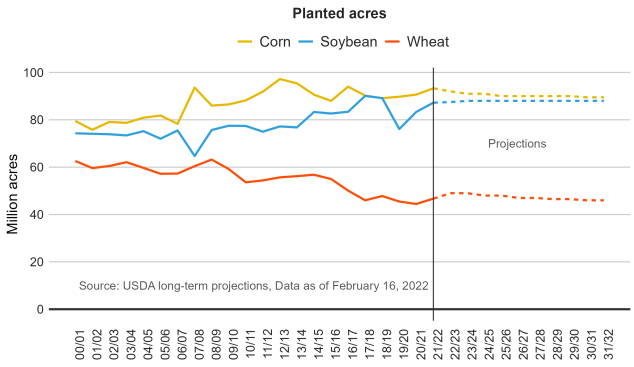

Figure 2: Projections of planted acres of major field crops, 2022/23–2031/32

The planted acres of soybeans are expected to remain stable through 2031/32, while corn and wheat planted acres may see a small decline over the period. Corn yield is expected to grow substantially during this period, from 181 bushels/acre in 2022/23 to 199 bushels/acre in 2031/32. The nominal corn price is projected to be $4.80/bushel for the 2022/23 marketing year, decline to $4.00/bushel over the next four years, and remain steady until 2031/32. Similarly, the nominal soybean price is projected to start at $10.50/bushel in 2022/23, and fall through 2026/27 before flattening at $10.00/bushel for the remainder of the projection. The wheat price starts at $6.50/bushel in 2022/23, falls to $5.50/bushel in 2024/25, and then further down to $5.25 in 2029/30 through 2031/32.

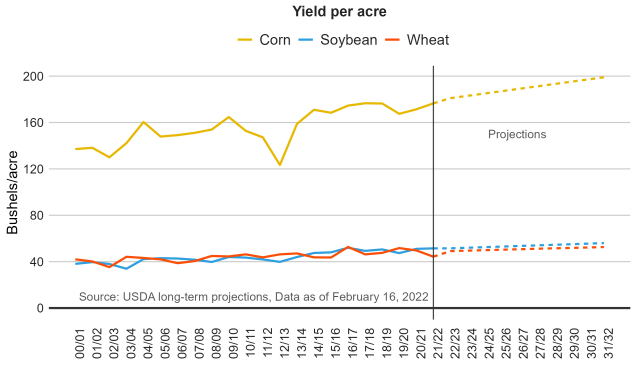

Figure 3: Projections of yield per acre of major field crops, 2022/23–2031/32

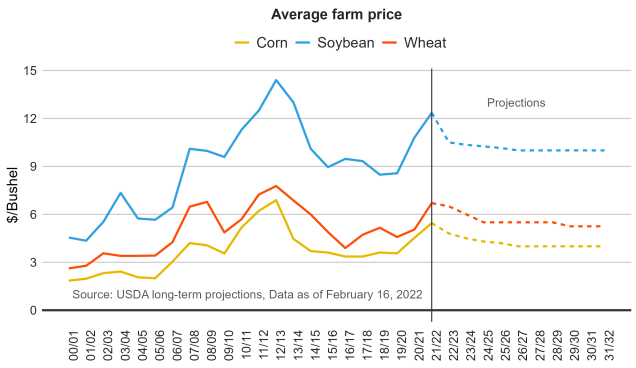

Figure 4: Projections of average farm price of major field crops, 2022/23–2031/32

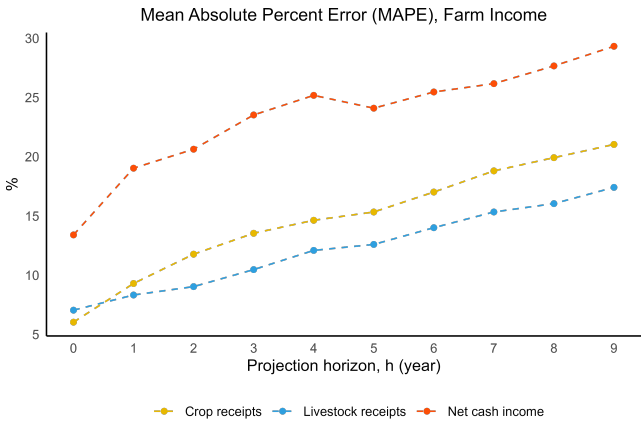

Figure 6: Mean absolute percent error (MAPE) for projections of net cash income, crop receipts and liveestock receipts

Accuracy and Informativeness of the baselines

Despite their importance to policy, the baseline projections have not been rigorously evaluated in the literature. A recent working paper examines the accuracy and informativeness of the agricultural baselines (Bora et al., 2021a). The study finds that the projection error, defined as the difference between the projected and realized values, increases with the projection horizon, suggesting that the projections are less accurate when the future is far ahead. The study also examines the degree to which the projections consistently differ from their realized values. The findings suggest that the baselines consistently under-predict soybean harvested acres and over-predict wheat harvested acres, consistent with previous studies (Boussios et al., 2021). The projections of net cash income, crop receipts, and livestock receipts are also under-predicted, and the magnitude of under-prediction increases with the projection horizon. These findings suggest that baseline projections may also exhibit asymmetric loss, as shown for USDA short-term forecasts (Bora et al., 2021b).

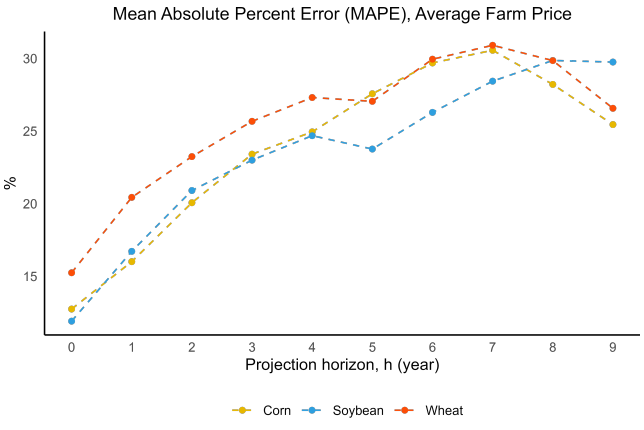

Figure 5: Mean absolute percent error (MAPE) for projections of season average farm price of corn, soybean, and wheat

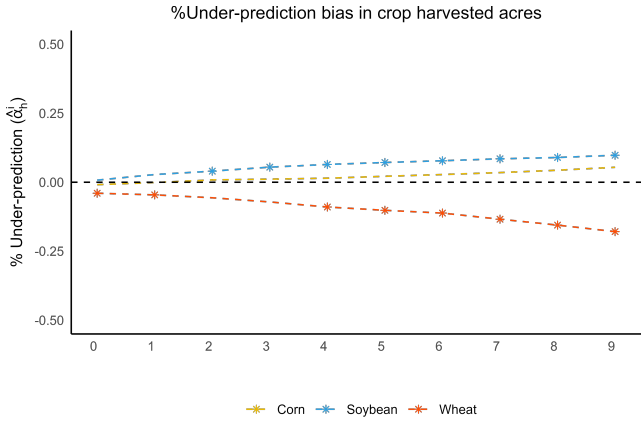

Figure 7: %Bias in harvested acre projections, (*) suggests statistically significant at 5%

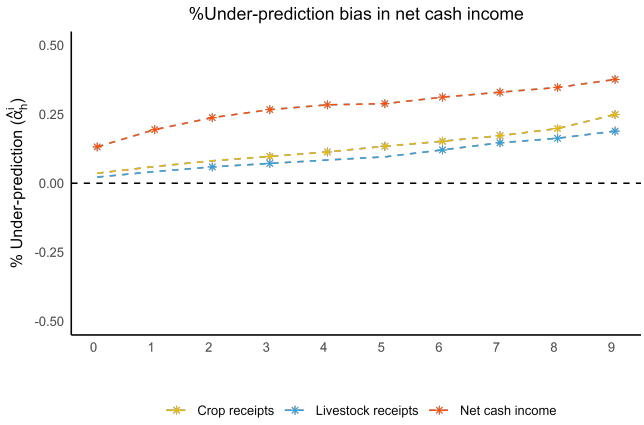

Figure 8: %Bias in net cash income projections, (*) suggests statistically significant at 5%

The study asks an interesting question: How long into the future the projections stay informative? The question is vital for how market participants use the baselines and future revisions of the baseline models. The results suggest that the informativeness of most of the baseline projections diminishes after four to five years into the future. There are differences, however, across variables. The projections of crop yields stay informative for nine years, with the reduced predictive ability for harvested acres of about 5-7 years ahead and farm

price of only 2-4 years ahead. These results are not surprising because predicting yield around a long-term trend has proven easier than predicting farm prices, which tend to be more volatile over time. The bottom-line net cash income also remains informative 4-6 years into the future. In comparison, some individual components such as crop receipts and cash expenses remain informative for shorter horizons of about two years. Government payments are notably difficult to predict even in the current year and are not informative beyond the current year, as policy decisions are difficult to predict. The findings, however, do not suggest that the projections cannot be improved beyond the reported maximum horizon, as the test results are subject to the projection process. The results only indicate that the projections may stay informative for a more extended period using improved models.

Implications for Market Participants and Future Revisions of Baseline Models

Policymakers, agricultural businesses, and program administrators have used these projections extensively in their policy and investment decisions in recent years. The findings of the study have important implications for the users of this information and future revisions of baseline models and processes. The results suggest that the accuracy and informativeness of the baseline projections may be enhanced using better projection models, more rigorous review processes, and robust information sets. The study identifies which variables in the baseline do not stay informative for more extended periods. These findings may help USDA review the models and processes involved in producing the projections and identify any potential improvements. As USDA stresses that the baselines are "projections" and "not forecasts," the findings underline the importance of stochastic analysis for the users of baselines. While the figures published in the baseline reports represent one conditional scenario, USDA performs additional stochastic analysis to project distributions for different future scenarios. However, the stochastic baselines have not always been published or have not received the same attention from users. Publishing stochastic projections in addition to the baseline report may allow users to adapt to different scenarios.

References

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