USDA Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

COVID-19 Working Paper, *AP-104*

August 2022

COVID-19 Working Paper: Farm Sector Financial Ratios: Pre-COVID Forecasts and Pandemic Performance for 2020

Anil K. Giri, Carrie Litkowski, Dipak Subedi, and Tia M. McDonald

Abstract

This study compares 2020 values for farm sector financial ratios before and after the onset of the Coronavirus (COVID-19) pandemic. Forecasts from the February 5, 2020, release of the USDA Economic Research Service's Farm Income and Wealth Statistics data product represent the pre-pandemic (before) forecasts. Those forecast values are compared to the data released on February 4, 2022, which represent the realized values for 2020 and include pandemic impacts on commodity demand and the policy response to the economic shock. Solvency ratios (which are indicators of the sector's ability to repay financial liabilities via the sale of assets) worsened in 2020 relative to pre-pandemic expectations. Efficiency ratios (which evaluate the conversion of assets into production and revenue) and liquidity ratios (which are indicators of the availability of cash to cover debt payments) showed mixed outcomes for the realized results in 2020 relative to the pre-pandemic forecasts. Four profitability ratios were stronger in 2020 relative to pre-pandemic expectations. All solvency, liquidity, and profitability ratios plus 2 out of 5 efficiency ratios for 2020 were weaker than their respective average ratios obtained from 2000 to 2019 data.

Keywords: Coronavirus, Farm Financial Ratios, Solvency Ratios, Efficiency Ratios, Liquidity Ratios, Profitability Ratios, Direct Government Payments

Acknowledgments:

We thank three anonymous reviewers for their technical reviews. We thank USDA, Economic Research Service (ERS) staff members Jeff Hopkins, Chief of the Farm Economy Branch, Krishna Paudel, Deputy Director for Research and Communications, and Kelly Maguire, Assistant Administrator. We also appreciate the help of Elaine Symanski, Grant Wall, Christopher Whitney, and Christine Williams of ERS for editing and Xan Holt for design.

Economic Research Service
www.ers.usda.gov

Contents

What Is the Issue?

The financial position and performance of farms and the farm sector are measured using ratios that reflect efficiency, liquidity, profitability, and solvency. Financial ratios indicate how well the sector utilizes assets and help assess vulnerabilities associated with the accumulation of debt. Comparative analysis of key financial indicators and the outlook for 2020 before the Coronavirus (COVID-19) pandemic and after COVID-19-related assistance provides insight into whether the sector emerged stronger or weaker than initially predicted. A better understanding of key financial ratios can help stakeholders understand and monitor the financial vulnerability of the sector. The analysis of financial ratios provides a more holistic view of the farm sector than the one provided by the net farm income indicator alone.

What Did the Study Find?

Despite record level direct Government payments to farmers and an increase in net farm income in 2020, the values for many financial ratios worsened relative to the initial forecasts and their average over the past 20 years.

This working paper categorizes sector-level ratios into four groups: solvency, efficiency, liquidity, and profitability. Results show the values for some financial ratios were worse in 2020 than forecast, while others were better in 2020 when compared with pre-pandemic expectations. More specifically, analysis of the February 4, 2022, release of the farm income and wealth statistics shows the following for 2020:

- Solvency ratios were weaker relative to the pre-pandemic forecast and their 20-year average suggesting some diminished capacity of the sector's ability to overcome adverse financial events through increased borrowing.
- Efficiency ratios indicated mixed outcomes relative to the initial pre-pandemic forecast. Changes in the efficiency of the sector could impact future financial performance. Two ratios (asset turnover and operating expense) were weaker; two ratios (interest expense and net farm income) remained the same; and one (capital consumption) improved, relative to the pre-pandemic forecast. Compared to their 20-year average, two ratios (asset turnover and operating expense) were weaker; two (interest expense and net farm income) were the same; and one (capital consumption) was stronger.
- Liquidity ratios indicated mixed outcomes relative to the initial pre-pandemic forecast. Liquidity ratios are early indicators of elevated stress and measure the ease with which assets can be quickly converted into cash to meet short-run financial obligations as the obligations become due. The current ratio and working capital to gross revenue ratio were stronger, the debt servicing ratio remained the same, and the times interest earned ratio worsened relative to the pre-pandemic forecast. All liquidity ratios in 2020 were weaker than the 20-year average.
- Profitability ratios (which measure returns relative to resources used, indicating how well the sector can make profits) were mixed. Improvement in profitability, where noted, was largely the result of higher direct Government payments. However, even after improvement in 2020, all ratios were still weaker than the 20-year average.

The results are summarized in table 1.

How Was the Study Conducted?

The USDA, Economic Research Service Farm Income and Wealth Statistics data product provides estimates and forecasts for 19 ratios related to the farm sector's financial position and performance. To account for how the sector adjusted during the pandemic and how the outlook changed, the authors compare 2020 values for the financial ratios before and after the onset of the pandemic. Forecasts from the February 5, 2020, release represent pre-pandemic forecasts and are compared to the data released on February 4, 2022, the point at which the 2020 values had been revised and were no longer considered forecasts but rather estimates.

Table 1

Summary of 2020 farm sector financial ratios from the February 2020 and February 2022 Farm Income and Wealth Statistics releases

						February 2022 estimates for 2020 compared to:	
Category	Ratio	Preferred value	Average (2000–19)	February 2020 release, 2020 forecasts	February 2022 release, 2020 estimates	Average (2000–19)	February 2020 forecasts for 2020
Solvency ratios	1. Debt to asset	Low	12.83	13.59	13.90	Weaker	Worsened
	2. Debt to equity	Low	14.74	15.73	16.14	Weaker	Worsened
	3. Equity to asset	High	87.17	86.41	86.10	Weaker	Worsened
Efficiency ratios	1. Asset turnover	High	0.17	0.15	0.14	Weaker	Worsened
	2. Capital consumption	Low	0.07	0.07	0.06	Stronger	Improved
	3. Interest expense	Low	0.04	0.04	0.04	Same	Same
	4. Net farm income	High	0.21	0.21	0.21	Same	Same
	5. Operating expense	Low	0.67	0.67	0.68	Weaker	Worsened
Liquidity ratios	1. Current	High	2.10*	1.42	1.86	Weaker	Improved
	2. Working capital to gross revenues	High	0.25*	0.12	0.19	Weaker	Improved
	3. Debt service	Low	0.24	0.26	0.26	Weaker	Same
	4. Times interest earned	High	6.31	6.57	6.06	Weaker	Worsened
Profitability ratios	1. Operating profit margin	High	0.12	0.14	0.10	Weaker	Worsened
	2. Total rate of return on farm assets	High	7.04	3.36	4.70	Weaker	Improved
	3. Rate of return on farm assets from income	High	2.08	2.09	1.52	Weaker	Worsened
	4. Rate of return on farm assets from capital gains	High	4.96	1.27	3.18	Weaker	Improved
	5. Total rate of return on farm equity	High	7.31	3.23	4.75	Weaker	Improved
	6. Rate of return on farm equity from income	High	1.62	1.77	1.06	Weaker	Worsened
	7. Rate of return on farm equity from capital gains	High	5.69	1.47	3.69	Weaker	Improved

*Average calculated from 2009-19

Notes: Preferred value suggests direction related to financial performance without considering an optimal level. It specifies whether a higher or lower value would indicate that the ratio is stronger (relative to the historical average) or improved (relative to the forecast from the February 2020 release). By the February 4, 2022, release, the 2020 values had been revised and no longer were considered forecasts but rather estimates.

Source: USDA, Economic Research Service Farm Income and Wealth Statistics, February 4, 2022.

Farm Sector Financial Ratios: Pre-COVID Forecasts and Pandemic Performance for 2020

Introduction

The sound financial health of the U.S. farm sector is vital because of its importance to food security and for the wellbeing of U.S. farm households and rural communities. Analyzing key financial ratios is one way to examine the financial health of the farm sector. Financial ratios combine information from the balance sheet and income statement to evaluate agricultural financial stress, vulnerability to financial risk, and how well the sector performs in ways not always visible from the farm income indicator alone. Farm financial ratios provide more context, including how well the farm sector utilizes assets (an indication of sector financial performance) and assess vulnerabilities associated with the accumulation of debt (an indication of sector financial position) over time. Some of the ratios (especially profitability ratios) use net farm income, along with other metrics and indicators (including information from the farm sector balance sheet), to provide a more comprehensive overview of the sector. Financial ratios also consider long-term investments and liabilities to provide a more complete picture of farm financial health.

The Farm Financial Standards Council (FFSC), in its recommendations to promote uniformity and integrity in financial reporting and analysis, endorses financial performance measurement using five categories—liquidity, solvency, profitability, repayment capacity, and financial efficiency. The recommendations also promote using financial ratios consistently and uniformly as the indicator to examine each criterion, as financial ratios are most informative when analyzed relative to previous periods (FFSC, 2021). The USDA, Economic Research Service (ERS) indicators are constructed to generally meet the FFSC recommendations and summarize 19 ratios across 4 categories—liquidity, solvency, profitability, and efficiency.

Financial ratios are valuable in understanding and analyzing the financial performance of farm businesses across (different types of) farm business (Ahrendsen and Katchova, 2012). The ratios also can indicate if a farm business—or a certain percentage of a group of farm businesses or the sector—is in the critical zone, based on specified cut-off values for different ratios (Kohl and Wilson, 1997; Katchova, 2010). Lenders use the values of financial ratios to evaluate loan applications when making lending decisions (Kohl and Wilson, 1997) and monitor loan performance using the values of the same ratios (Ahrendsen and Katchova, 2012).

Data and Methods

The USDA, ERS Farm Income and Wealth Statistics data product calculates and provides most of the same liquidity, solvency, and profitability ratios to measure farm financial health used by the FFSC (FFSC, 2021). Financial ratios and the data underlying the ratios are reported in the Farm Income and Wealth Statistics data product. In this report, ERS evaluated the impact of the Coronavirus (COVID-19) pandemic on the farm sector by comparing pre-pandemic expectations from the February 5, 2020, release with data from the February 4, 2022, release. The 2020 values from the February 2020 release were considered forecasts; for the most part, the values reflected a view of pre-pandemic drivers and trends. In the February 2022 release, the 2020 values are considered estimates and reflect the impacts of the pandemic and responses to the pandemic (including COVID-19 financial aid).

The Farm Income and Wealth Statistics data product is released three times each year, usually in early February, late August/early September, and late November/early December. The data product provides estimates and forecasts for 19 ratios related to the farm sector's financial performance. The first U.S. calendar year forecasts for 2020 were released on February 5, 2020; this release represents the last pre-pandemic income and balance sheet forecasts for 2020. With the September 2, 2021, release, the forecasts for 2020 were converted to estimates, incorporating observed data (including direct Government payments to farmers from COVID-19 related programs). Information in the February 4, 2022, release represent the latest estimates and incorporate some new and revised data. Comparing changes in the 2020 ratios from these two releases, along with their historical, 20-year averages (based on estimates for 2000–19 from the February 5, 2020, and February 4, 2022, releases), can provide insights into how the farm sector adjusted during the pandemic and how the sector's financial position in 2020 differed from the pre-pandemic outlook. Furthermore, the comparisons can also show the impact of policies on the farm sector's financial health.

It is important to note the comparisons of forecast, actual, and historical values do not provide a measure of the impact of the pandemic on the farm sector; other factors contributed to changes in the values of these indicators of financial health. These factors include changes in the global marketplace and trade policies, unexpected domestic and international disease and pest pressures, and weather. Also, the comparison of forecasted and actual (or estimated) values reflects forecast error and the incorporation of newly available and observed data on prices, planting decisions, and crop progress (including crop conditions and harvesting status). Isengildina-Massa et al. (2020) showed that initial forecasts of net cash farm income[1] (released in February of the year being forecast) had an average forecast error of 10.8 percent when compared to estimated net cash farm income measured 18 months later. While the actual error for the February 2020 net cash farm income forecast for 2020 was 1.2 percent (much smaller than average), there were significant (yet offsetting) revisions to some major components of net cash farm income. The absolute value of the forecast error for animal/animal product cash receipts and direct Government payments were much larger in the February 2020 release (11.2 percent and 205.1 percent, respectively) compared to average absolute forecast errors for the same variables (3.1 percent and 6.7 percent, respectively).

This working paper groups sector-level ratios into four categories: solvency, efficiency, liquidity, and profitability. Many of the same indicators are used in the calculation of multiple ratios. Therefore, in the next section, we examine the changes in those indicators individually. Then, we provide a description of each type of ratio, along with how the ratios are calculated.

[1] Net cash farm income is an indicator of profitability that encompasses cash receipts from farming, as well as farm-related income (including Government payments), minus cash expenses. It does not include noncash items—including changes in inventories, economic depreciation, and gross imputed rental income of operator dwellings—which are captured in net farm income.

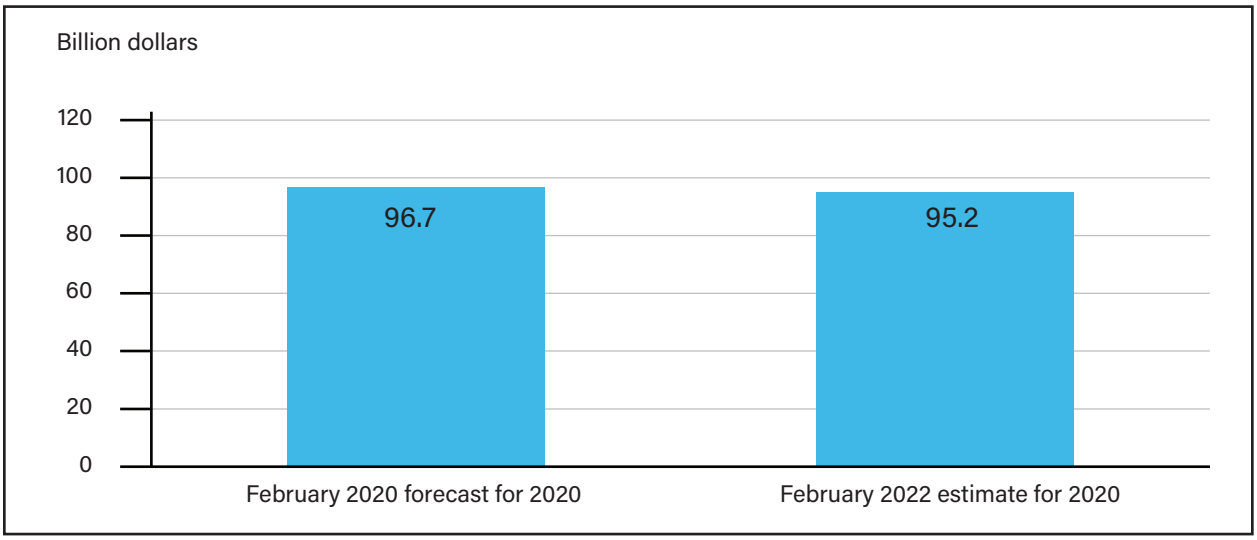
Changes in Underlying Indicators Resulted in Changes to Financial Ratios

Changes and revisions to the financial ratios are driven by the underlying indicators used to calculate the ratios. The key indicators used by several ratios are net farm income, value of agricultural production, direct Government payments, gross revenue, assets, debt, working capital, total production expense, and interest expense. Understanding how each of these indicators changed from the initial forecasts released in February 2020 explain why the financial ratios changed.

Net Farm Income

Net farm income, used in 7 of the 19 financial ratios (1 related to efficiency, 1 related to liquidity, and 5 related to profitability), is often considered the primary indicator of the farm sector's economic wellbeing and accounts for gross revenue and production expenditures. Net farm income includes both cash and non-cash income and expense items. For net farm income, the pre-pandemic forecast for 2020 from the February 2020 release was slightly lower than the 2020 estimate from the February 2022 release as there were largely offsetting declines in the value of agricultural production and increases in the value of Government payments (figure 1). The February 2020 release forecasted 2020 net farm income at $96.7 billion. In the February 2022 release, net farm income for 2020 was estimated at $95.2 billion. Therefore, compared with February 2020, the February 2022 release showed net farm income 1.6 percent ($1.5 billion) lower than pre-pandemic expectations.

Figure 1
2020 net farm income from the February 2020 and February 2022 releases

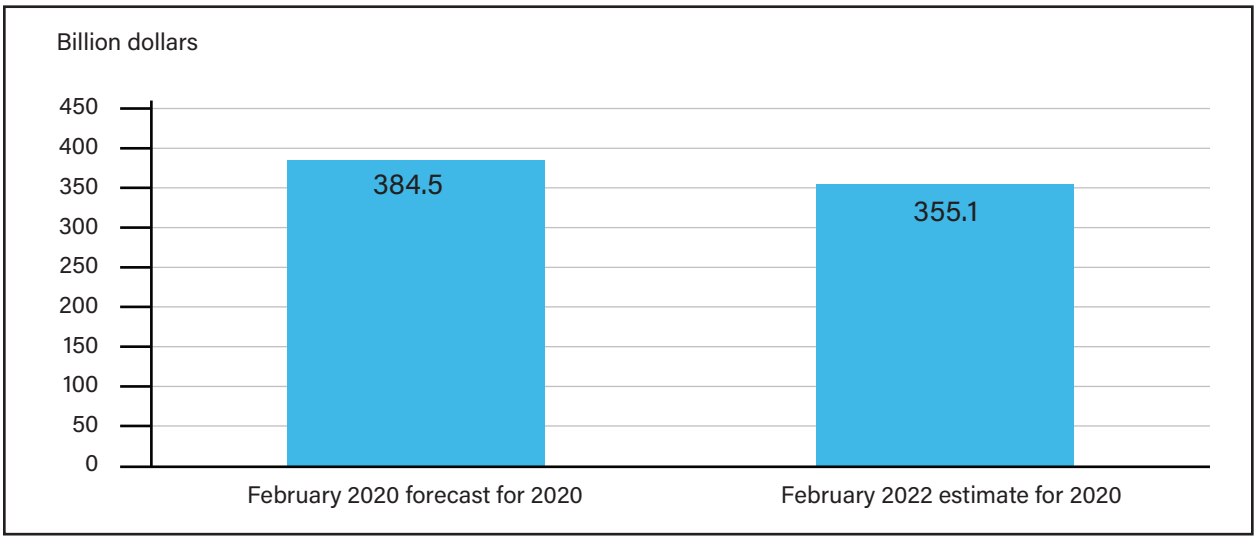


Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Value of Agricultural Production

The value of agricultural production (crops and animal/animal products) is a key determinant of the farm sector's financial health and used in 8 of the 19 financial ratios. All efficiency ratios and all but two liquidity ratios—current ratio and times interest earned ratio—use value of agricultural production in the calculation. A higher value of agricultural production generally improves efficiency and liquidity indicators if other values are unchanged. The value of production for crop and animal/animal products generally accounts for about 85 percent of total gross farm income. Figure 2 shows that in the February 2020 farm income forecast release, the value of production was forecast at $384.5 billion. These forecasts were developed using production and price projections from the *World Agricultural Supply Demand Estimates* report and internal projections from USDA, ERS analysts, as of January 2020. For the February 2022 release, estimates for the value of production in 2020 were developed using survey-based data from the USDA, National Agricultural Statistics Service (NASS). The February 2022 release estimated the value of production for 2020 at $355.1 billion. Much of this change from the February 2020 forecast was due to the lower value of production for animal/animal products because of supply chain disruptions and changes in global demand for meat and poultry due to the pandemic. Therefore, compared with February 2020, the February 2022 release showed total value of production lower by 7.6 percent ($29.4 billion) relative to pre-pandemic expectations.

Figure 2
2020 value of crop and animal/animal products production from the February 2020 and February 2022 releases



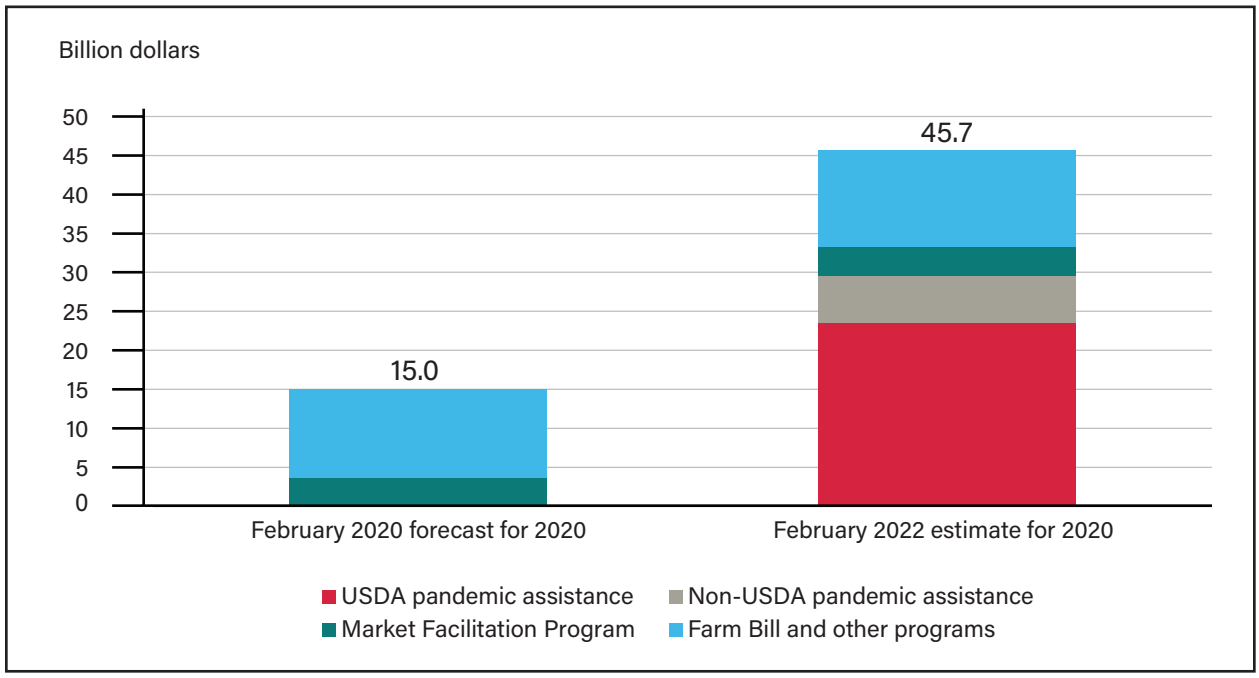
Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Direct Government Payments

Direct Government payments are payments made to farm operations from programs authorized under the Farm Bill and ad hoc programs; the payments are used explicitly in 8 of the 19 financial ratios. Those ratios are all five efficiency ratios (listed in appendix table A2), two liquidity ratios (listed in appendix table A3), and one profitability ratio (listed in appendix table A4). Higher direct Government payments generally improve efficiency and liquidity indicators if other factors are unchanged. Government payments are an important source of revenue for farm operations and contribute to the overall financial wellbeing of households that operate farms. Figure 3 shows that the February 2020 release forecasted total direct Government payments of $15.0 billion. In the February 2022 release, total direct Government payments for 2020 were

estimated at $45.7 billion, a record high in both nominal and inflation adjusted dollars, because of payments from COVID-19-related programs—especially the Coronavirus Food Assistance Program (CFAP) and the Paycheck Protection Program (PPP). These payments were not anticipated in the February 2020 release. Therefore, the February 2022 release showed total direct Government payments 205 percent ($30.7 billion) higher relative to pre-pandemic expectations. In both releases, more than $3 billion ($3.7 billion in the February 2020 release and $3.8 billion in the February 2022 release) came from the Market Facilitation Program (MFP). The MFP made payments to U.S. producers affected by retaliatory tariffs implemented by several Governments on U.S. agricultural products (Giri et al., 2020).

Figure 3
2020 direct Government payments from the February 2020 and February 2022 releases



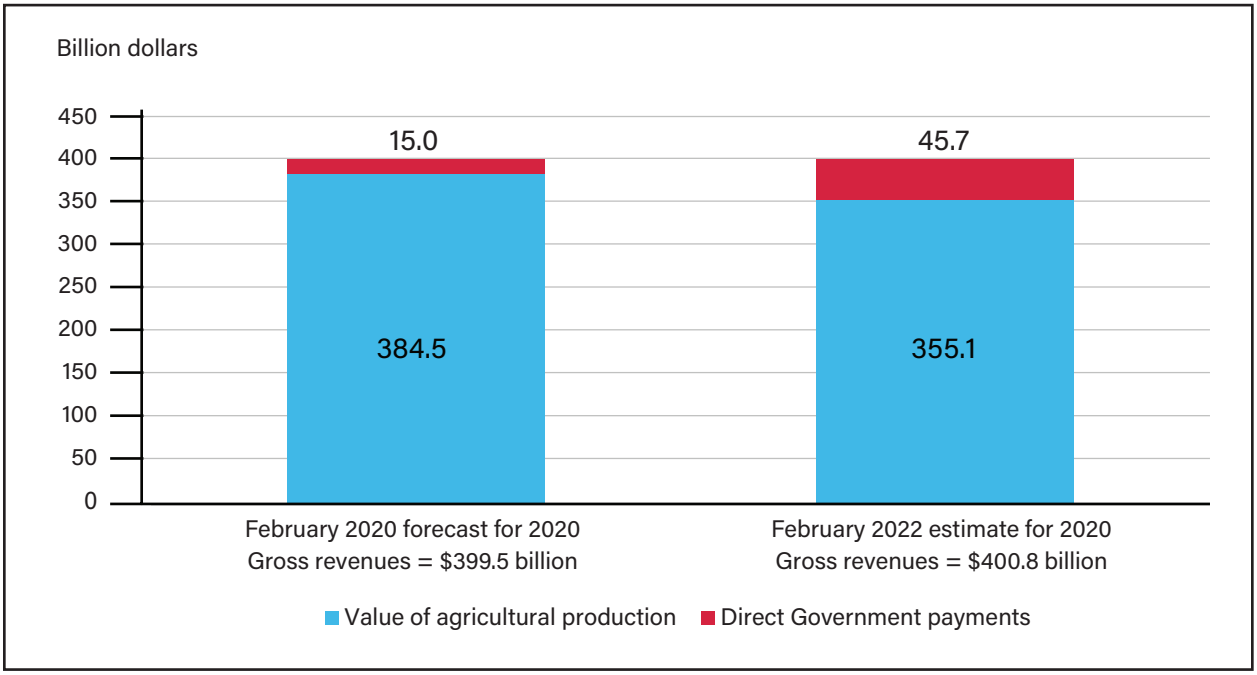
Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Gross Revenue

Gross revenue, used in 8 of 19 financial ratios (5 related to efficiency, 2 related to liquidity, and 1 related to profitability), is the value of production plus direct Government payments. Combined, gross revenue accounted for 89 percent of gross farm income, on average, across 2000–19. Farm related income accounts for the remaining share of gross income and includes some non-cash income and income that may be unrelated to the financial performance of farm operations.[2] As shown in figure 4, the value of production plus Government payments from the February 2022 release of $400.8 billion was nearly identical to the February 2020 forecast at $399.5 billion. The downward revision to the value of production in the February 2022 release (relative to the February 2020 release) was completely offset by an upward revision to direct Government payments.

[2] Farm related income includes the gross imputed rental value of farm dwellings, net cash rent received by operator landlords, and income earned from other sources—including insurance indemnities, forest products sold, machine hire, and custom work.

Figure 4
2020 gross revenue from the February 2020 and February 2022 releases



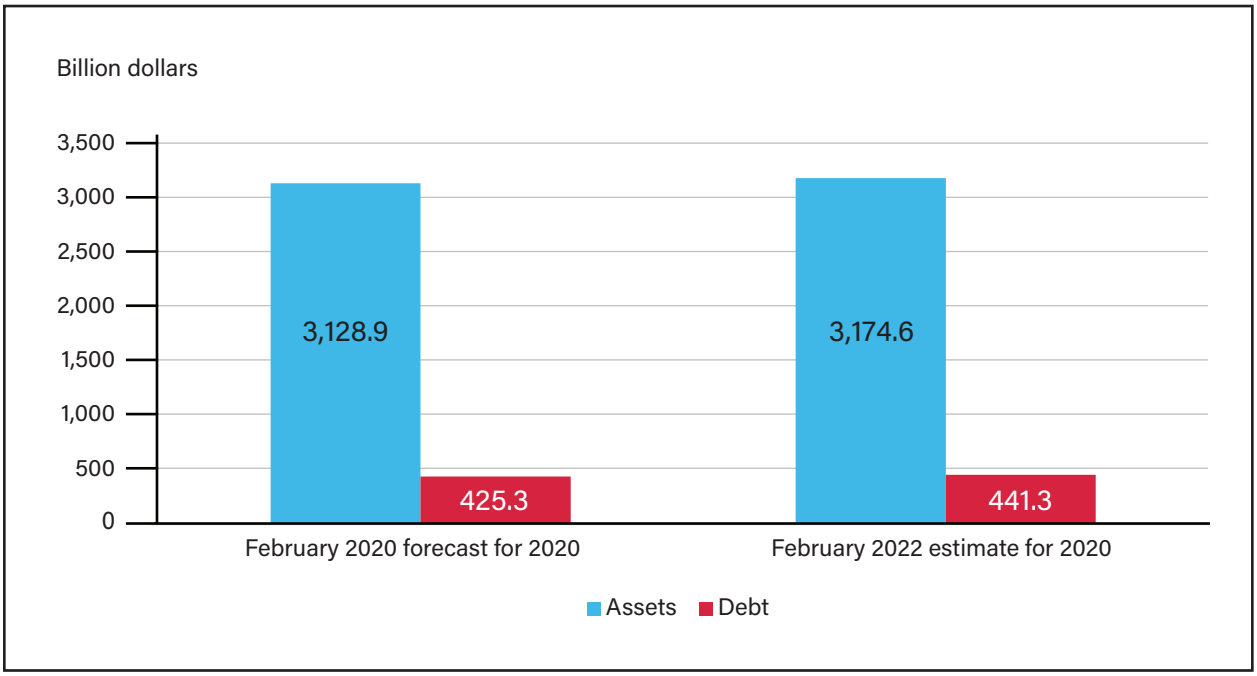
Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Assets and Debt

The value of farm sector assets is used in 8 of the 19 financial ratios. Assets include land, equipment, and breeding livestock. The total value of a farm operation's assets includes assets owned by the operation and financed by debt. Figure 5 shows that the February 2020 release forecast 2020 total value of assets of $3,128.9 billion. In the February 2022 release, total value of assets for 2020 was estimated to be $3,174.6 billion. Therefore, compared with the February 2020 release, the February 2022 release showed total value of assets 1.5 percent ($45.7 billion) higher relative to pre-pandemic expectations. The value of total assets can increase either by the value of owned assets increasing (e.g., land) or by operations acquiring new assets (e.g., equipment).

The level of debt held by the farm sector is used in 2 of the 19 financial ratios. Debt for a farm operation can come from non-real estate loans, which can be used to buy inputs or equipment—and from real estate loans, which can be used to purchase land or buildings to expand a farm or ranch. The February 2020 release forecasted 2020 total farm debt of $425.3 billion. In the February 2022 release, total 2020 farm debt was estimated to be $441.3 billion. Therefore, compared with February 2020, the February 2022 release showed farm debt 3.8 percent ($16.0 billion) higher relative to pre-pandemic expectations.

Figure 5
2020 assets and debt from the February 2020 and February 2022 releases



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

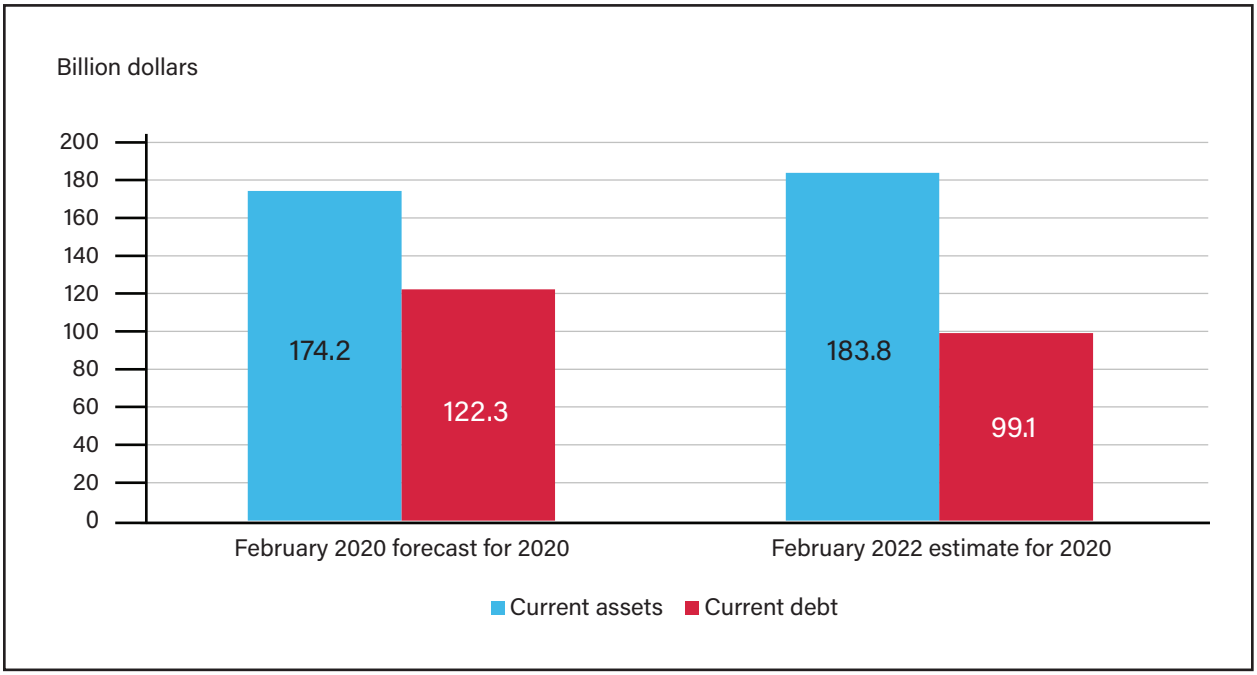
Working Capital

Working capital, used in 1 of the 19 financial ratios (liquidity), is an absolute indicator of the amount of cash available to fund operating expenses after paying off debt to creditors due within 12 months (current debt). Working capital is calculated as the amount of cash and cash-convertible assets (current assets) minus current debt on the farm sector balance sheet.

The February 2020 release forecasted 2020 current assets of $174.2 billion (figure 6). In the February 2022 release, current assets for 2020 were estimated to be $183.8 billion. Therefore, compared with February 2020 release, the February 2022 release showed current assets 5.5 percent ($9.6 billion) higher relative to pre-pandemic expectations.

The February 2020 release forecasted 2020 current debt at $122.3 billion. In the February 2022 release, current debt for 2020 was estimated at $99.1 billion. Therefore, compared with February 2020 release, the February 2022 release showed current debt 19.0 percent ($23.2 billion) lower relative to pre-pandemic expectations.

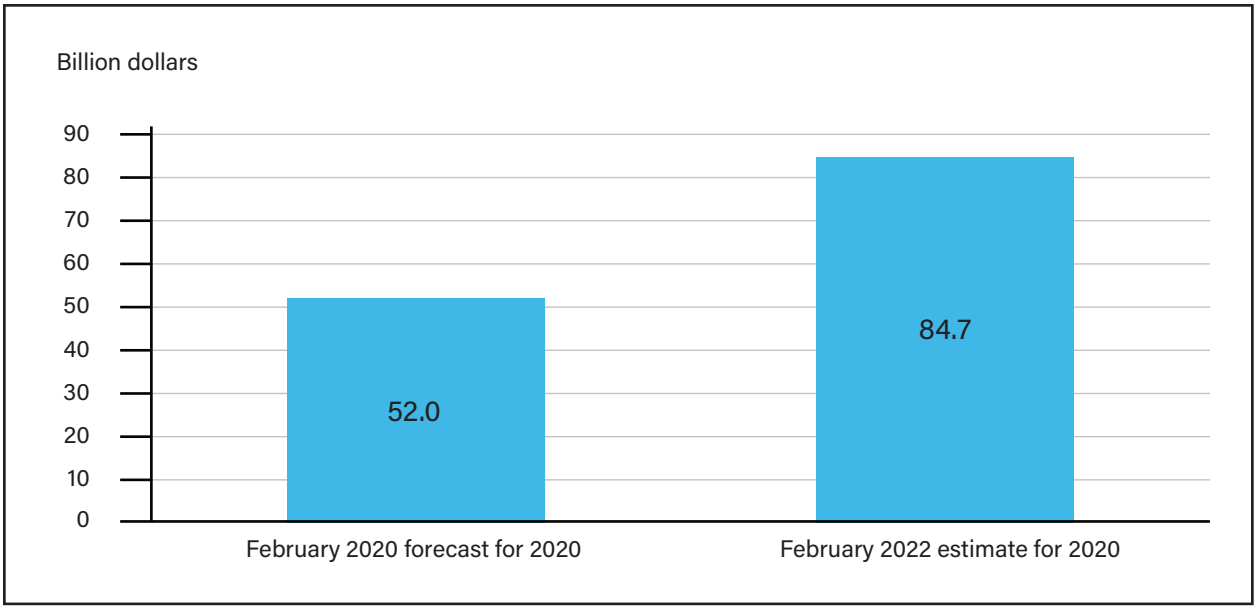
Figure 6
2020 current assets and current debt from the February 2020 and February 2022 releases



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Working capital is an indicator of the amount of cash that would be available to fund operating expenses after paying off current debt. Working capital is an important indicator of the financial position of the farm sector. Figure 7 shows the February 2020 release forecasted 2020 working capital at $52.0 billion. In the February 2022 release, total working capital for 2020 was estimated at $84.7 billion. Therefore, compared with the February 2020 release, the February 2022 release showed working capital 63.0 percent ($32.7 billion) higher relative to pre-pandemic expectations.

Figure 7
2020 working capital from the February 2020 and February 2022 releases

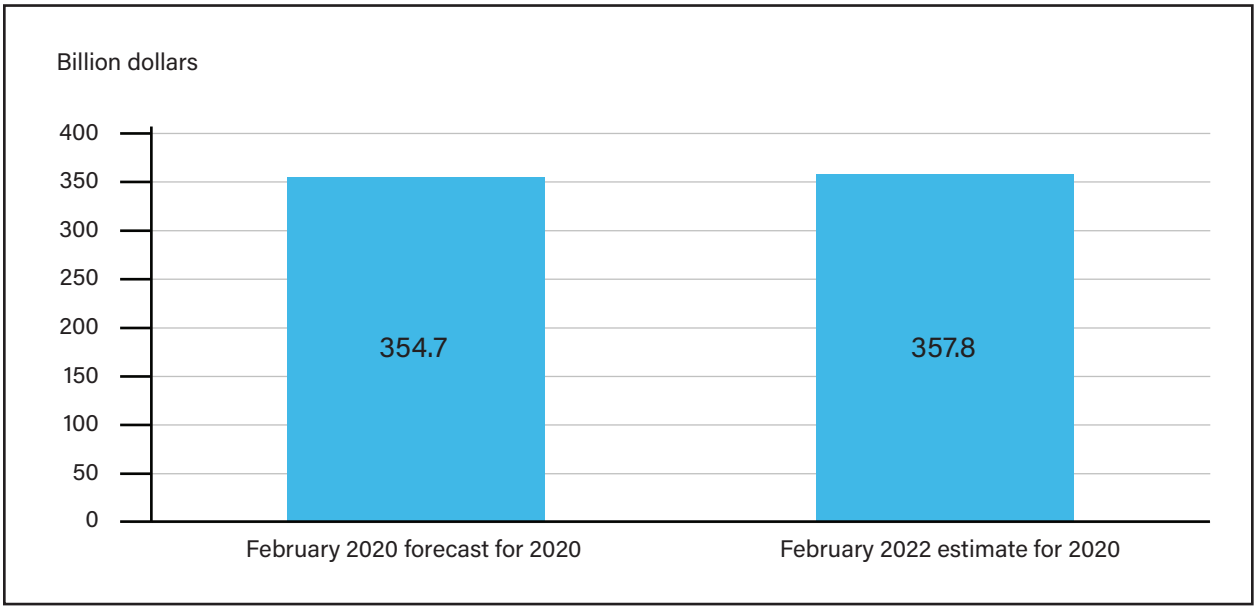


Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Total Production Expense

Total production expense is used explicitly in 1 of the 19 financial ratios (efficiency). However, calculation of net farm income involves total production expenses. Therefore, implicitly, all seven ratios that use net farm income use total production expenses. Total production expenses include expenses like feed, seed, fertilizer, labor, interest paid on debt, rent to landlords, and property taxes. The February 2020 release forecasted 2020 total production expenses at $354.7 billion (figure 8). In the February 2022 release, total production expense for 2020 was estimated at $357.8 billion. Therefore, compared with the February 2020 release, the February 2022 release showed total production expense 1 percent ($3.1 billion) higher relative to pre-pandemic expectations. Higher production expenses would reduce efficiency (as measured by the operating expense ratio) unless gross revenue increased by the same or a larger amount.

Figure 8
2020 total production expense from the February 2020 and February 2022 releases

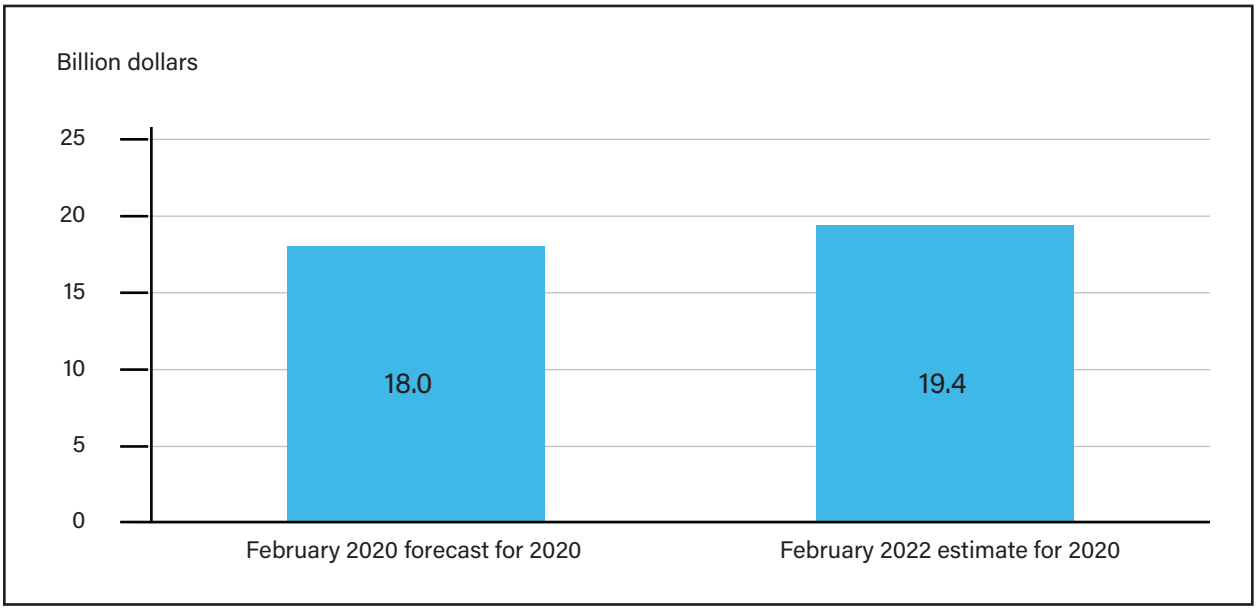


Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Interest Expenses

Interest expenses, used in 6 of the 19 financial ratios, describe interest payments made in a year on total debt for the farm sector. Interest expenses are included in total production expenses; however, some ratios look specifically at interest expenses relative to gross revenues or income to evaluate how holding debt affects efficiency and liquidity. Figure 9 shows the February 2020 release forecasted 2020 interest expenses at $18.0 billion. In the February 2022 release, interest expenses for 2020 was estimated at $19.4 billion. Therefore, compared with February 2020 release, the February 2022 release showed interest expense 7.8 percent ($1.4 billion) higher relative to pre-pandemic expectations.

Figure 9
2020 interest expenses from the February 2020 and February 2022 releases



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Financial Ratios

USDA, ERS reports a series of solvency, efficiency, liquidity, and profitability ratios to measure the financial standing of the farm sector. These ratios are calculated using aggregated sector-level data.

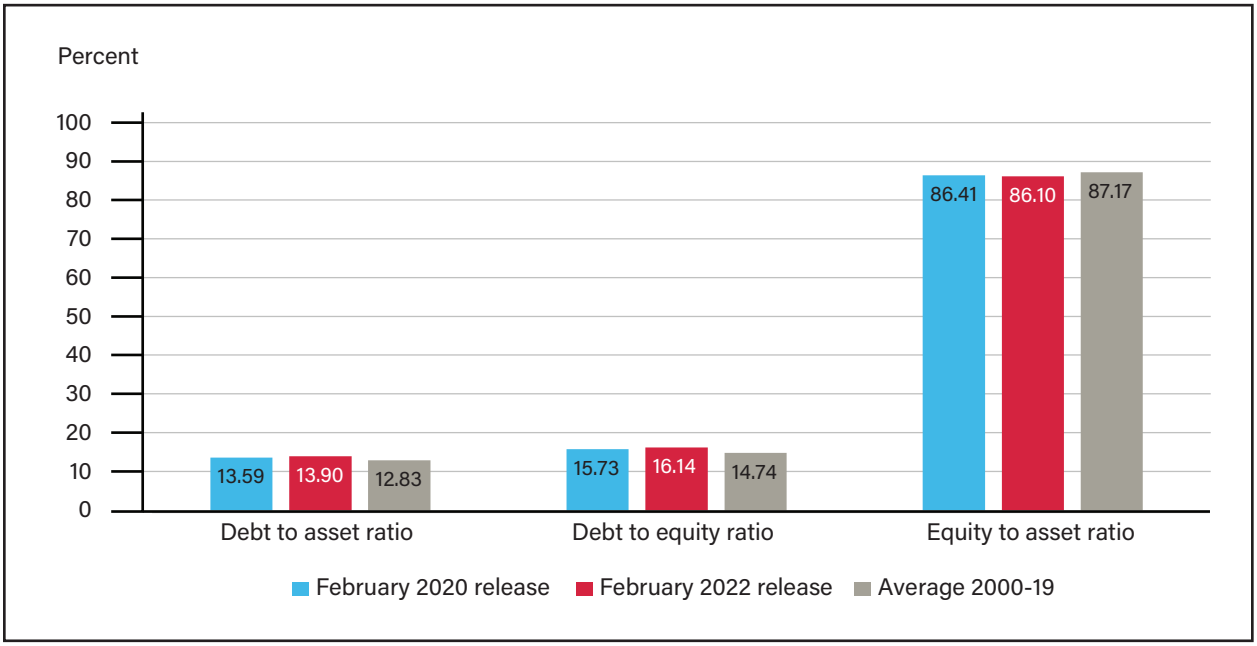
Solvency Ratios

Solvency is an indicator of the ability of a farm or ranch operation to satisfy its debt obligations when due. Solvency ratios compare the amount of debt relative to equity or assets invested in the farm sector. The ratios are often referred to as measuring leverage, which is the amount of debt used to finance assets. Ratios indicate the farm or ranch's ability to repay all debt by selling all assets at an indicated price (FFCS, 2021). As a result, the ratios provide a measure of the sector's ability to repay financial liabilities via the sale of assets. By providing a picture of the sector's current financial position—the ratios also indicate the farm sector's risk exposure, ability to overcome adverse financial events, meet long-term debt obligations, and continue future operations.

USDA, ERS provides estimates and forecasts for three indicators of solvency: the debt-to-equity ratio, debt-to-asset ratio, and equity-to-asset ratio. The formula, definition, and preferred value (high or low) for each is shown in appendix table A1, and the data to calculate these ratios come from the farm sector balance sheet. Each of these reported solvency ratios are inherently linked because all assets must either be claimed by the farm owner or owed to a creditor, so the ratios provide similar conclusions on sector solvency. The equity-to-asset ratio and debt-to-asset ratio sum to 1.0 because of the accounting relationship between asset, debt, and equity. Assets are the sum of liabilities and equity. Higher debt-to-asset and debt-to-equity ratios indicate a lower level of solvency. Conversely, a lower equity-to-assets ratio indicates a lower level of solvency.

To provide more context and compare with historical averages, figure 10 shows the 2020 values for the solvency ratios from the February 2020 and February 2022 releases and the 20-year average. For all three solvency ratios, the estimated values for 2020 from the February 2022 release were worse than the initial 2020 pre-pandemic forecasts. From the February 2022 release, the debt to asset and debt-to-equity ratios were still above the 20-year average, while the equity-to-asset was lower. This result suggests that solvency in 2020 was worse than average for the sector.

Figure 10
Solvency ratios for 2020 weaker than pre-pandemic forecasts and 2000–19 average



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Efficiency Ratios

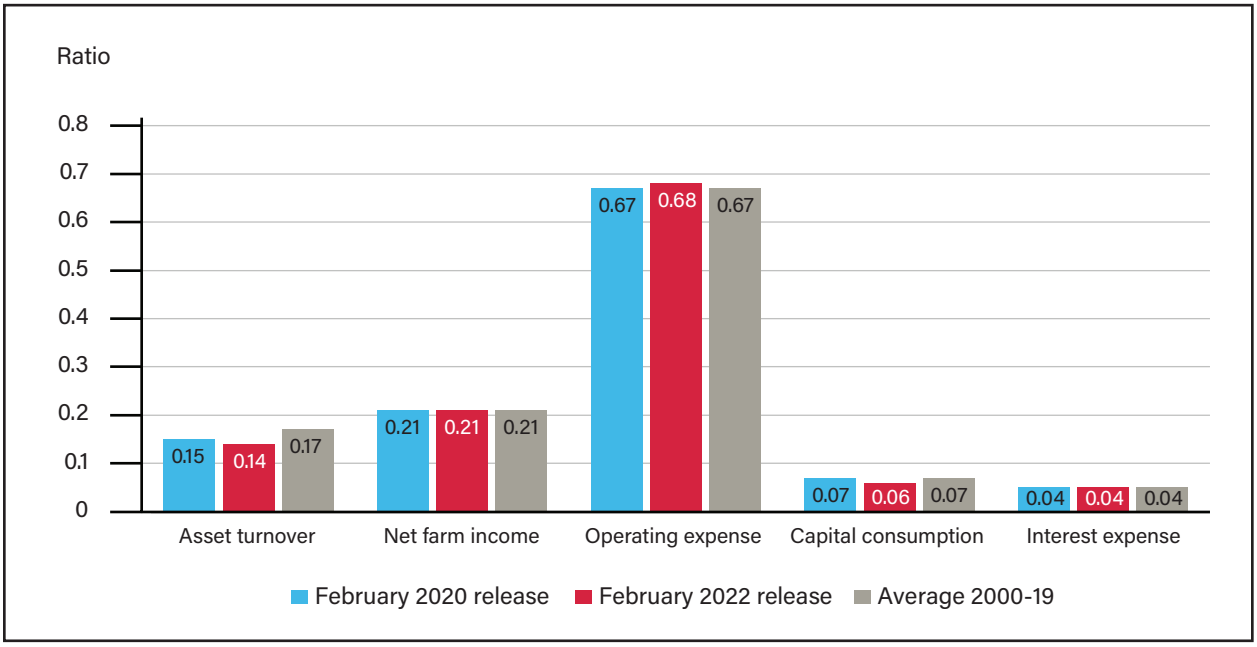
Farm sector efficiency ratios provide information on how well the sector uses its assets to create revenue and the relationship of expenses and net income to gross revenue. The ratios can be used to gauge the performance of sector production, marketing, and financing activities. The farm sector can increase profits in two primary ways: increasing production or increasing per unit profit margin. The sector's gross revenues are either used to cover expenses or are realized as net income.

USDA, ERS provides estimates and forecasts for five indicators of efficiency: asset turnover ratio, capital consumption ratio, interest expense ratio, net farm income ratio, and operating expense ratio. All efficiency ratios use the sum of the value of farm sector production and Government payments as a measure of gross revenue.[3] Appendix table A2 shows the formula used to calculate each ratio, its definition, and whether the preferred value is high or low.

Figure 11 shows 2020 values for solvency ratios from the two releases and the 20-year average. There was very little or no change in the value of efficiency ratios from pre-pandemic forecasts. This result was because gross revenue (measured as the sum of value of agricultural sector production and Government payments and a key component in the calculation of the efficiency ratios) was nearly the same in the February 2020 and February 2022 releases. The increase in Government payments offset decreases in the value of production, resulting in gross revenue to be almost the same in the two releases. Of the five efficiency ratios for 2020—the February 2022 release showed two ratios (asset-turnover and operating expense) to be weaker, two ratios (interest expense and net farm income) to remain unchanged, and one ratio (capital consumption) to improve—compared to the February 2020 pre-pandemic forecast. The 2020 values for the efficiency ratios were very close to their 20-year averages, which means in 2020, the sector used assets to generate similar rates of revenues as in the past 20 years.

[3] For the financial ratios, value of production is the sum of crop and animal/animal products production. The value does not include farm related income—such as gross imputed rental value of farm dwellings, machine hire and custom work, and commodity insurance indemnities.

Figure 11
Efficiency ratios for 2020 relatively unchanged from pre-pandemic forecasts and 2000–19 average



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

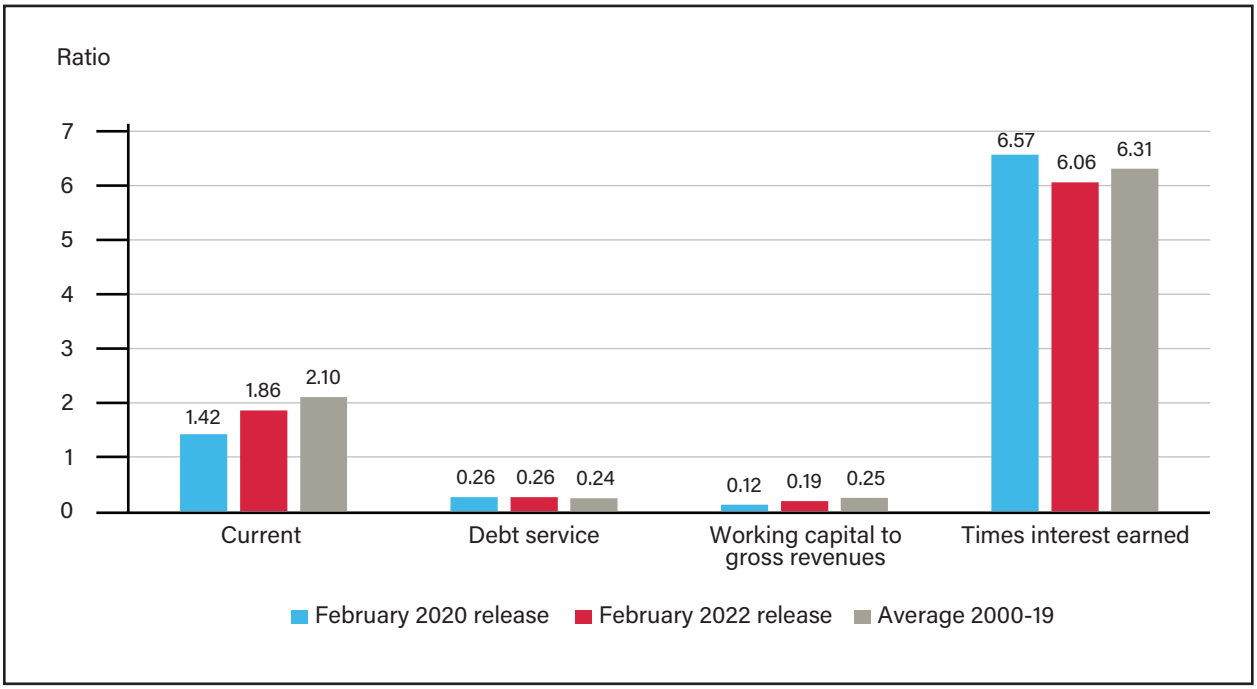
Liquidity Ratios

In finance, the term liquidity has two related meanings. Liquidity is the ease with which an asset can be converted into cash. Liquidity can also refer to the amount of capital readily available as cash. Liquidity ratios provide a way to assess the farm sector's ability to make scheduled financial payments as the payments come due. Liquidity indicators are focused on the ability to meet short-term debt, as well as sell assets quickly to raise cash. Therefore, liquidity indicators provide an overview of the ability to run an operation without disruptions by meeting financial obligations as the obligations come due (FFSC, 2021).

USDA, ERS provides estimates and forecasts for four liquidity ratios: current, debt service, times interest earned, and working capital to gross revenues. Appendix table A3 shows the formula used to calculate each ratio, its definition, and whether the preferred value is high or low.

Figure 12 shows 2020 values for the liquidity ratios from the two releases and the 20-year average. Of the four liquidity ratios, the estimated values for 2020 from the February 2022 release were improved from the pre-pandemic forecast for current ratio and working capital to gross revenues ratio. The improvement in the current ratio was because of revisions to current debt and current assets. The working capital to gross revenues ratio uses working capital for its calculation, which was revised up in the February 2022 release relative to the February 2020 release. The debt service ratio did not change in the two releases, and the times interest earned ratio worsened. The 2020 values for all liquidity ratios were weaker than the 20-year (or 11-year) averages. For the current ratio and the working capital to gross revenues ratio, the 2020 estimate is compared to the 11-year average as data on current assets and current debt were not available prior to 2009.

Figure 12
Some liquidity ratios for 2020 were stronger than pre-pandemic forecasts but all ratios were weaker than the 2000–19 average



Note: For the current ratio and the working capital to gross revenues ratio, the 2020 estimate is compared to the 11-year average (2009–19) as data on current assets and current debt were not available for years prior to 2009.
Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

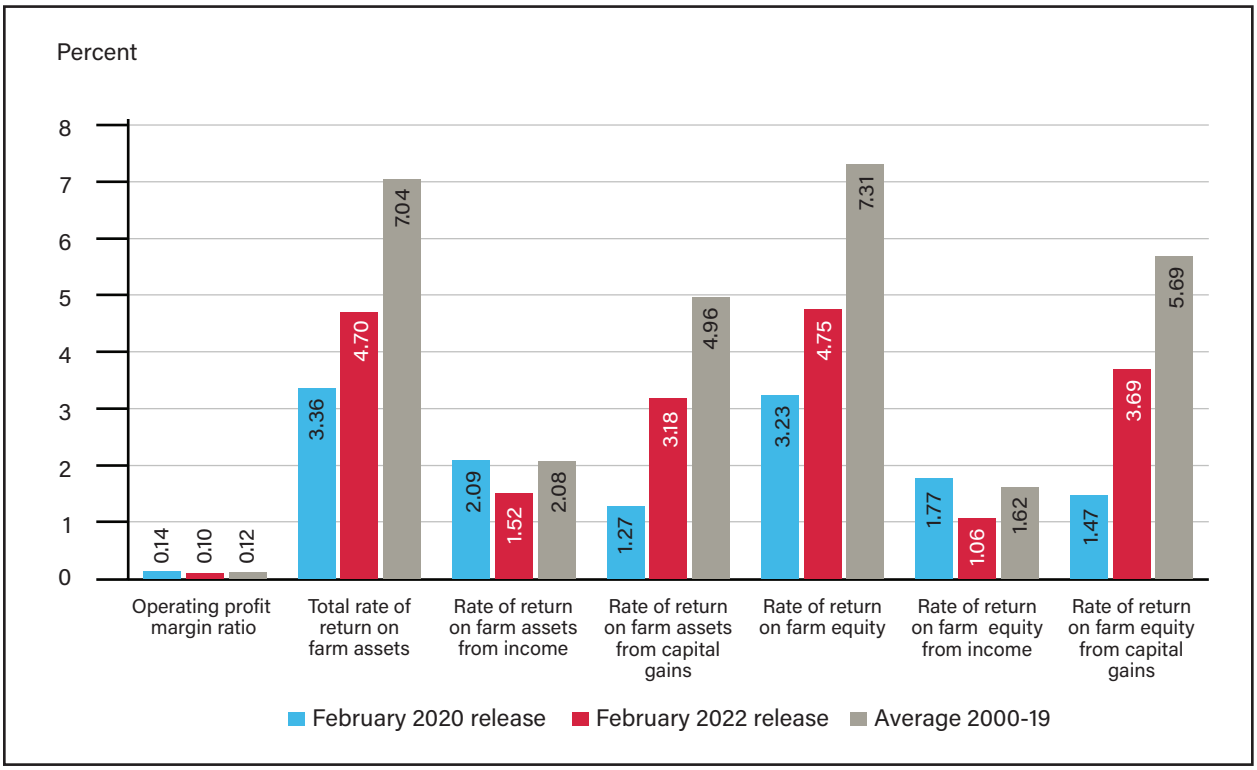
Profitability Ratios

Profitability refers to the ability to generate returns from production inputs and asset investments. Accordingly, profitability ratios indicate farm sector returns relative to resources used. Returns to farming are realized through operations' profits (income) or growth in the value of total farm assets (capital gains) for the sector.

The definition, formula, and the preferred value of seven profitability ratios reported by USDA, ERS are listed in appendix table A4. The calculation of operating profit margin and returns to income require subtracting unpaid labor. Many farms use unpaid operator or family member labor and management. From an economic perspective, it is necessary to subtract the opportunity cost of using this time as a production input since this time may otherwise have been spent in a different productive activity.

Figure 13 shows the 2020 values for the profitability ratios from the two releases and the 20-year average. There are seven profitability ratios: one indicates operating profit margin, three are related to return relative to farm assets, and three are related to return relative to farm equity. Compared with the February 2020 pre-pandemic forecasts, the 2020 estimates from the February 2022 release were weaker for the operating profit margin ratio, while the total return on assets and returns on farm equity were stronger. The worse than expected operating profit margin ratio was the result of increases in the value of unpaid labor relative to the value of production. Even though the labor is unpaid, the financial ratio accounts for the fact that unpaid labor could have otherwise been allocated to a wage-earning activity and therefore reduces overall returns. The higher-than-expected returns to farm assets and equity were mostly driven by higher-than-expected capital gains. The February 2022 release showed the 2020 estimates for all profitability ratios weaker than their 20-year average.

Figure 13
Profitability ratios for 2020 mostly improved from pre-pandemic forecasts but weaker than 2000–19 average



Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Changes and Outlook for Liquidity, Efficiency, Solvency, and Profitability Ratios

Table 2 summarizes how the 2020 values for each of the financial ratios changed in the two releases and how the values compare to the 20-year average. It is important to note that the magnitude of changes is not evaluated. This means that even when the changes are small, we state whether they improved or worsened. Figures 10, 11, 12, and 13 have exact values for the ratios and provide information on the magnitude of the differences.

Data from the February 2022 release show solvency ratios (which provide a measure of the sector's ability to repay financial liabilities via the sale of assets) worsened in 2020 compared with the pre-pandemic February 2020 release. For the efficiency ratios, which measure the conversion of assets into production and revenue, results were mixed when comparing the 2020 values from the two releases. Two of the efficiency ratios worsened, two remained the same, and one improved. The 2020 values for two of the four liquidity indicators, which measure availability of cash to cover debt payments, were stronger in the February 2022 release compared with the February 2020 release. One of the liquidity ratios was weaker, while the other stayed the same. Four profitability ratios were stronger for 2020 in the February 2022 release compared with the February 2020 release. The ratios measure the farm sector's return, relative to resources used and returns to farming realized, through operations' profits (income) or growth in the value of total farm assets (capital gains) for the sector.

The 2020 values for the majority of the financial ratios were worse than their average over the past 20 years. All solvency, liquidity, and profitability ratios for 2020 were weaker than the 2000–19 average. Only one efficiency ratio (capital consumption) was stronger in 2020 compared with the 20-year average.

Table 2

Liquidity, efficiency, solvency, and profitability ratios based on the February 2022 Farm Income and Wealth Statistics release

Category	Ratio	2020 compared with the 2000–19 average	February 2020 forecast for 2020 (pre-pandemic) compared to February 2022 estimate for 2020
Solvency ratios	Debt-to-asset ratio	Weaker	Worsened
	Debt-to-equity ratio	Weaker	Worsened
	Equity-to-asset ratio	Weaker	Worsened
Efficiency ratios	Asset turnover ratio	Weaker	Worsened
	Capital consumption ratio	Stronger	Improved
	Interest expense ratio	Same	Same
	Net farm income ratio	Same	Same
	Operating expense ratio	Weaker	Worsened
Liquidity ratios	Current ratio	Weaker	Improved
	Working capital to gross revenues ratio	Weaker	Improved
	Debt service ratio	Weaker	Same
	Times interest earned	Weaker	Worsened
Profitability ratios	Operating profit margin ratio	Weaker	Worsened
	Total rate of return on farm assets	Weaker	Improved
	Rate of return on farm assets from income	Weaker	Worsened
	Rate of return on farm assets from capital gains	Weaker	Improved
	Total rate of return on farm equity	Weaker	Improved
	Rate of return on farm equity from income	Weaker	Worsened
	Rate of return on farm equity from capital gains	Weaker	Improved

Source: USDA, Economic Research Service Farm Income and Wealth Statistics as of February 5, 2020, and February 4, 2022.

Conclusion

This report compares forecasted financial ratios for 2020 from the February 2020 pre-pandemic release of the Farm Income and Wealth Statistics with estimated values from the February 2022 release. It also compares the 2020 ratios with their 20-year average. This comparison can lend insight into the impacts of the pandemic on the financial health of the farm sector beyond net farm income alone. This report also provides insights on how the outlook for key indicators changed in the first year of the pandemic and the financial health (based on examination of the ratios) of the sector after the unprecedented level of Government payments and policies to blunt the impact of the pandemic-caused supply and demand shocks.

The value of production in 2020 was lower relative to pre-pandemic expectations. However, the decrease (or downward revision) was completely offset by the increase in Government payments from COVID-19 assistance. The offset resulted in efficiency ratios, which use gross revenues (value of production plus direct Government payments) in their calculation, to be largely unchanged.

Assets and debt were higher in 2020 than expected in the pre-pandemic forecast. The revision to debt was proportionally larger than the revision to assets than the pre-pandemic forecast. This revision resulted in worse than expected solvency ratios, including the debt-to-asset ratio, that indicate the sector's ability to meet longer term debt obligations. The shorter-term perspective on debt obligations is provided by indicators of current assets (assets that can be liquidated to cover the current year's debt obligations) and current debt. Compared to the pre-pandemic forecast, the current ratio ended up stronger in 2020, meaning that current debt obligations were lower relative to the sector's ability to cover those obligations. Taken together, the current and the debt-to-asset ratios suggest the increase in debt relative to expectations represents an increase in longer term debt obligations with little impact on short-term debt obligations.

Further scrutiny of asset values shows the values to be a key driver of change in the rate of returns on farm assets and equity. The February 2020 release forecasted lower total rates of returns on assets and equity, whereas the February 2022 release estimated higher rates of returns. Returns on assets and equity can come from income or capital gains. The decomposition of returns on assets and equity showed that returns from capital gains were stronger, while returns from income were weaker relative to pre-pandemic expectations.

Most (16 out of 19) of the financial ratios for 2020 were weaker than average over the past 20 years. All solvency, liquidity, and profitability ratios were weaker than average. This finding suggests worse than average financial performance for the farm sector as a whole in 2020. While the sector did not experience significant financial stress, indications are that the sector is vulnerable to different demand and supply shocks. Other factors, such as higher interest rates and higher input costs, could put the sector under more financial stress than in the past 20 years. However, net farm income in 2020 was higher than average over the past 20 years when the series is adjusted for inflation. Therefore, it is important to look at multiple financial indicators when evaluating sector performance and to understand what each indicator considers.

Further research could explicitly examine the impact of Government payments on the financial ratios. Examining interlinkages between Government payments and other indicators would require a computable general equilibrium model linking several supply and demand equations. This study does not attempt to isolate the impact of Government payments on other variables and show how the ratios would have changed without the COVID-19 assistance to farmers and ranchers. This paper only examines how the inclusion of record-high direct Government payments in 2020 changed the ratios from the pre-pandemic forecast for the sector.

References

Ahrendsen, B.L., and A.L. Katchova. 2021. "Financial Ratio Analysis Using ARMS Data," Agricultural Finance Review 72(2):262–272.

Barry, P.J., and P. Ellinger. 2012. "Credit Risk Assessment and Capacity-Borrower Relationships," Financial Management in Agriculture, 7th edition.: 85–99. Boston, MA: Prentice Hall.

Giri, A.K., E.W.F. Peterson, S. Sharma, and I. Tetteh. 2020. "Ex-Post Analysis of the 2018 and 2019 Market Facilitation Programs, Choices, Quarter 3.

Giri, A.K., T. McDonald, D. Subedi, and C. Whitt. 2021. COVID-19 Working Paper: Financial Assistance for Farm Operations and Farm Households in the Face of COVID-19, AP-090, U.S. Department of Agriculture, Economic Research Service.

Isengildina-Massa, O., B. Karali, T.H. Kuethe, and A.L. Katchova. 2021. "Joint Evaluation of the System of USDA's Farm Income Forecasts," Applied Economic Perspectives and Policy 43(3):1140–1160.

Katchova, A.L. 2010. "An Analysis of the Financial Performance of Beginning Farmers," selected paper, Agricultural and Applied Economics Association, annual meeting, Denver, CO.

Farm Financial Standard Council. 2021. "Financial Guidelines for Agriculture," Farm Financial Standards Council, Menomonee Falls, WI.

Kohl, D., and T. Wilson. 1997. "Understanding Key Financial Ratios and Benchmarks," Business Tools Bulletin, Northwest Farm Credit Services.

Litkowski, C., and J. Law. 2021. A Timely Tool for Evaluating Financial Conditions in Agriculture: USDA Forecasts of the Value of Production in the Face of COVID-19, AP-086, U.S. Department of Agriculture, Economic Research Service.

U.S. Department of Agriculture. 2020a. Coronavirus Food Assistance Program 2 Cost-Benefit Analysis.

U.S. Department of Agriculture. 2020b. Coronavirus Food Assistance Program Cost-Benefit Analysis.

U.S. Department of Agriculture, Economic Research Service. 2020. Farm Income and Wealth Statistics.

U.S. Department of Agriculture, Economic Research Service. 2021. Documentation for Farm Sector Financial Ratios.

Appendix

Solvency, Efficiency, Liquidity, and Profitability Ratios Definitions, Formulas, and Preferred Values

Table A1
Solvency ratios: definitions, formulas, and preferred values (three ratios)

Solvency ratio	Definition	Formula	Preferred value
Debt-to-asset ratio	The proportion of assets owed to creditors to cover outstanding debt obligations.	$\frac{Debt_t}{Assets_t}$	Low
Debt-to-equity ratio	The proportion of assets owed to creditors (debt) relative to those provided by owner's capital (equity).	$\frac{Debt_t}{Equity_t}$	Low
Equity-to-asset ratio	The proportion of farm assets that are owned by the operator and, hence, not financed by debt.	$\frac{Equity_t}{Assets_t}$	High

Note: The preferred value of a ratio suggests the desired direction for better financial performance.
Source: USDA, Economic Research Service Farm Income and Wealth Statistics data product, "Documentation for the Farm Sector Financial Ratios."

Table A2
Efficiency ratios: definitions, formulas, and preferred values (five ratios)

Efficiency ratio	Definition	Formula	Preferred value
Asset turnover ratio	Measures the efficiency with which farm assets are used to generate production.	$\frac{Value\ of\ production_t + Government\ payments_t}{\frac{Assets_t + Assets_{t-1}}{2}}$	High
Net farm income ratio	Measures the amount of net farm income generated per dollar of production, plus total direct Government payments in the farm sector.	$\frac{Net\ Farm\ Income_t}{Value\ of\ production_t + Government\ Payment_t}$	High
Operating expense ratio	Measures the amount of cash the farm sector spends to generate a dollar of production.	$\frac{Total\ production\ expense_t - Interest\ expense_t - Capital\ consumption_t}{Value\ of\ production_t + Government\ Payment_t}$	Low
Capital consumption ratio	Measures the proportion of production, plus direct Government payments needed to cover the sector's capital consumption.	$\frac{Capital\ Consumption_t}{Value\ of\ production_t + Government\ Payment_t}$	Low
Interest expense ratio	Measures the proportion of production, plus direct Government payments used to make interest payments on debt.	$\frac{Interest\ Expense_t}{Value\ of\ production_t + Government\ Payment_t}$	Low

Note: The preferred value of a ratio suggests the desired direction for better financial performance.
Source: USDA, Economic Research Service Farm Income and Wealth Statistics data product, "Documentation for the Farm Sector Financial Ratios."

Table A3
Liquidity ratios: definitions, formulas, and preferred values (four ratios)

Liquidity ratio	Definition	Formula	Preferred value
Current ratio	Measures the ability of current assets, if sold and converted to cash, to cover current debt obligations.	$\frac{Current\ Assets_t}{Current\ Debt_t}$	High
Debt service ratio	Measures the share of production, plus direct Government payments used for debt payments.	$\frac{Interest\ expense_t - Principal\ payments_t}{Value\ of\ production_t + Government\ Payment_t}$	Low
Working capital to gross revenues ratio	Measures working capital, relative to production, plus direct Government payments.	$\frac{Working\ Capital_t}{Value\ of\ production_t + Government\ Payment_t}$	High
Times interest earned ratio	Measures the ability to cover debt payments, specifically interest payments.	$\frac{Net\ farm\ income_t + Interest\ expense_t}{Interest\ expense_t}$	High

Notes: In the calculation of the debt service ratio and times interest earned, interest expenses exclude interest expenses on operator dwellings. The preferred value of a ratio suggests the desired direction for better financial performance.
Source: USDA, Economic Research Service Farm Income and Wealth Statistics data product, "Documentation for the Farm Sector Financial Ratios."

Table A4
Profitability ratios: definitions, formulas, and preferred values (seven ratios)

Profitability ratio	Definition	Formula	Preferred value
Operating profit margin ratio	Measures profitability as a share of total value of production and government payments.	$\frac{Net\ farm\ income_t + Interest\ expense_t - Returns\ to\ unpaid\ labor\ and\ management_t}{Value\ of\ production_t + Government\ paymentst_t}$	High
Total rate of return on farm assets	Measures how well assets are able to transform into income for the farm sector.	$Rate\ of\ return\ on\ farm\ assets\ from\ income_t + Rate\ of\ return\ on\ farm\ assets\ from\ capital\ gains_t$	High
Rate of return on farm assets from income	Measures the per-dollar return on farm assets from income.	$\frac{Net\ farm\ income_t + Interest\ expense_t - Returns\ to\ unpaid\ labor\ and\ management_t}{\frac{Assets_t + Assets_{t-1}}{2}}$	High
Rate of return on farm assets from capital gains	Measures the returns to the assets from an increase in the assets' value, apart from their income generating potential.	$\frac{Assets_t - Assets_{t-1}}{\frac{Assets_t + Assets_{t-1}}{2}}$	High
Total rate of return on farm equity	Measures the total per-dollar return (current income and capital gains) on farm equity.	$Rate\ of\ return\ on\ farm\ equity\ from\ income_t + Rate\ of\ return\ on\ farm\ equity\ from\ capital\ gains_t$	High
Rate of return on farm equity from income	Measures the per-dollar return on farm equity from income.	$\frac{Net\ farm\ income_t - Returns\ to\ unpaid\ labor\ and\ management_t}{\frac{Equity_t + Equity_{t-1}}{2}}$	High
Rate of return on farm equity from capital gains	Measures the returns to equity from an increase in the value of sector assets.	$\frac{Assets_t - Assets_{t-1}}{\frac{Equity_t + Equity_{t-1}}{2}}$	High

Notes: Data on the returns to unpaid labor and management are taken from USDA's Agricultural Resource Management Survey (ARMS). The preferred value of a ratio suggests the desired direction for better financial performance.
Source: USDA, Economic Research Service Farm Income and Wealth Statistics data product, "Documentation for the Farm Sector Financial Ratios."