Agricultural Cycles and Implications for the Near Term

By Ani L. Katchova and Ana Claudia Sant'Anna

U.S. agriculture has experienced several boom and bust cycles over the last century. During the 1910s and 1940s, demand for food enhanced agricultural exports and farm profitability (Henderson, Gloy, and Boehlje 2011). These booms were followed by busts in the farm economy as the economic and financial conditions changed. In the 1970s, a spike in agricultural exports led to another sharp increase in farm incomes, followed by the largest agricultural bust in recent history, the farm crisis of the 1980s. In 2006, rising commodity prices coupled with strong exports and demand for renewable fuels triggered another boom in farm incomes. Since 2013, however, the farm economy has experienced a period of declining farm incomes, lower commodity prices, and falling (though recently stabilized) land values.

While farm businesses continue to have relatively strong equity positions and historically low leverage, the prolonged period of low farm income since 2013 has eroded working capital on farms and increased financial stress. Although conditions between the two periods are notably different, this recent agricultural downturn has sparked questions about the possibility of repeating the farm crisis of the 1980s.

Ani L. Katchova is an associate professor and Farm Income Enhancement Chair at the Department of Agricultural, Environmental, and Development Economics at The Ohio State University. Ana Claudia Sant'Anna is an assistant professor at the Division of Resource Economics and Management in the Davis College at West Virginia University.
The authors would like to thank Robert Dinterman for compiling the data on agricultural delinquencies and bankruptcies. The views expressed are those of the authors and do not necessarily reflect the positions of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

In this paper, we explore the agricultural sector indicators of farm incomes, farm assets and debt, land values, and credit availability that help define and explain the agricultural downturn. While economic conditions have deteriorated and farmers have experienced financial stress, the financial indicators of agricultural loan delinquency rates and bankruptcy rates have remained relatively stable during the recent downturn, making a repetition of the events that occurred during the 1980s farm crisis unlikely. Despite these positive statistics, concerns remain about the duration of this downturn and the ability of farmers to weather a few more expected years of similar conditions.

I. Agricultural Sector Indicators

Several indicators for farm sector financial health are reported and analyzed by the U.S. Department of Agriculture (USDA) (Key, Litkowski, and Williamson 2018). During the last few years, there was a steep decline in agricultural commodity prices, a weaker market for farmland, and a small uptick in interest rates. Lower commodity prices result in lower cash receipts and therefore lower farm incomes. Net farm income and net cash income are important indicators of the financial health of the farm sector (Key, Litkowski, and Williamson 2018). Additional indicators include farm debt and financial solvency that can affect debt repayment capacity.

Net cash income and net farm income forecasts

The USDA's farm income estimates are the official measures of the farm sector's contributions to the national economy and play an important role in the development of agricultural policy (Schnepf 2016). Furthermore, these forecasts serve as an input in various USDA models and in GDP estimates (McGath and others 2009). The USDA farm income forecasts and estimates are widely used by policymakers and media sources to help understand developments in the agricultural economy, and they are a widely used data source for lenders and other agricultural sector stakeholders seeking to understand the magnitude and drivers of farm sector well-being. Net cash income represents the income from cash receipts, cash farm-related income, and government program payments, minus cash expenses. Net farm income is a more comprehensive measure that includes non-cash items such as changes in

inventories and depreciation. The USDA prepares and releases forecasts for the farm economy's net cash and net farm incomes in February, August, November, and February of the following year. Every August, the USDA releases official estimates of net cash and net farm incomes for the prior year. Several recent studies have looked into the accuracy, bias, and efficiency of the USDA net cash and net farm income forecasts.

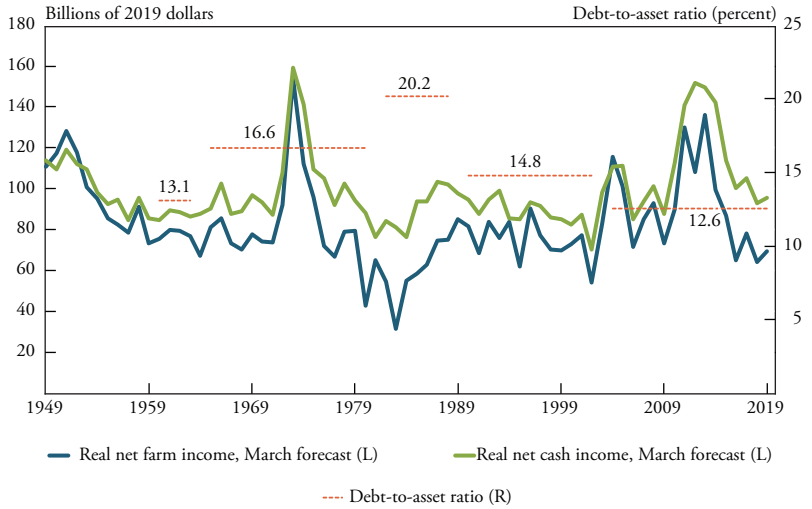
Isengildina-Massa and others (2019) show that the forecast accuracy improved at each forecast horizon over time, with later forecasts being more accurate; however, even the latest forecast made six months prior to the official estimate in August is still significantly different from the official estimate. In addition, forecasts made six to nine months prior to the official estimate are not found to be efficient, meaning that the USDA either smooths (underpredicts) or overreacts (overpredicts) when making forecasts, which later forecasts will need to correct. Bora, Katchova, and Kuethe (2019) show that if it is assumed that the USDA has an asymmetric loss function, then there is a higher cost associated with overpredicting net cash income, particularly in crop cash receipts and government payments. These findings have important implications as the farm income forecasts influence decisions made by farmers, market participants, and policymakers.

Identifying agricultural downturn through net farm and net cash income

The USDA's latest net farm income forecast, released on March 6, 2019, predicts net farm income at the end of 2019 to increase by $6.3 billion (10 percent) from 2018 to $69.4 billion in 2019.[1] If realized, in inflation-adjusted terms, this income would be about 50 percent lower than its highest levels of 2013 and below its historical average across 2000–17, according to the USDA. While there is no formal definition of the term "agricultural downturn," Oppedahl (2017) identifies 2013 as the start of the recent downturn particularly because of the decline in farm income. After farm income declined from 1990 to around 2002, there was an expansion until 2013, after which farm income again declined by about 50 percent. However, this is not the first time that net farm income has fallen in the range of $60 to $80 billion. Net farm income stayed in that range (in real terms) between the years 1959–64, 1967–71, 1976–81 and more recently 1997–2001 (Chart 1).

Chart 1

Real U.S. Net Farm Income, Net Cash Income, and Average Debt-to-Asset Ratios



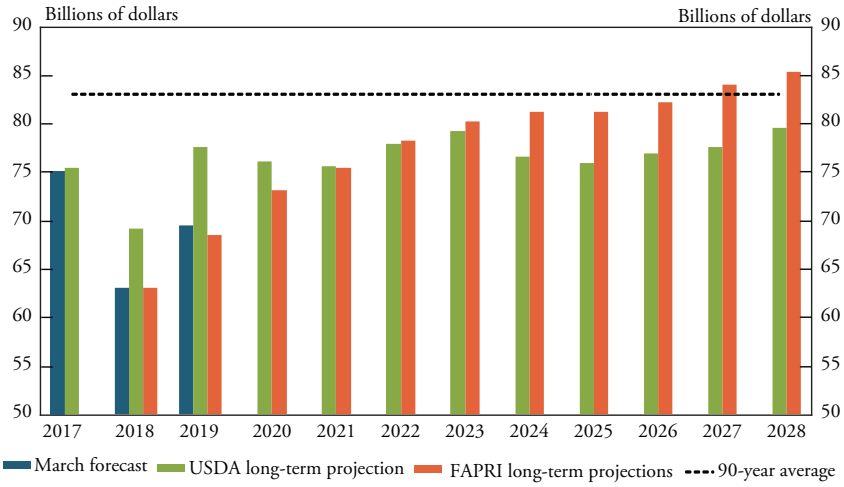
Source: USDA Economic Research Service (USDA ERS).

Is the current 2019 farm income forecast a temporary rebound or a signal of increasing farm incomes to come? Net farm income and net cash income in inflation-adjusted values remain below historical averages from 2000 to 2017, with the percent increase in net farm income still below its last increase in 2016–17. The 2019 final estimate on net farm income may be even higher than the current forecast of $69.4 billion, since the first forecast of the year is generally lower than the final estimate (Kuethe 2018). Nevertheless, for the forecast value to reach the 90-year average of $83 billion estimated by Widmar (2018), an increase of 20 percent or about $13.4 billion would be needed on top of the March 6, 2019 forecast.

The length of time during which net farm income remains below its long-term average is concerning as it may mean financial stress conditions for farmers (Widmar 2018). The year 2019 could mark the fourth consecutive year where net farm income has been below the 90-year average (Charts 1 and 2), and the sixth year of consecutive low farm incomes, indicating an agricultural downturn. Therefore, the current concern should not be whether to expect net farm income to drop to the level witnessed during the 1980s farm crisis, but rather on the length of the agricultural downturn and the toll it might take.

Chart 2

Projected U.S. Net Farm Income, 2017–28



Sources: USDA ERS and the University of Missouri Food and Agricultural Policy Research Institute.

Long-term projections for farm income

Projections from the USDA and the Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU) indicate that it is unlikely for net farm income to surpass the $83 billion 90-year average mark in the near future (Chart 2). FAPRI-MU projects net farm income to surpass the 90-year average mark in 2027, while projections from the USDA estimate 2028 net farm income at $79.5 billion. The USDA projects net farm income to remain in the $75 to $80 billion range, while FAPRI-MU projections are more optimistic, predicting modest increases to net farm income of 1–3 percent from the year 2021 onward.

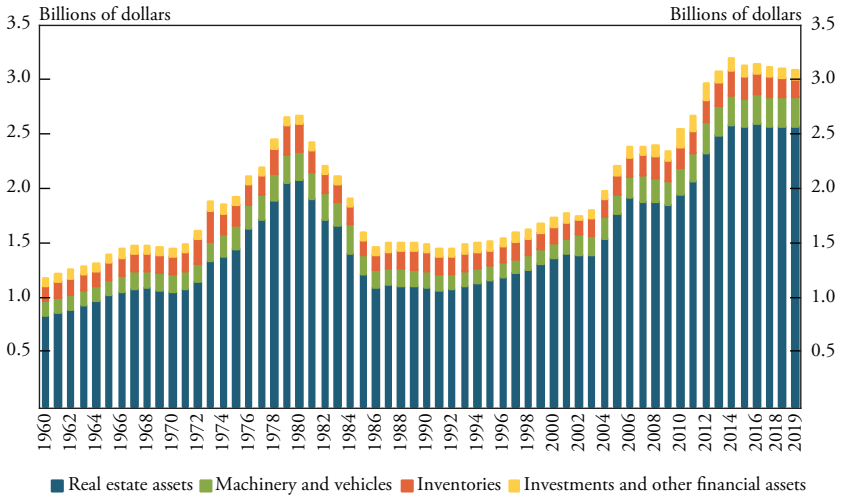
Farm assets and agricultural land values

During the recent downturn in net farm income, land (and more generally farm real estate assets) has continued to account for an important portion of total farm assets (over 80 percent) (Chart 3). The share of land in the total farm assets has increased gradually over time, reducing the relative contribution of other assets such as investments and inventories. This is why trends in land values can provide insights into farm financial stress.

Current land values are the highest seen since 1913 and appear to have stabilized at values above $3,000 per acre (Chart 4). The lowest land values

Chart 3

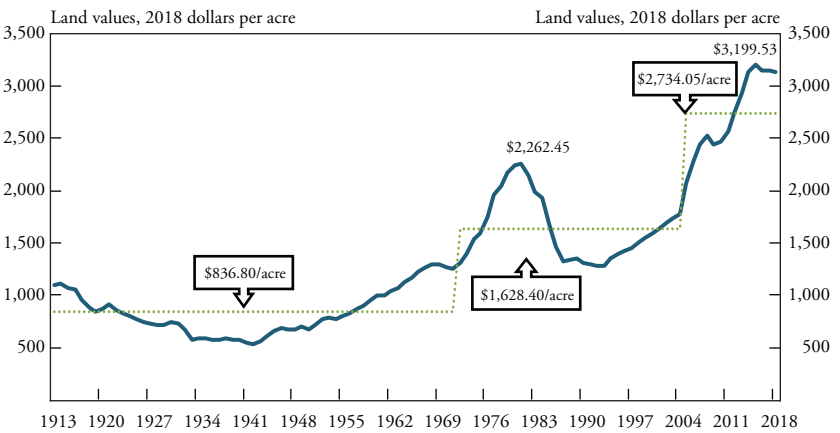
Farm Assets by Type of Asset, 1960–2019



Note: Bar for 2019 represents a forecast value.
Source: USDA ERS.

Chart 4

Land Value per Acre, 1913–2018



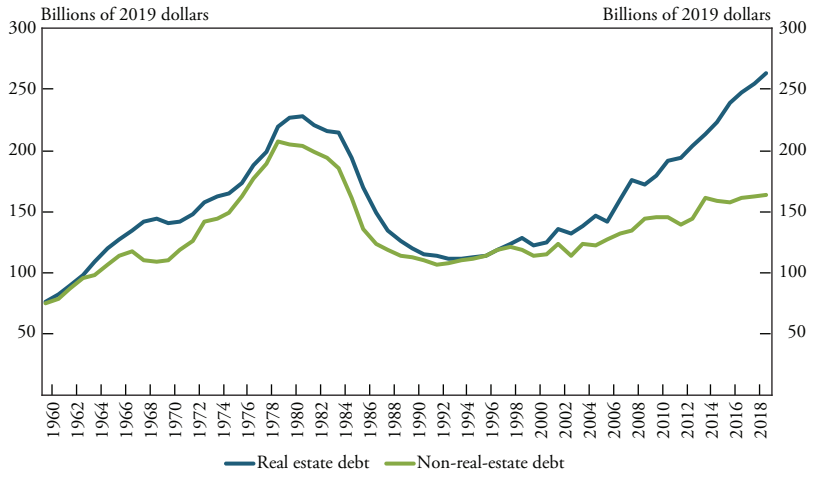
Source: USDA National Agricultural Statistics Service.

were observed during the 1940s, when land values reached $523/acre. This value was lower in real terms than the sharp reduction in land values witnessed during the 1980s farm crisis. Looking at the period ranging from 1913 to 2018, two major peaks in land values can be identified. The first occurred before the 1980s farm crisis and the second began in 2009. This second peak of high land values is 1.4 times larger than the first one. It would seem that land values are reaching a new plateau, potentially a third one. The number of years it takes to reach each new plateau appears to be getting shorter and shorter. The changes in plateaus could be brought on by 1) higher returns to land due to increases in productivity and increased demand for commodities (for example, the boom in demand of corn for biofuels), 2) greater demand for land brought on by farm consolidation and urban pressures, and 3) a prolonged period of low interest rates. The pattern in ups and downs in land values follows closely the ups and downs in total farm assets.

From 2013 onward, total farm assets have surpassed $3 trillion in 2018 dollars. This is the highest recorded amount. The farm assets portfolio appears to have remained unchanged since the 1960s, although the shares of inventories and investments seem to be slightly smaller than those in the 1980s. These facts suggest that the high land values are the reason for maintaining the high total farm assets values. This could mean a stronger financial resilience of farmers who own their land debt-free. Although in the past 20 years total farm assets have seen increases even larger than those from 1960 to 1980, the pattern of decline in total assets experienced from 1980 to 1986 has not been present recently. In fact, the lowest amount of total farm assets in the period of 1960 to 2019 occurred in 1960 (Chart 3), when land values were also low (Chart 4). Since 2013, total farm assets appear to have stabilized with small declines from year to year. This trend appears more similar to the trend that occurred from 2006 to 2009 than the decline that occurred during the 1980s farm crisis (Charts 3 and 4).

Along with the greater importance and share of farmland in total assets, there has been an increase in the amount of debt that is secured by real estate. In the twenty-first century, real estate debt has increased in larger amounts than non-real-estate debt (Chart 5). Both types of debt were almost the same amount during the couple of years preceding the year 2000. It appears that the non-real-estate debt has stabilized

Chart 5
Farm Real Estate Debt and Non-Real-Estate Debt



Source: USDA ERS.

at a lower level while real estate debt has exhibited constant growth in the twenty-first century. This trend is different from the one witnessed in the distant past. In general, real estate debt has been greater than non-real-estate debt, though they have both followed similar growth patterns. Up until 2008, non-real-estate debt accounted for over 45 percent of total farm debt. The USDA forecast for 2019 is that non-real-estate debt will account for 38.2 percent of total farm debt. Similar to the discussion on the share of land in total farm assets, this points to the greater dependence of farm assets on farmland values, with farmland being used as collateral for real estate loans. As such, agricultural lenders as well as farmers seem to be more dependent on high land values to maintain high total asset values.

Farm debt and financial solvency

In the 1970s, debt increased steadily in response to increases in farm income and land values, from $251 billion in 1970 to a peak of $431 billion in 1980, measured in 2019 values. This meant an increase of 71 percent in total farm debt over 10 years spanning the 1970s. Currently, a similar pattern can be detected, as total farm debt has been increasing steadily since 2009, from $317 billion in 2009 to $426.7 billion forecast for 2019, a 35 percent increase. Hence, the increase in farm debt in real terms was larger in the 1970s ($180 billion) than in the last 10 years ($110 billion).

The smaller growth in total farm debt recently may also be associated with changes in lending practices. Zhang and Tidgren (2018) highlight the changes that have occurred since the 1980s farm crisis: 1) cash flows and repayment rates are given greater consideration than before, 2) loan-to-value ratios are required to be below 85 percent, and 3) collateral land values are estimated based on the returns of the land within a period instead of on current market values.

Rather than the total amount of farm debt, financial solvency (measured by the debt-to-asset ratio) may pose a greater concern for agricultural lenders. As mentioned, the repayment capacity has become an important aspect in agricultural lending since the 1980s. The positive news is that the current low levels of farm income are at times when debt-to-asset ratios have been the lowest since the 1960s (Chart 1). Higher land values may be responsible for the lower debt-to-asset ratios. The highest average debt-to-asset ratio was witnessed during the 1980s farm crisis.

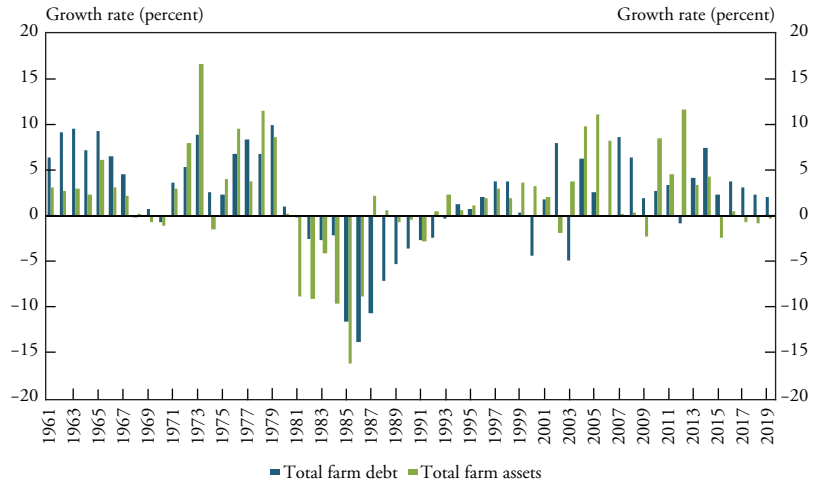
The expectation, however, is for debt-to-asset ratios to increase in the near future, since total farm debt has been growing at higher rates than total farm assets (Chart 6). Variations in total farm debt seem to lag the variation experienced in total farm assets. Since 2015, the growth rates in total farm assets have been mostly negative, while the growth rates for total farm debt have been positive (at least 2 percent). The concurrent negative growth rates in farm assets from 2015 to 2019 coupled with growing farm debt differs from what was experienced during the 1980s, where the growth rates in both farm debt and assets were negative. Among the farm assets components, investments and inventories are probably the cause for lower total farm assets. Inventories have been decreasing since 2015, while investments have experienced declines of 22 percent in 2015 and around 11 percent in 2016 and 2018. Farm real estate continues to be an important component of farm assets (approximately 83 percent), which was also the case during the 1980s farm crisis.

Credit availability

An environment of low interest rates can increase demand for loans as well as demand for farmland. A higher demand for land as an investment may occur as land starts to provide higher returns than other

Chart 6

Annual Growth Rates in Total Farm Debt and Total Assets, 1960–2019



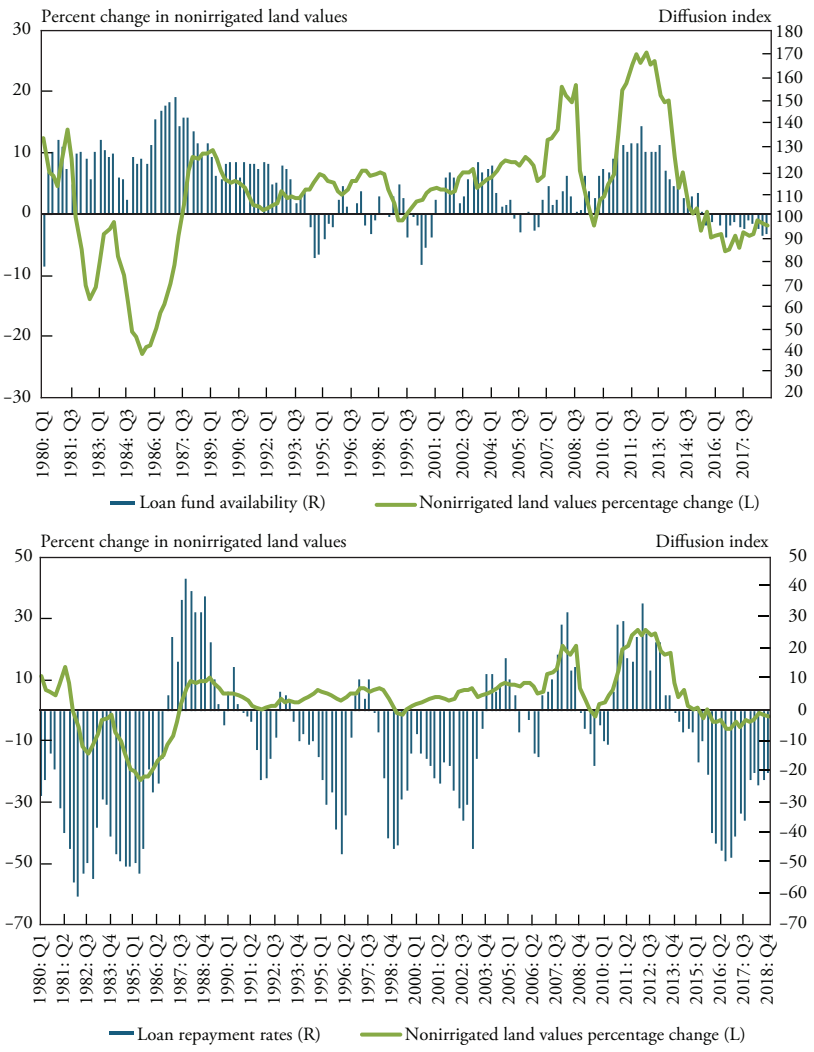
Note: Bar for 2019 represents a forecast growth rate.
Source: USDA ERS.

investment opportunities such as stocks or bonds (Zhang and Tidgren 2018). Information on agricultural loans collected from call reports allows for an analysis of total outstanding debt (Devadoss and Manchu 2007; Shalit and Schmitz 1982) but it does not provide information on the amount of loans granted in a given year or quarter. Additionally, information on the total volume of loans does not indicate whether loan requirements are becoming stricter or not. Stricter loan requirements may impact credit access and credit availability. Although credit access and credit availability are different terms, in our analysis we use them interchangeably. Hence, if there is an increase in credit supply through increasing funds in banks, more bank competition, or less strict collateral requirements, there is more credit available and easier credit access.

Credit availability may be vital for land acquisition, but it can also put an upward pressure on land values. Even with the changes undergone in the lending system, it appears that credit availability can still influence land values. Shalit and Schmitz (1982) argue that land prices may be determined by the amount of debt the land can carry. Agricultural lenders' perceptions about lending markets are captured in the Ag Credit survey conducted by the Federal Reserve Bank of Kansas City. Bankers answer questions stating whether they believe the conditions

Chart 7

Land Values and Credit Availability, 1980:Q1 to 2018:Q2



Notes: The top graph shows percentage changes in nonirrigated land values and the diffusion index for loan fund availability. The bottom graph shows percentage changes in nonirrigated land values and the diffusion index for loan repayment rates.
Source: Federal Reserve Bank of Kansas City.

in the current quarter were higher than, lower than, or equivalent to the same quarter a year earlier. In Chart 7, the right vertical axis has the scale of the diffusion index, which is equivalent to the difference between bankers that responded "higher" and those that responded "lower" added to 100. Therefore, values below 100 indicate that the

majority of bankers responded to a decrease in current conditions (that is, in loan repayment rates or in loan fund availability) with respect to last year, while values above 100 indicate the opposite. We would expect increases in loan fund availability and in loan repayment rates to increase credit availability.

Chart 7 shows that, in general, higher loan repayments occurred at times of positive and increasing percentage changes in land values and vice versa. This pattern is particularly clear from 2003 onward and during the 1980s. In the case of loan fund availability and percentage changes in land values, since 2001, increases in loan fund availability have occurred at times when percentage changes in land values are positive and increasing. The difference between now and the 1980s is that in the 1980s, loan fund availability was higher (that is, the diffusion index was above 100), while loan demand and repayment rates were lower (the diffusion index was below 100), and in recent years, loan fund availability and loan repayment rates have been lower, while demand for loans have been higher. This indicates a new type of credit environment than in the 1980s.

Current credit conditions portray an environment of lower credit availability. Around the start of the agricultural downturn, the diffusion index for loan repayment rates and for loan fund availability was below 100. The diffusion index for loan fund availability has been lower than 100 since 2016 and the diffusion index for loan repayment rates has been lower than 100 since 2013 (Chart 7). Not only have we witnessed smaller growth in debt (Chart 6) but also, as mentioned, data from the Ag Credit survey show that an increased number of agricultural lenders indicate lower credit availability than during the previous year as well as lower repayment rates. These credit conditions may have helped to put downward pressure on land values after 2015 (Chart 4). Notice how in Chart 7, negative percentage changes in land values for farmland in the tenth district are associated with lower repayment rates and lower loan fund availability in the past four to five years. Continued periods of lower repayment rates and lower loan fund availability may cause lenders to restrict credit supply, potentially putting further downward pressure on land values and increasing farm financial stress.

Comparing the recent agricultural downturn with the 1980s farm crisis

Could the farm economy repeat the farm crisis of the 1980s? During the 1980s farm crisis, farmers experienced a period of significant increase in debt aligned with declining net farm income and increasing interest rates. The heightened number of bankruptcy filings for farmers prompted the creation of chapter 12 as an exclusive form of bankruptcy reserved for farmers. Land values, which increased sharply in the late 1970s, went into a steep decline in the 1980s. Having taken on loans using their farmland as a collateral, many farmers were faced with increasing financial stress as the value of their collateral deteriorated, making it harder for them to repay their loans or renegotiate loan terms. Debt-free farmers, on the other hand, had the opportunity to acquire cheaper land and expand their farms.

There are similarities and differences between the events that took place before the 1980s farm crisis and the agricultural downturn of the past six years. The similarities could be narrowed down to three points: 1) decreasing commodity prices and net farm income, 2) declining land values following a notable increase in land values, and 3) increasing farm debt. Although these trends are similar, the magnitude of changes was higher in the 1980s than in recent years. A major difference between the two time periods is the solvency of farm businesses. Debt-to-asset ratios are the lowest they have been in past years, whereas during the 1980s farm crisis, debt-to-asset ratios were the highest they have ever been. Currently, the average debt-to-asset ratio is around 13 percent, while in the 1980s it was 20 percent. The data used here refer to sector information and do not reflect the information of farmers individually, as some farmers are still highly indebted and financially vulnerable. Rather, the data provide a collective picture of farm financial stress. The current agricultural downturn conditions may make it harder for farmers to take on new loans, causing them to use their own internal funds (or working capital) to finance purchases.

Interest rates and lender characteristics leading up to the 1980s farm crisis differ from those experienced in recent years. Farm mortgage rates that were 17.5 percent in the 1980s have declined throughout time to about 4–5 percent in recent years. The composition of lenders has also changed. The majority of farm debt is currently held by commercial banks and the Farm Credit System instead of individuals, as was

the case during the 1980s. Additionally, the occurrence of bank mergers may mean banks have greater portfolio diversification, making them more resistant to financial stress (Bunge 2017; Beck, Demirguc-Kunt, and Levine 2003).

Overall, these conditions have been stronger and more favorable during the recent agricultural downturn compared with the 1980s. For these reasons, a repeat of the 1980s farm crisis is unlikely in the near future. What is uncertain, however, is how long the downturn is going to last.

II. The Effect of the Agricultural Downturn on Agricultural Financial Indicators

Information on delinquency rates and bankruptcy can provide an outlook on the current farm financial stress farmers are enduring. Current data show that delinquency and bankruptcy levels are much lower recently than during the 1980s farm crisis. While this does not rule out that highly indebted farmers may be experiencing farm financial stress, it does suggest that a repeat of the 1980s farm crisis is unlikely.

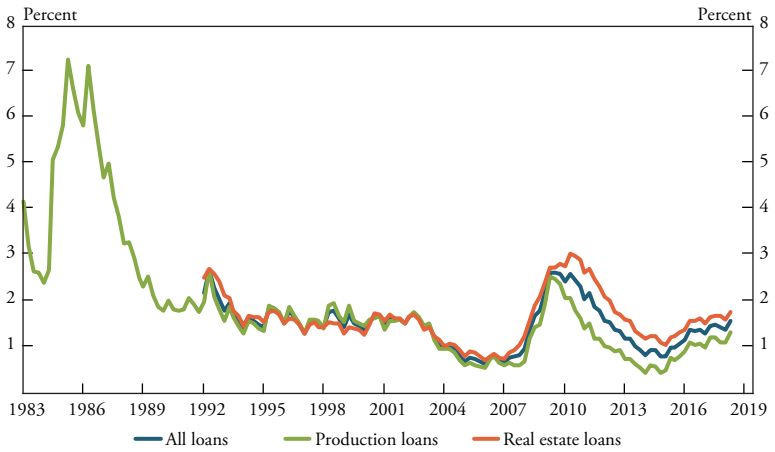
Delinquency rates on agricultural loans

Repayment capabilities can be analyzed by observing trends in agricultural loan delinquencies. Agricultural loan delinquencies constitute loans over 90 days due and loans in nonaccrual status. This information can be acquired from call reports provided by lending institutions. Current delinquency rates are much lower than those experienced in the 1980s (Chart 8). Delinquency rates were over 5 percent during the late 1980s. Since the 1990s, higher agricultural loan delinquency rates of up to 3 percent were experienced in the years preceding the financial crisis of 2008. In recent years, agricultural delinquency rates have been below 2 percent.

Agricultural loans are further analyzed as production and real estate loans. Production loans are taken to finance farm operations (such as purchasing inputs and machinery), while real estate loans are used toward the purchase of farmland and buildings. The repayment lengths and terms for these loans vary, with production loans being shorter term than real estate loans. Delinquency rates for production loans have been smaller than delinquency rates for real estate loans since 2004 (Chart

Chart 8

Agricultural Loan Delinquency Rates for Loans over 90 Days Due and in Nonaccrual Status



Source: Federal Deposit Insurance Corporation.

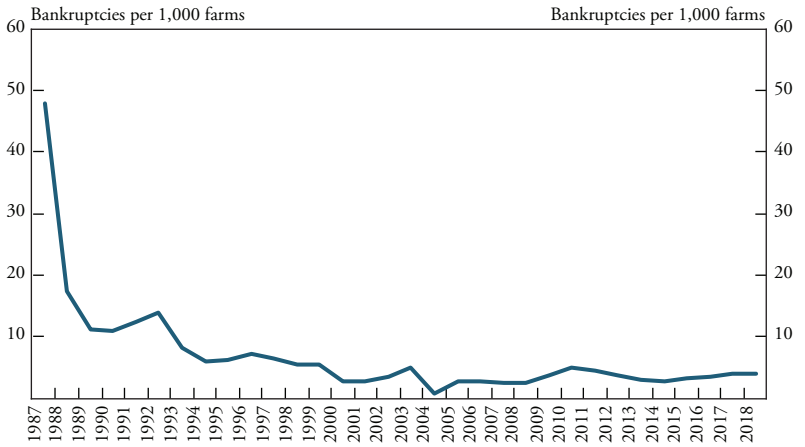
8). The gap between delinquency rates for real estate loans compared with production loans has varied from 0.25 to 1.5 percent, returning to 0.5 percent in 2018 (Davis, Dinterman, and Katchova 2018). This divergence in agricultural delinquency rates may be related to the lower debt amounts of production loans compared with real estate loans.

Farm bankruptcies

In addition to changes in the agricultural lending system, there were also changes in bankruptcy legislation. In 1986, chapter 12 bankruptcies were introduced in response to the farm crisis, allowing farmers to repay their debts in three to five years instead of having to liquidate their farms (as in the case of chapter 7, for example). Chapter 12 was initially a temporary form of bankruptcy and set to expire in 1993, but it was continually extended by Congress until it became a permanent fixture in 2005 with the passage of the Bankruptcy Abuse Prevention and Consumer Protection Act (Dinterman, Katchova, and Harris 2018). Chapter 12 bankruptcy filing is available to farmers who cannot service their debt as long as their total debt is below $4,411,400. Historically, bankruptcy rates since 2000 have been lower than those experienced in the 1980s (Chart 9) (Dinterman, Katchova, and Harris 2018). Therefore, the farm financial stress experienced by farmers during the recent agricultural downturn has a smaller effect on bankruptcy filings than in the

Chart 9

Historical Farm Bankruptcy Rate



Notes: Chapter 12 started in 1986. Bankruptcy rates prior to 1986 cannot be compared directly and were therefore excluded from this chart. Filings prior to 1980 include bankruptcies filed for chapters 7, 11, and 13 by farmers, while those from 1986 onward are chapter 12 filings.
Source: U.S. Courts.

1980s. Once again, there seems to be a period of farm financial stress during the recent agricultural downturn like in the 1980s, but with less influence on farm bankruptcies as a financial indicator.

Although farmers may be facing financial stress during the agricultural downturn with low net farm income, the number of farm bankruptcies has remained fairly stable in recent years. The best way to analyze farm bankruptcy is by looking at changes to chapter 12 bankruptcy filings, though farmers may also file under other bankruptcy chapters if they cannot qualify for chapter 12. In the period in which chapter 12 has been a permanent fixture in the bankruptcy code, the highest levels of chapter 12 bankruptcy filings occurred from late 2009 to mid-2012, with around 700 chapter 12 filings per year. In 2018, chapter 12 filings totaled 498, which was slightly down from 501 in 2017, likely reflecting a greater resilience among farmers. Chapter 12 filings do have regional variation. Recently, Midwestern states have had elevated levels of filings, with the state of Wisconsin having the highest bankruptcy rates in 2018 among all states.

Multiple factors may influence bankruptcy filings (Dinterman, Katchova, and Harris 2018). Among the factors that increase the likelihood of filing for bankruptcy are a lower ability to service

debt and higher unemployment rates. Among the factors that have a negative effect on bankruptcy rates are farm sizes, solvency rates, net farm income, land values, and government payments. Dinterman, Katchova, and Harris (2018) find that the general economy factors such as interest rates and unemployment rates were stronger predictors of farm bankruptcies than agricultural factors such as farm incomes. However, agricultural land values are a strong predictor of bankruptcies because they make up a large share of debt for farmers, and due to the potential for a chapter 12 filing to "cram down" the outstanding debt to the market value of agricultural land in a bankruptcy proceeding.

Conclusion

U.S. agriculture is currently undergoing an agricultural downturn, with many agricultural economic and financial indicators worsening. Farm incomes have dropped by 50 percent since 2013, land values have plateaued in the past three years, farm debt growth has exceeded that of farm assets, and credit conditions have worsened. The downturn has not, however, become a crisis similar to that of the 1980s, as farmers are in a stronger position today than three decades ago.

Although current financial conditions are better than during the 1980s, they may deteriorate in upcoming years. Some positive factors have helped farmers remain in better condition than in the 1980s, such as a higher plateau of land values, low interest rates, net farm income and solvency indicators above 1980s values in real terms, and low agricultural delinquency rates and bankruptcy rates. Nevertheless, the uptick in net farm income in 2017 and expected increase in 2019 are not enough to reach the 90-year average. Several organizations project net farm income to remain below the 90-year average mark in coming years.

Zhang and Tidgren (2018) identify liquidity and working capital as issues related to the agricultural downturn rather than overall solvency. Although farmers still have strong equity positions, less access to credit, lower profitability levels, and deteriorating working capital are elevating farm financial stress. If land values stabilize at higher values, we may see the average debt-to-asset ratio remain lower than it was during the 1980s. The financial stress faced by farmers does appear to be less than that during the 1980s. While we may not expect further declines in land values, due to various factors (such as lending regulation changes)

farmers may still expect to experience an extended period of farm financial stress. Currently, the concern is over the length of the agricultural downturn, which is expected to be prolonged with gradual declines as opposed to the collapse during the 1980s farm crisis (Zhang and Tidgren 2018). As the history of boom and bust cycles tends to repeat itself, it is important to continue to examine the factors that will help boost farm income going forward into 2020 and beyond.

Endnote

[1]This paper was written for the Federal Reserve Bank of Kansas City's Agricultural Symposium in July 2019. At that time, the USDA's most recent forecast for U.S. farm income was from March 2019. In August, the USDA made an upward revision to its expectations for farm income in both 2018 and 2019, which would alter some of the data and discussion that follow, including historical comparisons.

References

Beck, Thorsten, Asli Demirguc-Kunt, and Ross Levine. 2003. "Bank Concentration and Crises." National Bureau of Economic Research, working paper no. 9921, August. Available at https://doi.org/10.1596/1813-9450-3041

Bora, S., Ani L. Katchova, and T. Kuethe. 2019. "Evaluating the USDA's Net Cash Income Forecasts under Multivariate Asymmetric Loss." The Ohio State University Department of Agricultural, Environmental, and Development Economics, unpublished working paper.

Bunge, Jacob. 2017. "Supersized Family Farms Are Gobbling Up American Agriculture." *Wall Street Journal*, October 23.

Davis, Eric C., Robert Dinterman, and Ani L. Katchova. 2018. "Ohio Agricultural Lending Outlook: Fall 2018." The Ohio State University Department of Agricultural, Environmental, and Development Economics, report, October 15.

Devadoss, Stephen, and Viswanadham Manchu. 2007. "A Comprehensive Analysis of Farmland Value Determination: A County-Level Analysis." *Applied Economics*, vol. 39, no. 18, pp. 2323–2330. Available at https://doi.org/10.1080/00036840600675687

Dinterman, Robert, Ani L. Katchova, and James Michael Harris. 2018. "Financial Stress and Farm Bankruptcies in U.S. Agriculture." *Agricultural Finance Review*, vol. 78, no. 4, pp. 441–456. Available at https://doi.org/10.1108/AFR-05-2017-0030

Henderson, Jason, Brent Gloy, and Michael Boehlje. 2011. "Agriculture's Boom-Bust Cycles: Is This Time Different?" Federal Reserve Bank of Kansas City, *Economic Review*, vol. 96, no. 4, pp. 81–103.

Isengildina-Massa, O., B. Karali, T. Kuethe, and Ani L. Katchova. 2019. "Multivariate Evaluation of USDA Net Cash Income Forecasts and Its Components." Paper presented at the Agricultural and Applied Economics Association Annual Meeting, Atlanta, GA, July.

Key, Nigel, Carrie Litkowski, and James Williamson. 2018. "Current Indicators of Farm Sector Financial Health." U.S. Department of Agriculture, *Amber Waves*, July 2.

Kuethe, Todd. 2018. "Adjusting USDA's Net Farm Income Forecast Based on Historic Performance." University of Illinois at Urbana-Champaign Department of Agricultural and Consumer Economics, *farmdoc daily*, vol. 8, no. 222.

McGath, C., R. McElory, R. Strickland, L. Traub, T. Covey, S. Short, J. Johnson, R. Green, M. Ali, and S. Vogel. 2009. "Forecasting Farm Income: Documenting USDA's Forecast Model." U.S. Department of Agriculture Economic Research Service, *Technical Bulletin*, no. 1924, February.

Oppedahl, David. 2017. "The Downturn in Agriculture: Implications for the Midwest and the Future of Farming." Federal Reserve Bank of Chicago, *Chicago Fed Letter*, no. 374.

Schnepf, R. 2016. "U.S. Farm Income Outlook for 2016." Congressional Research Service, CRS report no. R40152, September.

Shalit, Haim, and Andrew Schmitz. 1982. "Farmland Accumulation and Prices." *American Journal of Agricultural Economics*, vol. 64, no. 4, pp. 710–19. Available at https://doi.org/10.2307/1240580

University of Missouri Food and Agricultural Policy Research Institute. 2018. "U.S. Baseline Outlook: Projections for Agricultural and Biofuel Markets." FAPRI-MU report no. 01-18, March.

Widmar, David. 2018. "After 2017 Rebound, Net Farm Income to Fall in 2018." *Agricultural Economic Insights*, September 4.

Zhang, Wendong, and Kristine Tidgren. 2018. "The Current Farm Downturn Vs the 1920s and 1980s Farm Crises: An Economic and Regulatory Comparison." *Agricultural Finance Review*, vol. 78, no. 4, pp. 396–411. Available at https://doi.org/10.1108/AFR-08-2017-0075