Current Farm Downturn vs. 1920s and 1980s Farm Crisis: An Economic and Legal Comparison

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Abstract

Purpose – This paper examines the current farm economic downturn and credit restructuring by comparing it with the 1920s and 1980s farm crisis from both economic and legal perspectives.

Design/methodology/approach – This paper closely compared critical economic and legal aspects of the current farm downturn with two previous farm crises in the 1920s and 1980s, and equally importantly, the golden eras that occurred before them. This study compares key aggregate statistics in land value, agricultural credit, lending regulations, and also evaluates the situations and impacts on individual farmer households by using several case studies.

Findings – We argue that there are at least three economic and legal reasons why the current farm downturn is unlikely to slide into a sudden collapse of the agricultural markets: strong, real income accumulations in the 2000s, historically low interest rates, and more robust regulatory environment for agricultural lending. And modifications in government policies such as allowing a switch from ARC to PLC would provide critical help to farmers in need. The current farm downturn is more likely a liquidity and working capital problem, as opposed to a solvency and balance sheet problem for the overall agricultural sector.

Originality/value – While there is much concern of another farm crisis, there lacks careful comparison of current downturn with not only 1980s but also the 1920s-1930s farm crisis. Using both sector-wide economic statistics, regulatory analysis, and three representative farmer case studies, our analysis provides empirical evidence for cautious optimism of the future trajectory of the current downturn.

Keywords: Farm crisis, farm downturn, land value, farm income, agricultural credit, interest rate

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“Golden” Eras and Farm Crisis: Setting the Stage

There have been three major “golden” eras in modern U.S. agriculture over the last 100 years: 1910 to 1920, 1973 to 1981, and most recently 2003 to 2013, which was fueled by growing export demand from China, historically low interest rates and an expanding biofuel market. Figure 1 shows the nominal and inflation-adjusted Iowa land values since 1910, and Figure 2 shows the inflation-adjusted gross and net farm income for the U.S. during the same period. Both figures reveal that with these golden eras, farmland values, commodity prices, and farm income often reached record heights. It is also evident that shortly following the first two golden eras the agricultural sector contracted heavily: the first ending in a long, drawn-out decline in land values from 1921 to 1933, the second ending with a sudden collapse from 1981 to 1986.

With the current corn price cut in half compared to the 2013 peak level of US $7/bushel and farm income declining more than 30 percent in less than three years, farmland values and cash rent across the Corn Belt have declined three years in a row. Many agricultural lenders, academics, and other stakeholders in the U.S. farm sector worry about a replay of the 1980s farm crisis, which is still vivid for many producers and lenders who witnessed the collapse of the farm sector and many farm businesses. However, it is more important to put today’s problems into perspective by comparing across the previous boom-bust cycles of U.S. agriculture. In particular, we closely compare this current farm downturn with the previous two farm crises in the 1920s and 1980s, and equally important, the golden eras before them.

This paper examines the current farm economic downturn through both an economic and regulatory lens and compares it with the 1920s and 1980s farm crises. We compare aggregate economic and legal data for the agricultural sectors, including farm income, interest rates, government support and lending regulations. We then showcase how the golden eras and farm downturns impacted individual producers using three case studies of farmer households.
The first golden era started at the turn of the last century. Rising corn prices, beginning in the early 1900's, sent the price of farmland and buildings on an upward path. The $43/acre level of 1900 was the highest farmland price experienced to that date (Murray 1967). Almost each year in the 1900-1914 period brought a new all-time high record for land values. With the continuous gains in Iowa farm revenue, for example, the demand for more acreage increased. For instance, a farmer who bought a quarter section (160 acres) for $7,000 in 1900 saw the value of his farm rise steadily until it reached a value of $20,000 in 1914 (Murray 1967). Returns such as these caused farmers and nontraditional agricultural land buyers to invest in farmland. This led to exuberant land speculation and over-valuation of farmland, causing a land boom. At the height of this agricultural land boom, there was a sharp decline in prices of farm products. Corn, which had been selling for $2 a bushel in the summer of 1919, plunged to 41 cents in 1921 (Murray 1967). This reduced the overall value of farmland and virtually halted all investment activity. A majority of farmers who bought land during this boom relied heavily on mortgages, and subsequently found it more difficult to pay off these mortgages (Rajan and Ramcharan 2015). The number of farm mortgage foreclosures in Iowa rose from practically non-existent from 1910 to 1920 to 2,000 in the 1920s and more than 6,000 following the Great Depression in 1933. In summary, the 1920s farm crisis featured a long, drawn-out decline in farmland values, further dampened by the global economy-wide Great Depression from 1929 to 1933.

The farm crisis in the 1980’s had some similarities to the farm crisis prior to the Great Depression. Several important factors fueled the 1970s land boom and ever-increasing investment in U.S. agriculture (Barnett 2000): intentional devaluation of the U.S. dollar designed to reduce an overall trade deficit, which led to massive increases in agricultural exports; various tax codes, especially a substantial income tax deduction for interest expenses that encouraged borrowing; below-market-rate farm loans available to producers through government-sponsored lenders; and lastly, a very strong demand for U.S. agricultural exports, in part due to the crop failures in the Soviet Union in 1973 (Harl 1990). All of these factors generated a boom atmosphere, a rise in production, and rising farm products’ prices and net farm income.
from 1970 to 1973. This led to massive, unprecedented investment in agricultural assets, especially farmland.

Two things are worth pointing out for this period: one, the U.S. agricultural sector was (and still is) heavily integrated into the larger national and global economic systems and thus increasingly vulnerable to outside economic and political influences (Barnett 2000). Second, the overall inflationary environment largely affected farmland investment activities and farmland values. During the high-inflation era of 1970s, many agricultural producers and investors tried to “index” their wealth to inflation by purchasing farmland to store wealth or as a hedging tool (Barnett 2000). This further intensified the land boom.

The most striking aspect of this period in American agricultural history is that debt capital largely financed the massive investment in agricultural assets. With both the nominal interest rates and the rate of inflation very high in the “stagnation” period of the 1970s, in real (inflation-adjusted) terms, debt financing for investment purchases was unbelievably inexpensive. Between 1970 and 1980, the amount of farm mortgage debt outstanding in the U.S. grew 59 percent. This was the first time debt has been used to finance a capital formation of this scale (Barnett 2000, Harl 1990). This was also the first time in American history that the amount that farmers owed in interest was greater than their total net farm income. This resulted in a highly leveraged agricultural sector, which was hit hard by a convergence of factors in the early 1980s: the sharp rise in nominal and real interest rates, a substantial increase in the dollar, and a significant drop in U.S. commodity prices due to the plummeting of the export market and record-level agricultural production.

U.S. agriculture has always been characterized by recurrent episodes of oversupply and declining prices. There have always been farmers and investors catching the land speculation fever during a boom-bust cycle. Of course, there are some factors unique to the 1920s and 1980s farm crises that may not apply to the current downturn. For example, there are no signs of a major economic disruption like World War I, as was seen in the 1910s or a general economic crisis like the 1930s Great Depression; and,
arguably, the new advances in seed and machinery technology significantly enhance today’s farmers’ ability to cope with disastrous production conditions like the drought in 1983.

However, there are similarities between the previous golden era-farm crises and the current downturn: first, many farmers were shocked by the Federal Reserve’s decision to shoot up interest rates from 8 percent to 18 percent in 1981, and now the Federal Reserve is inching up interest rates again (Federal Reserve Bank 2017), although not as dramatically and suddenly as it did in the early 1980s.

Second, one of the watershed moments that prompted agricultural exports and crop prices to drop in the 1980s was President Carter’s decision to impose an embargo on exports to the Soviet Union, and now there is significant and growing uncertainty with respect to U.S. agricultural trade, especially with respect to Mexico and China. For example, the current administration is planning to renegotiate NAFTA (North American Free Trade Agreement) after withdrawing from TPP (Trans-Pacific Partnership). Third, the trade-weighted U.S. dollar index skyrocketed in the early 1980s to the highest level over the past five decades, and today we are seeing a strengthening U.S. dollar as well. This potentially hurts U.S. agricultural exports. Finally, the downward adjustment in cash rent and other production costs in each of the three farm crises or downturns are almost as challenging as their hikes upwards in the expansive, go-go years before.

In the next section, we closely examine several key sector-wide statistics and regulations underlying the golden eras and farm downturns, from both economic and legal perspectives. Next, we investigate and showcase how a changing agricultural economy impacted individual producers using several case studies of farmer households. Finally, we evaluate how future policy or economic fluctuations might impact the trajectory of the current farm downturn using the same case study.

Are We Going to See a Replay of 1920s or 1980s Farm Crises?

In the wake of alarming signs indicating a possible farm crisis, we discuss several critical aspects of today’s agricultural economy by comparing them with the current downturn with the 1920s and 1980s
farm crises. Importantly, we group the discussions into two categories: economic considerations that include discussions on farm income, interest rates, and government safety nets, and legal considerations, such as lending regulations and federal involvement in agricultural lending.

**Economic Considerations**

*Much stronger, real income accumulation before the current downturn*

When debunking or confirming the idea of a farm crisis replay, it is useful to closely investigate the previous farm crises of the 1920s and 1980s and the golden eras before them. Through that comparison, we argue that the much stronger income accumulation during the late 2000s, fueled by growing export demand from China, historically low interest rates, and the expanding biofuel market, puts agricultural producers and businesses in a much better condition to weather current economic storms.

<Insert Table 1>

Table 1 presents the average annual percentage change in inflation-adjusted Iowa land values, as well as gross and net farm income for the three golden eras and farm downturns. While it is concerning to see that since 2013 gross and net cash income has decreased 4.5 percent and 9.8 percent per year, respectively, it is equally important to note that from 2003 to 2013, gross and net income consistently grew 4.5 percent and 8.1 percent every year, reaching almost record-high levels in both farm income and land values. Forecasted income for 2017 by USDA-Economic Research Service seems to suggest that farm income is stabilizing in Corn Belt states like Iowa.

A comparison between this third golden era and the two previous reveal that farmers accumulated much more income, especially cash, during the most recent decade than during the 1910s and 1970s. Net cash income before the 1980s farm crisis was much smaller, even though land values skyrocketed during the same time. In his book about the 1980s farm crisis, Dr. Neil Harl described the gains in farm income and land value as “illusionary” and driven by inflation (Harl 1990). In other words, high commodity prices in the 2000s seem to have positioned current agricultural producers to better withstand the current economic storms.
Historically low interest rates

Put simply, land value is the net present value of all discounted future income flows. With certain assumptions imposed, one could think of land value being net income divided by interest (discount) rate. Despite recent decisions by the Federal Reserve to raise the federal funds rate by a total of 75 basis points, current interest rates remain at historically low levels. The one-year Treasury Constant Maturity Rate was around 3–7 percent during the 1910s and 1920s, jumped to 15—20 percent during the early 1980s, and is now around 1.2 percent (Federal Reserve Bank 2017). Farmland mortgage rates resemble this trend as well.

Low interest rates are favorable to keep the farmland market afloat: on the one hand, it encourages stronger loan demand due to lower interest payments, and on the other hand, low interest rates signal that the returns on other competing assets, such as stocks and bonds, aren’t as appealing so that there is a higher investor demand for farmland. Figure 1 reveals that, even with recent hikes, interest rates are still very low compared to the 1980s, and the Federal Reserve is likely to raise the interest rate at a slow pace, as opposed to a sudden hike, which makes loan restructuring possible.

Figure 2 shows the agricultural liquidity and solvency ratios for the United States since 1960, and Figure 3 shows agricultural loan delinquency rates since 1970. In particular, the debt service ratio measures the share of value of production used for debt payments, and a higher value suggests a lower liquidity. Although the current rate is rising, it is still well below the 1980s farm crisis level. The profitability ratio, such as rate of return on farm assets, is now inching down, but is also higher than the
1980s levels. It is likely that, with the current stagnation of commodity prices and continued decline in farm income, the debt service ratio will continue to rise and the profitability ratio remain flat or decrease. However, this is more likely a liquidity and working capital problem, as opposed to a solvency problem. The balance sheet of the U.S. farm sector is still very strong, which can be seen from the low level of debt-to-asset ratio in Figure 2. Similarly, although we see that the loan repayment index continues to decline, the delinquency rates for both agricultural loans in general, as well as farmland loans, are still at very low levels.

<Insert Figure 4>

Figure 4 specifically compares the average cash rent and annual mortgage payments per acre for a typical Iowa farmland loan under prevailing farmland loan interest rates and varying terms.\(^1\) It shows that due to abnormally high interest rates in the 1980s, the mortgage payment for a typical farmland loan was almost three times higher than the typical cash rent, and extending the farmland loan repayment schedules from 15 to 30 years did almost nothing to alleviate the financial burden faced by landowners. This eventually led to massive foreclosures, bankruptcies, suicides, and even the killing of a Hills Bank lender (Atkinson 1999). However, under today’s low interest rate environment, debt restructuring is feasible and makes sense. With current prevailing farmland loan rates, extending a farmland loan from a 15- to 30-year repayment schedule would cut the annual mortgage payment needed from over $350 per acre—higher than the 2016 cash rent payment of $230—to a level comparable to the typical cash rent payment. In fact, many lenders are now advising their clients to take advantage of the current favorable interest rates to secure repayment capacity. Although it is difficult to rule out a future sudden change in interest rates, it is safe to say that at least for the foreseeable future, producers who are currently over-leveraged still potentially have the option to take advantage of the low interest rates.

\(^1\) This calculation makes two assumptions: (a) the average land value and cash rent value from ISU surveys is used as proxy for gross income and asset/collateral value; and (b) it assumes certain loan-to-value ratios based on regulations on agricultural lending and common lending practices, which we will discuss more in detail later.
The future of agriculture’s government safety net is less clear, as well as its effectiveness in providing financial support for farmers in times of need. On the one hand, one could argue that there is today much broader crop insurance coverage for farmers: Figure 5 shows that in 1987, only 50 million acres in the entire United States were insured in the Federal Crop Insurance program. Today, the total cropland insured in Iowa alone exceeds 25 million acres, representing 93% of Iowa’s corn and soybean production acres (USDA RMA 2017). Importantly, the modern crop insurance programs also expanded to include revenue coverage—a product that did not exist in the 1980s when only a rudimentary version of APH yield insurance existed, and only at low coverage levels (Sherrick and Schnitkey 2014).

However, broader coverage may not necessarily lead to stronger income support. There are at least several factors that limit the effectiveness of the current federal government safety net in helping farmers when crop or livestock markets don’t deliver satisfactory income. First, ARC (Agricultural Risk Coverage) payments are employing a rolling five-year Olympic average formula that makes the support level dwindle even more with current declining commodity prices (Plastina et al. 2016), hurting ARC’s effectiveness in helping farmers in times of need. For example, the average ARC-CO payments per corn base acre in Iowa decreased from $47 in 2014/15, to $34 in 2015/16, and finally to $9 in 2016/17 (Plastina et al. 2017). Second, under the 2014 Farm Bill, the operating producers select either ARC or PLC, and the vast majority of producers in the Midwest opted into ARC and predominantly ARC-CO programs due to higher projected payments. However, with the current negative-margin prices, PLC offers a stronger support compared to ARC-CO, yet many producers are stuck with ARC-CO unless the policy changes. The average PLC payment per corn acre in Iowa jumped from nothing in 2014/15 to about $35 in 2016/17 (Plastina et al. 2017). Thirdly, in the late 1980s, the then-new CRP (Conservation Reserve Program) helped stabilize land rent and land value by offering competitive payments comparable to cash rents, which would last for 10 or 15 years (USDA FSA 2017). This helped ease the grain
oversupply problem through set-aside acres, which gradually increased to almost 36 million acres in the early 1990s. Comparatively, the current CRP program is pushing its 24-million acreage enrollment limit for the general sign-up, and the continuous sign-up that often targets buffer strips would not be broad enough to cover the whole farm. Finally, crop insurance indemnity is linked with the same-season February prices, which makes its current support level too low to be relevant for producers, unless a natural disaster strikes. In addition, with virtually almost every eligible producer enrolled in crop insurance, there is not much room to change the current program to provide additional support (USDA RMA 2017).

**Legal and Regulatory Considerations**

Legal and regulatory policy have influenced each “golden” era of agriculture. Several of these policies may have directly contributed to past crises. It is our contention that the current regulatory environment is somewhat more protective against precipitous economic decline in the agricultural sector than those which existed during the prior eras. Two key developments have been particularly impactful: (1) the creation of new lending sources, resulting in a shift from private individuals to regulated institutions and (2) increased tightening of lending standards. We analyze these associated policies for each era and conclude that today’s regulatory environment offers more protection against a sector-wide crisis, than those of past eras.

**1910-1930s**

In 1910, farmers had few good options for financing. Farm real estate mortgage debt was held primarily by private investors (75 percent), followed by state banks and trust companies (13 percent) and life insurance companies (12 percent) (Saulnier et al. 1958). Given that most lenders were individuals, interest rates on farm loans varied widely. And many state banks, although willing to make five-year loans to farmers, insisted upon notes that were payable on demand.
The Federal Reserve Act of 1913 for the first time granted national banks the authority to make loans to farmers to purchase land. The value of these loans could not exceed 25 percent of their capital and surplus or one-third of the value of their deposits. And, loans could be made for only five years at a time.

The Federal Farm Loan Act of 1916, the genesis of the Farm Credit System (FCS), created joint stock land banks, federal land banks, and the Federal Farm Loan Board. The Act sought to increase competition among lenders and increase the availability of low-cost-credit. These federal land banks were authorized to give farmers 5 to 40-year loans secured by a first mortgage on farmland. The loans could not exceed 50 percent of the value of the land mortgaged (and 20 percent of the value of permanent, insured improvements).

By 1920, however, it was still private lenders who dominated the agricultural credit arena. Uninhibited by legal limits or cautious tradition, many private investors were willing to finance speculative land purchases (Dyson 1971). Farm real estate mortgage debt increased by approximately 135 percent from 1910 to 1920. Individual investors held 70 percent of farm mortgages, and the federal land banks’ share of the lending pool had climbed to just four percent (Saulnier et al. 1958).

When commodity prices plunged in 1920, along with the good fortune of the farming sector, a round of foreclosures reallocated the pool of lenders, shifting the mortgage debt from individuals to more conservative insurance companies and institutions. Life insurance companies, for example, always sought to maintain a 30 percent loan-to-value ratio. Despite this shift and the fact that commodity prices rebounded in the mid-20s, land prices continued a steady decline. Consequently, farmers could not repay their mortgage debt and debt-to-asset ratios spiked to 39.6 percent by 1930 from 29.1 percent in 1920. The Great Depression eliminated all hope for a recovery, and the still-fragile farm credit system collapsed.

In response, Congress passed the Farm Credit Act of 1933 to build upon the 1916 legislation and expand FCS. The Act created 12 federal land banks to continue offering long-term agricultural real estate
loans through federal land bank associations and 12 federal intermediate credit banks to provide short and
intermediate term credit to local production credit associations (PCAs) and other agricultural lenders.
President Roosevelt also signed an Executive Order in 1933 to place these institutions under the
supervision of a new agency, the Farm Credit Administration (FCA). By the end of the Great Depression,
38 percent of farm debt was held by government-sponsored lenders (Saulnier et al. 1958).

1970-1980s

If the first golden age was marked by the entry of government-sponsored institutions into the agricultural
mortgage sector, the second golden age was marked by the solidification of these entities as primary farm
lenders. In 1970, unlike the first golden age, land was not the only capital intensive requirement for
farming. Farmers’ debt to purchase machinery and other non-real estate assets was nearly the same as that
for real estate. Individual investors still held the majority of farm mortgage debt (37%), and dramatically
rising farm incomes and higher land prices caused an unprecedented demand for farmland and a
concurrent need for credit (USDA ERS 1985). This fueled intense competition amongst lenders and a
general relaxing of lending standards not seen during the prior golden era. Credit on reasonable terms was
readily available to nearly all farmers.

The Farm Credit Act of 1971 increased the allowable loan-to-value ratio for FCS association loans
from 55 percent to 85 percent for standard real estate loans and to 97 percent of the appraised value for
real estate loans guaranteed by the government. Legislators deemed this a “prudent relaxation” of then-
current restrictions (Hearings 1971). During the 1970s, the Farmers Home Administration (FmHA) also
emerged as a prominent lender. Congress had created the FmHA in 1946 as a direct lender “of last
resort”. The agency provided government-subsidized operating and farmland loans to family-sized
farmers unable to obtain credit through other channels.

The ready availability of easy credit drove land prices even higher. The market for farmland was
also increased because many viewed farmland as a hedge against inflation and a tax shelter. (USDA-ERS
Farmers who already owned property used their land as collateral to obtain more loans and expand their operations.

Perhaps most significantly, lenders during this era frequently based their lending decisions on the current market value of collateral and the current crop prices, rather than on cash-flow analysis (FDIC 1995). This meant lower down payments, and a growth of credit availability that exceeded even quickly rising income levels. The overall share of farm real estate debt held by commercial banks dropped during this time, in part due to below-market loan rates offered by FCS, which priced loans based on the average cost of funds in their security portfolio rather than the marginal cost. Farm debt rose steadily with land prices.

When the bubble burst in the early 1980s, most mortgage debtors were vastly over-extended. By mid-1985, FCS’s federal land banks and FmHA held 52.3 percent of outstanding farm real estate debt. Banks continued to hold the largest share of non-real estate debt (35.5 percent), while the PCAs, intermediate credit banks, and FmHA held 31.4 percent (USDA-ERS 1985).

Through the Farm Credit Amendments Act of 1985, Congress provided funding to FCS to prevent its collapse. It also restructured the FCA to increase its oversight authority and grant it regulatory enforcement powers. The Agricultural Credit Act of 1987 implemented further reforms to protect borrowers impacted by imminent foreclosure by FmHA, which had continued to offer farmland loans to struggling farmers after land prices plunged. It authorized the agency to write off billions of dollars in farm debt and directed additional funds toward FCS institutions. The Act also reorganized FCS to make it more efficient and created the Federal Agricultural Mortgage Corporation (Farmer Mac), which for the first time established a secondary market for farm real estate loans.

**2010 to Present**

The credit landscape has shifted significantly since the 1980s. With this shift comes greater protections against sector-wide economic failure. At the end of 2015, FCS held 47% of farm real estate debt,
compared to 33 percent by commercial banks, 8 percent by life insurance companies, 6 percent by private
individuals, and 5 percent by FSA (formerly FmHA) and Farmer Mac (USDA-ERS 1985). Commercial
banks continue to hold the largest share (40%) of non-real estate farm debt. Compared to their relatively
small holdings in real estate debt in the 1980s, commercial banks are now a major source for agricultural
real estate loans. This shift from individuals to commercial banks provides greater stability and less
credit-driven speculation in the market. The consolidation of lending institutions (leading to more
diversified loan portfolios), increased capitalization requirements, and the emergence of Farmer Mac as a
guarantor of many farm loans also suggest that a downturn in agriculture is less likely to trigger the
collapse of large numbers of financial institutions.

Commercial banks are regulated by the federal government or the respective state where they are
chartered. Additionally, all FDIC-insured institutions must abide by federal regulations that require
“prudent underwriting standards.” Regulations set fundamental limits on lending activities, such as loan-
to-value ratios no greater than 85 percent for loans to purchase improved property, such as farmland. In
reality, lending guidelines are much more restrictive. Unlike lenders from the 1970s, today’s agricultural
lenders rely on cash flow, not collateral value, in assessing loan eligibility. And, applying this rule,
commercial banks rarely make farm loans for real estate with loan-to-value ratios greater than 60 to 70
percent. Federal banks are supervised by bank examiners from the Office of the Comptroller of the
Currency. Banks are required to mitigate risk, guard against an overconcentration of agriculture-related
loans, and use prudent underwriting practices. In particular, the OCC handbook states, with respect to
underwriting agricultural loans:

There should be a strong emphasis on borrower cash flow and repayment capacity. Ag banks
should not place undue reliance on collateral and cyclical factors as part of underwriting decisions.
Along these lines, banks should be sensitive to evidence of speculation in Ag land prices or
commodities that influence the market. For example, an Ag loan approval should be based on a
reasonable expectation that operating cash flow will provide sufficient repayment, not on the Ag
land value (OCC 2014)

Likewise, FCS’s lending practices have become more stringent as well. The FCA, which oversees
FCS institutions, is responsible to ensure that its member associations practice prudent underwriting
practices. Although regulations still allow FCS to lend up to 85 percent of the appraised value of real
estate, the standard practice is 50 percent loan-to-value ratio. And, like other lenders, FCS is now placing
a strong emphasis on cash flow and repayment capacity, as opposed to current collateral value. The FCA
Loan Portfolio Management handbook includes a section on “Lessons from the Past,” warning against
“over-reliance on inflated expectations for future incomes combined with rapidly increasing values for
agricultural assets.” (FCA 2017).

Yet, the sector is stressed, as indicated by a near two-fold increase in loan demand since 2013 and
sluggish loan repayment numbers (Chicago Fed). In 2016, the USDA’s Farm Service Agency (FSA), the
former FmHA, ran out of money for making loans to farmers seeking operating capital because the
demand was so large. If farmers are turned down by institutional lenders, FSA becomes the lender of last
resort. Congress authorized an additional $185 million in funding for the 2017 fiscal year (original budget
was for $6.4 million). Future funding levels for these programs are uncertain.

*Lessons Learned*

Although the farm sector is facing significant debt and accompanying risk, today’s regulatory
environment is protective against systemic collapse. First, unlike the last two golden eras, most farm
loans are now held by more regulated institutional lenders. This stabilizes the credit market and has
reduced speculative activity that fueled the land booms of prior eras. Consolidation and increased
capitalization of lenders also reduces the likelihood of bank failures. Second, lenders have tightened
underwriting standards substantially, particularly with respect to valuing collateral. Lenders now eschew
basing lending decisions upon current land values or commodity prices and instead rely primarily on
borrowers’ cash flow and repayment capacity. This makes it more difficult for producers to obtain credit
and will drive some from the business, but it has created a larger cushion for debtors and lenders to
weather economic challenges.
“Farming in Our Blood”: Case Studies of Farmers Who Lived Through the Downturn

The previous section focused on the aggregate economic statistics and legal regulations, and this section illustrates how the golden eras and farm downturns were manifested at the individual producer level. In particular, we use three case studies of farmers who lived through 1910s-1930s, 1970-1980s and 2000s-2016 to showcase the impacts of agricultural economic fluctuations on individual producers. These individual farmer case studies transform numbers on a page into real life.

Farmer A – 1920s

Farmer A, is largely borrowed from Murray (1967). He owned a 311-acre farm in 1919 in central Iowa for which he owed a mortgage debt of only $11,000. Up to this time he had resisted all temptations to buy during the boom. He had seen the farm next to his sell four times between 1909 and 1917 - in 1909 at $100 an acre and in 1917 at $190 an acre. Finally in March of 1920, at the top of the boom, courthouse records show that Farmer A got the fever and bought this neighboring farm of 240 acres at $396 an acre for a total of $95,000.

To make the purchase, Farmer A borrowed $34,000 in cash by increasing the mortgage on his home farm from $11,000 to $45,000. This $34,000, plus $16,000 of additional cash from deposits and bank loans on livestock and equipment, made a total of $50,000, which was paid on the $95,000 purchase, leaving only $45,000 to be financed by mortgages. Compared to most of the land boom sales, this one was conservative with more than 50 per cent of the amount paid in cash.

Farmer A’s new mortgage debt was not heavy in relation to the value of the farm. He had a mortgage of $45,000 on each farm for a total of $90,000 of debt on 551 acres or an average of $163 an acre. With land valued at around $400 an acre, this meant a debt which was considerably less than one-half of the land value.
The first blow, which came in 1921, was the drop in prices of farm products (Shideler 1957). Corn, which had been averaging over $1 a bushel and actually selling for $2.00/bushel in the summer of 1919, plunged to 41 cents in 1921. The boom was definitely over.

The second blow was the interest payment on the mortgage debt, which hit like a "ton of brick" in 1921. In the actual case of Farmer A with a $90,000 mortgage debt, the required interest payment of $5,000 was more than the value of all the corn produced on both of his farms that year. Some farm owners borrowed money from banks, relatives, and any other sources available to meet their required payments, hoping that next year would see corn above $1.00/bushel. But that never happened, as the average corn price for 1921-1925 was only 63 cents a bushel.

Foreclosures and bank failures began in the early 1920's. Those buyers who had made only a small down payment and owed a large debt were the first to lose their farms, usually to the holder of a junior mortgage, which is a second or third mortgage. In the case of Farmer A, who had paid over half the purchase price in cash, the foreclosures did not occur until 1927 and 1928 when he lost both of his farms. Up to this time, Farmer A had hopes that conditions might improve, but they did not. In the meantime he had borrowed all he could to stave off foreclosure, only to give in when he had exhausted his borrowing ability and could meet neither his property taxes, nor the interest on his debts. Farmer A was typical of a particularly unfortunate group of land boom victims who had invested a large amount of their own resources, only to see them evaporate with the continued low level of corn-hog prices after 1920.

Farmer B – 1970s- 1980s

Combined testimonies of farm families from Minnesota and Iowa form the basis for the creation of “Farmer B.” These testimonies were documented in Farming is in Our Blood (Rosenblatt 1990) and The Farm Crisis (IPTV 2013).

Farmer B started farming in the mid-1970s in Fayette County in Northeast Iowa, renting 500 acres to grow corn and soybeans. He also inherited 160 acres, which he owned free and clear, from his
grandfather. After accumulating income for a few years, and inspired by the skyrocketing commodity and land prices (Zhang 2017), Farmer B wanted to further expand his operation. With the encouragement of lenders, he bought 320 acres in 1978 at an auction for $1,650 an acre.

After paying slightly more than 20 percent as a down payment for the 320 acres, Farmer B obtained two land loans. One loan was a 10-year farmland mortgage of $150,000 with 10 percent fixed interest obtained from a local community bank, while the other was a 15-year variable rate loan of $250,000 from a local Federal Land Bank (FLB). The interest rate was fixed for the first three years at 9 percent, and then adjustable to prevailing market rates. In addition, Farmer B had a five-year machinery loan of $50,000 initiated in 1977 and an annual $30,000 operating loan with a floating interest rate from PCA.

When Farmer B obtained these farmland loans, he had every intention to make timely and regular payments. In 1978, his crop income was more than double the annual mortgage payments needed for the land loans, and he saw the collateral value on his balance sheet and his net-worth on the bank statements skyrocket.

Things turned ugly for Farmer B in the early 1980s after the Soviet Union grain export embargo. In addition, crude oil prices had doubled in 1979, and the cost of fertilizer, seed and farm chemicals shot up by 20%. With a strong U.S. dollar hurting U.S. agricultural exports, the prices of corn, soybeans, and wheat received by Farmer B dropped significantly to below cost of production, and his farm income started to tank.

Like his neighbors, Farmer B sensed the tightening agricultural profitability but still thought his balance sheet was strong. In 1983, he had about $1,000 per acre unpaid for the two land loans, and high interest rates started to take a significant toll. After a disastrous 1983 harvest, Farmer B was still current on his debt payments for the machinery, land, and operating loans. But his working capital quickly shrank to less than $25,000. The cost of production and grain prices were not that different, but interest rates almost doubled from nine percent to 17 percent.
In February 1984, Farmer B was called in to the FLB, and the bank officer told him they needed $50,000 more in collateral for loan security purposes. Farmer B was caught by surprise and at a loss as to how he could work through this. Neither FLB nor PCA was able to offer loan restructuring or a reduction in the interest rate.

In addition, the PCA sought additional collateral and could not offer additional operating loans. Farmer B finally went to FmHA and got a $20,000 operating loan at a 15 percent interest rate. Farmer B struggled through the 1984 crop season, but saw in early 1985 another 30% decline in the value of his 500 acres. All proceeds went to the bank to pay interest and almost none went toward principal. With the additional reduction in collateral value, the FLB called in its loan. Farmer B was unable to refinance, and his farm, including the 160 acres he inherited in the 1970s, went to farm auction a year later, putting Farmer B out of the farming business.

Farmer C - 2010s

Farmer C is based on FINPACK data collected by Charles Brown, an Iowa State farm management specialist. Farmer C farms 1,223 acres in Freeborn County, Minnesota. He rented 1,000 acres for $257 an acre in 2015 and owned 223 acres, which he purchased in 2005. On the rented acres, he employed a 50/50 corn-soybean rotation, while growing continuous corn on his own 223 acres.

Farmer C’s major source of income stems from his corn and soybean yields and inventory. Because of accumulated savings from the late 2000s, he had $200,000 in cash and $113,969 prepaid expenses and supplies associated with an annual operating loan before the 2015 planting season. He fully owns a 2012 tractor and a 2012 combine. With land values increasing to close to $8,000/acre in early 2015, his total asset value was above $3 million as of January 2015. In terms of liabilities, Farmer C has a 20-year land mortgage with a $301,145 remaining balance and a fixed 5% interest rate, and a five-year combine and tractor note in the amount of $300,000 with a fixed 5% interest rate and final payment due in late 2019. In
sum, Farmer C had a strong balance sheet, with a 24.3% debt to asset ratio, as well as a 2.26 current ratio, with $272,886 of working capital in January 2015.

In 2015, Farmer C had decent yields – 180 bushel/acre for corn and 55 bushel/acre for soybean, and good prices - $3.90/bushel for corn and $10.00/bushel for soybean, but not as good as in previous years. He did not change his operation, and due to high production costs, including the $257/acre cash rent, he saved only $42,255 net cash farm income. With high mortgage payments for the machinery and land loans, he incurred a negative capital replacement margin of $94,146. If Farmer C had cut production expenses by $50 per acre or negotiated to get a reduction in the cash rent, he could have improved profitability significantly. Alternatively, he could have refinanced the machinery and land loans to a longer term and locked in the current, low interest rates. This option would not improve profitability, but would buy more time and slow the erosion of working capital.

Because Farmer C made no changes in his operation for the 2015 growing season, he saw more erosion in his working capital, and a $94,146 loss in cash available after loan payments. In addition, the value of Farmer C’s land dropped from $8,000 to $7,000 an acre a year later.

For the 2016 growing season, Farmer C achieved much better yields than expected – 210 bushels/acre for corn and 65 bushels/acre for soybeans, but prices were lower than 2015 - $3.40/bushel for corn and $8.75/bushel for soybeans. Cash rent for the 1,000 rented acres was reduced by $50 to $225/acre, and input costs, especially fertilizer costs, were reduced from those of 2015 as well. There was a continued erosion of working capital, falling from $272,886 in early 2015 to $159,557 in late 2016 (Table 2). Despite declining land values leading to a reduction in the value of long-term assets, Farmer C’s debt-to-asset ratio is comparable to or even smaller than two years ago at 23.7%. This is because he paid down a significant amount of debt, especially the machinery debt, over the prior two years. The inaction of Farmer C to refinance, however, resulted in a negative capital debt repayment margin of - $25,032 had there been no ARC-CO payments, and his term debt coverage ratio dropped to 1.07, well below the safe threshold of 1.5 (Table 3).
Looking Ahead: the Trajectory of the Current Farm Downturn

As shown in the previous section, Farmer C still has an excellent balance sheet, yet his working capital is quickly draining away. Tables 2 and 3 showcase how his balance sheet, working capital, and capital debt repayment capacity would change under several alternative future scenarios, including changes in interest rates, land values, or government programs for 2018.

No Changes

Farmer C has not refinanced, and with potential risk for drought, yields are back to normal in 2017 – 180 bushels/acre for corn and 55 bushels/acre for soybeans. Farmer C began 2017 with $159,557 of working capital. He still has a healthy current ratio and has managed to pay off a substantial portion of his machinery loans. In this scenario, we assume that Farmer C did not refinance nor lower his production costs, but his cash rent for 1000 rented acres dropped another 10 bucks to $215/acre.

For 2018, we also hypothesize business as usual. Grain prices have slightly improved, pushing corn prices to $3.50/bushel and soybeans to $9.00/bushel. We also hypothesize a minor reduction in land value, down from $6,500/acre a year ago to $6,250/acre in 2018. Due to the loss in capital debt repayment margin in 2017, Farmer C cannot pay it all using the cash on hand and he will have to sell $10,000 bushels of corn inventory to have more cash on hand, yet his working capital still shrinks to merely less than $10,000. But because the farm still has an excellent balance sheet and the value of his collateral still significantly outweighs his debt obligations, there is no risk of default.

Interest Rate Hike

First, we assume for purposes of this scenario that Farmer C, who actually has fixed rate machinery and land loans, has variable rate loans with a rate that has increased to 8%. We also assume that the capitalization rate for land valuation rises from 3% to 5%. Table 2 shows that an increase in the capitalization rate would lead to a steep reduction in land value to $3,900/acre. Despite this decline, Farmer C would still have a strong balance sheet; however, his debt to asset ratio would rise to almost
27%, and, more importantly, Table 3 shows that his total interest paid would almost double, lowering his capital debt repayment capacity by close to $100,000. Under those conditions, cost management and improved marketing would be imperative for Farmer C.

Land Value Reduction

Another possible scenario is the substantial and sudden reduction in land value, specifically another 30% reduction from 2017, while the interest rate remains flat at around 5%. Tables 2 and 3 show that a reduction in land value lowers Farmer C’s total farm asset value, but does not necessarily change the profitability of production, unless the loan officer requests additional cash as security. In particular, we assume that the lender for Farmer C’s farmland loan asks for $30,000 in cash as additional security. His capital debt repayment capacity as a result incurs an additional loss of over $20,000 compared to the baseline.

Lower Crop Insurance Premium Subsidy

Finally, we evaluate two scenarios at the center of the current Farm Bill discussions. First, we examine the impacts of cutting the crop insurance subsidy by half. Most have been insured using Revenue Protection multiple peril crop insurance (Brown and Johnson 2017). We assume Farmer C is enrolled in the commonly purchased enterprise revenue protection insurance at the 70% coverage level, for which he receives an 80% subsidy rate (Zulauf 2016) and now this subsidy is cut in half. Based on current yield and price forecasts, there is no expected crop insurance indemnity payments for Farmer C for the 2017 and 2018 marketing years, and this subsidy reduction does not necessarily change the indemnity payments. However, a lower subsidy does raise Farmer C’s crop insurance premium payments, likely leading to Farmer C to reselect the 65% coverage level for a sizeable reduction in premium (FarmDoc 2017). This would still almost double his crop insurance payments from $11,739 to $22,840 for the 2018 marketing year, which exacerbates the existing problem of working capital erosion and loss in capital debt repayment capacity.
Option to switch from ARC-CO to PLC for Corn

Second, we examine how Farmer C’s situations would change if he is allowed to change his commodity program selection and choose PLC instead of ARC-CO. This would not change the payments for his 500 soybean base acres, as there is unlikely a payment for soybeans under either ARC or PLC. However, for his 723 corn base acres, the change in selection will increase the per-base-acre payment for 2018 from $0 in ARC-CO to $37.43 in PLC for the corn acres, which will lead to a valuable increase of more than $27,000 in total farm income and working capital. In other words, this program change would offer critical and necessary income support for Farmer C.

Discussion and Concluding Remarks

In this paper, we have examined the current farm economic downturn through both economic and legal perspectives. Essentially, we argue that despite the deteriorating agricultural financial conditions and continued decline in farm income, the current farm downturn is more likely a liquidity and working capital problem, as opposed to a solvency and balance sheet problem for the entire agricultural sector.

We argue that there are at least three economic and legal reasons why this farm downturn is unlikely to slide into a sudden collapse. First, a comparison between the third golden era of the 2000s and the previous two reveals that farmers accumulated much more income, especially cash, during the most recent decade. Second, the regulations governing agricultural credit markets have become more stringent, and agricultural lenders have tightened underwriting standards substantially, including valuing collateral based on cash flow as opposed to inflated market value. Third, despite recent moves by the Federal Reserve, farmers and other agricultural businesses still enjoy a very low interest rate, which limits the amount of debt in the agricultural sector. To this day, the balance sheet of the U.S. farm sector is still very strong, and the delinquency rates for agricultural loans are still fairly low.

From the perspective of Farmer C, he has an excellent balance sheet, even after several years of low-to-negative-profit production years. Farmer C has always made his payments on his fixed rate machinery
and land loans, but his working capital came from previous profits he saved the “golden years.” But, Farmer C would see $200,000 of this capital vanish after four years if he does not change his production or financing decisions. Farmer C has the equity to refinance, and he would have substantially reduced principal and interest payments had he refinanced in 2016 or early 2017 to lock in 5% interest rates. However, in contrast with producers in the 1980s, Farmer C is in a much better financial position going into the downturn, does not have a substantial debt to finance his production, and can still take advantage of low interest rates in securing loans, as well as refinancing. In the era of low-to-negative margins, cost management and better marketing would help Farmer C slow down or prevent working capital erosion.

Arguably, there is greater uncertainty regarding the effectiveness of the current and future government safety net in assisting producers during times of need. Most Midwest producers opted for ARC-CO, which, due to its Olympic average formula, offers a much smaller payment as commodity prices decline. And the federal government is likely to offer a lower subsidy for crop insurance under the 2018 Farm Bill. The safe-year February price benchmark in the crop insurance program and the closing acreage cap for CRP also hinder the ability of current programs to assist producers. Our analysis of Farmer C suggests that if farmers could switch from ARC-CO to PLC, they would receive increased support. In addition, many beginning farmers may not have the excellent balance sheet of Farmer C, and thus will need greater support during current times.

Finally, we argue that we are likely experiencing a gradual, drawn-out downward adjustment to the historical normal return levels for the agricultural economy, rather than an abrupt farm crisis. This is likely a result of several factors, including the strong balance sheet still enjoyed by some producers, the likely slow upward adjustment in interest rates, as opposed to abrupt hikes, and improving commodity prices through slow acreage reduction in the U.S. and beyond. If one has to predict future farmland market movement, it is likely under additional downward pressure as a sizeable portion of producers will be forced to liquidate some of their assets. It is, however, more likely a gradual, drawn-out trajectory like that of the 1920s-1930s as opposed to the sudden collapse of the mid-1980s or the global economic
collapse of the Great Depression. While this current downturn will no doubt force some producers to leave farming, we suggest that it will not lead to a sector-wise collapse or exodus like those of the prior eras.
References


Figure 1. Iowa farmland value and farmland loan interest rates 1969–2016

Source: Farmland value data is from Iowa State University land value survey and the farmland loan interest rate is from the Federal Reserve Bank of Chicago.
Figure 2. Agricultural liquidity, profitability and solvency ratios for the United States 1960–2017.

Source: USDA Economic Research Service Farm Income and Wealth Statistics. Please use the right y-axis titles for the two dashed lines: total rate of return on farm assets, and debt to asset ratio.
Figure 3. Agricultural Loan repayment index and delinquency rates 1970–2017

Figure 4. Cash rent and annual mortgage payments for Iowa farmland loans under prevailing interest rates.

Source: Farmland value data is from Iowa State University land value survey (Zhang 2017), cash rent data is from the ISU cash rent survey, and farmland loan interest rate is from the Federal Reserve Bank of Chicago. This figure assumes the following loan-to-value ratio: 80 percent before 1980, 85 percent 1981–1986, 65 percent 1987–2007, and 50 percent after 2007.
Figure 5. Crop Insurance Coverage for U.S. 1986-2016
### Average Annual Percentage Change in Inflation-adjusted Iowa Land Values and Farm Income

#### Golden Eras

<table>
<thead>
<tr>
<th>Period</th>
<th>Average % change</th>
<th>Gross Income</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910-1920</td>
<td>1.2%</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
<tr>
<td>1973-1981</td>
<td>9.7%</td>
<td>0.9%</td>
<td>-3.2%</td>
</tr>
<tr>
<td>2003-2013</td>
<td>11.1%</td>
<td>4.5%</td>
<td>8.1%</td>
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</table>

#### Crises and Declines

<table>
<thead>
<tr>
<th>Period</th>
<th>Land</th>
<th>Gross Income</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>1921-1933</td>
<td>-5.8%</td>
<td>-1.9%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>1981-1987</td>
<td>-15.0%</td>
<td>-2.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>2013-2017</td>
<td>-4.5%*</td>
<td>-4.5%</td>
<td>-9.8%</td>
</tr>
</tbody>
</table>

Note: The average land value change from 2013 to 2017 is approximate because 2017 land values are unknown. The 1910–1933 gross and net farm income changes are for the whole United States due to limited data at the state level. Land values are based on USDA Census of Agriculture and USDA NASS Land Value and Cash Rent Survey, while the data on farm income is from the USDA Economic Research Service Farm Income and Wealth Statistics database.
Table 2. Farmer C’s Current and Future Projected Balance Sheet for 2018

<table>
<thead>
<tr>
<th></th>
<th>December 2016</th>
<th>December 2017 Base</th>
<th>December 2018 Base (sold 10,000 bushels soybean in inventory)</th>
<th>If Joe pays 8% interest (cap rate is 5%) – December 2018</th>
<th>Land value drops another 30% - December 2018</th>
<th>Switch from ARC-CO to PLC – December 2018</th>
<th>Lower crop insurance subsidy from 80% to 40% – December 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current farm assets</strong></td>
<td>$377,090</td>
<td>$291,237</td>
<td>$227,918</td>
<td>$194,896</td>
<td>$205,432</td>
<td>$249,947</td>
<td>$218,881</td>
</tr>
<tr>
<td><strong>Cash on hand</strong></td>
<td>$107,443</td>
<td>$21,570</td>
<td>$46,011</td>
<td>$12,989</td>
<td>$23,525</td>
<td>$68,040</td>
<td>$36,974</td>
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<tr>
<td><strong>Intermediate farm assets</strong></td>
<td>$427,050</td>
<td>$375,850</td>
<td>$329,395</td>
<td>$329,395</td>
<td>$329,395</td>
<td>$329,395</td>
<td>$329,395</td>
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<tr>
<td><strong>Long-term farm assets</strong></td>
<td>$1,636,000</td>
<td>$1,524,500</td>
<td>$1,463,750</td>
<td>$941,094</td>
<td>$1,045,625</td>
<td>$1,463,750</td>
<td>$1,463,750</td>
</tr>
<tr>
<td><strong>Value of Owned land</strong></td>
<td>$1,561,000</td>
<td>$1,449,500</td>
<td>$1,393,750</td>
<td>$871,094</td>
<td>$975,625</td>
<td>$1,393,750</td>
<td>$1,393,750</td>
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<tr>
<td><strong>Total assets</strong></td>
<td>$2,440,140</td>
<td>$2,191,587</td>
<td>$2,021,063</td>
<td>$1,465,385</td>
<td>$1,580,452</td>
<td>$2,043,092</td>
<td>$2,012,026</td>
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<tr>
<td><strong>Current farm liabilities</strong></td>
<td>$217,533</td>
<td>$219,128</td>
<td>$218,084</td>
<td>$218,084</td>
<td>$218,084</td>
<td>$218,084</td>
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<tr>
<td><strong>Intermediate farm liabilities</strong></td>
<td>$131,179</td>
<td>$67,196</td>
<td>$4,198</td>
<td>$4,198</td>
<td>$4,198</td>
<td>$4,198</td>
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<tr>
<td><strong>Long-term farm liabilities</strong></td>
<td>$228,752</td>
<td>$201,514</td>
<td>$177,347</td>
<td>$177,347</td>
<td>$177,347</td>
<td>$177,347</td>
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<tr>
<td><strong>Total liabilities</strong></td>
<td>$577,464</td>
<td>$487,838</td>
<td>$399,629</td>
<td>$399,629</td>
<td>$399,629</td>
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<tr>
<td><strong>Net worth</strong></td>
<td>$1,902,031</td>
<td>$1,703,749</td>
<td>$1,621,434</td>
<td>$1,065,756</td>
<td>$1,220,494</td>
<td>$1,621,434</td>
<td>$1,621,434</td>
</tr>
</tbody>
</table>

**Liquidity**
- **Current ratio**
  - December 2016: 1.73
  - December 2017: 1.33
  - December 2018: 1.05

- **Working ratio**
  - December 2016: 0.89
  - December 2017: 0.94
  - December 2018: 1.15

- **Working capital to gross farm income**
  - December 2016: 19.9%
  - December 2017: 10.7%
  - December 2018: 4.4%

**Solvency**
- **Farm debt to asset ratio**
  - December 2016: 23.7%
  - December 2017: 22.3%
  - December 2018: 19.6%
<table>
<thead>
<tr>
<th></th>
<th>2016 Crop Year</th>
<th>2017 Crop Year</th>
<th>2018 Crop Year</th>
<th>2018 Crop Year Baseline</th>
<th>If Joe has pay 8% interest (cap rate = 5%) – 2018 Crop Year</th>
<th>Land value drops another 30% - 2018 Crop Year</th>
<th>Switch from ARC-CO to PLC for corn – 2018 Crop Year</th>
<th>Lower crop insurance subsidy from 80% to 40%–2018 Crop Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop income</td>
<td>$ 800,597</td>
<td>$ 676,226</td>
<td></td>
<td>$ 702,990</td>
<td>$ 702,990</td>
<td>$ 702,990</td>
<td>$ 702,990</td>
<td>$ 702,990</td>
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<tr>
<td>Crop insurance indemnity</td>
<td>$ 0</td>
<td>$ 0</td>
<td></td>
<td>$ 0</td>
<td>$ 0</td>
<td>$ 0</td>
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<tr>
<td>Commodity payments</td>
<td>$ 32,535</td>
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<td>$ 0</td>
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<td>$ 0</td>
<td>$ 27,062</td>
<td>$ 0</td>
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<tr>
<td><strong>Gross farm income</strong></td>
<td><strong>$ 833,132</strong></td>
<td><strong>$ 676,226</strong></td>
<td><strong>$ 702,990</strong></td>
<td><strong>$ 702,990</strong></td>
<td><strong>$ 702,990</strong></td>
<td><strong>$ 730,052</strong></td>
<td><strong>$ 702,990</strong></td>
<td><strong>$ 702,990</strong></td>
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<tr>
<td>Interest paid</td>
<td>$ 31,577</td>
<td>$ 26,965</td>
<td>$ 24,469</td>
<td>$ 44,521</td>
<td>$ 24,469</td>
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<tr>
<td>Additional security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 30,000</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Net farm income</strong></td>
<td><strong>$ 117,660</strong></td>
<td><strong>$ 15,966</strong></td>
<td><strong>$ 48,718</strong></td>
<td><strong>$ 28,666</strong></td>
<td><strong>$ 18,718</strong></td>
<td><strong>$ 75,780</strong></td>
<td><strong>$ 37,617</strong></td>
<td><strong>$ 37,617</strong></td>
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<td>Depreciation</td>
<td>$ 51,200</td>
<td>$ 46,455</td>
<td>$ 42,700</td>
<td>$ 42,700</td>
<td>$ 42,700</td>
<td>$ 42,700</td>
<td>$ 42,700</td>
<td>$ 42,700</td>
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<tr>
<td>Nonfarm income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$ 30,000</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Family living</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
<td>$ 56,000</td>
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<tr>
<td>Income taxes</td>
<td>$ 19,977</td>
<td>$ 2,256</td>
<td>$ 9,060</td>
<td>$ 4,368</td>
<td>$ 2,040</td>
<td>$ 14,093</td>
<td>$ 6,996</td>
<td>$ 6,996</td>
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<tr>
<td>Interest on term debt</td>
<td>$ 23,668</td>
<td>$ 19,504</td>
<td>$ 17,625</td>
<td>$ 19,521</td>
<td>$ 17,625</td>
<td>$ 17,625</td>
<td>$ 17,625</td>
<td>$ 17,625</td>
</tr>
<tr>
<td><strong>Capital debt repayment capacity</strong></td>
<td><strong>$ 116,551</strong></td>
<td><strong>$ 23,669</strong></td>
<td><strong>$ 43,983</strong></td>
<td><strong>$ 30,519</strong></td>
<td><strong>$ 21,003</strong></td>
<td><strong>$ 66,012</strong></td>
<td><strong>$ 34,946</strong></td>
<td><strong>$ 34,946</strong></td>
</tr>
<tr>
<td>Total scheduled principal and interest</td>
<td>$ 109,048</td>
<td>$ 109,542</td>
<td>$ 109,542</td>
<td>$ 129,100</td>
<td>$ 109,542</td>
<td>$ 109,542</td>
<td>$ 109,542</td>
<td>$ 109,542</td>
</tr>
<tr>
<td><strong>Capital debt repayment margin</strong></td>
<td><strong>$ 7,503</strong></td>
<td>-$ 85,873</td>
<td>-$ 65,559</td>
<td>-$ 98,581</td>
<td>-$ 88,045</td>
<td>-$ 43,530</td>
<td>-$ 74,596</td>
<td>-$ 74,596</td>
</tr>
<tr>
<td>Cash required for replacement</td>
<td>$ 7,503</td>
<td>-$ 85,873</td>
<td>-$ 65,559</td>
<td>-$ 98,581</td>
<td>-$ 88,045</td>
<td>-$ 43,530</td>
<td>-$ 74,596</td>
<td>-$ 74,596</td>
</tr>
<tr>
<td><strong>Term debt coverage ratio</strong></td>
<td>1.07</td>
<td>0.22</td>
<td>0.40</td>
<td>0.24</td>
<td>0.19</td>
<td>0.60</td>
<td>0.32</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Note: we assume Farmer C is currently enrolled in ARC-CO for his 723 corn base acres and 500 soybean acres, and this policy change allows him to switch from ARC-CO to PLC for the 2018 marketing year.