Current Prosperity of Agriculture – Can it be Maintained?

The views expressed are those of the author and do not necessarily reflect the opinions of the Federal Reserve Bank of Kansas City or the Federal Reserve System.
A Farm Boom starting in 1900.

Indiana Farm Real Estate Values 1900

$\text{Dollars per Acre} \\
\text{Constant 2011 dollars}

0 - $499  
$500 - $999  
$1000 - $1999  
$2000 - $2999  
$3000 and up

Source: USDA
WWI and the “Golden Era for Agriculture” boost farmland values.

Indiana Farm Real Estate Values 1920

$Dollars per Acre
Constant 2011 dollars

- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
Farmland values decline during the “Roaring 20s”.

Indiana Farm Real Estate Values 1930

$Dollars per Acre
Constant 2011 dollars

- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
The Great Depression pushed down farmland values further.

Indiana Farm Real Estate Values 1940

$Dollars per Acre
Constant 2011 dollars

- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
Enhanced productivity and rising exports lifts farmland values during the 1950s and 1960s.

Indiana Farm Real Estate Values 1969

$Dollars per Acre
Constant 2011 dollars

0 - $499
$500 - $999
$1000 - $1999
$2000 - $2999
$3000 and up

Source: USDA
The Russian grain deal sparks the farm real estate boom.

Indiana Farm Real Estate Values 1974

$Dollars per Acre
Constant 2011 dollars

- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
By the late 1970s, farmland values are surging.

Indiana Farm Real Estate Values 1978

$Dollars per Acre
Constant 2011 dollars

0 - $499
$500 - $999
$1000 - $1999
$2000 - $2999
$3000 and up

Source: USDA
Higher interest rates and trade restrictions begin to cool land values.

Indiana Farm Real Estate Values 1982

$Dollars per Acre
Constant 2011 dollars
- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
At the end of the crisis land values are lower than 1969 levels.

Indiana Farm Real Estate Values 1987

$Dollars per Acre
Constant 2011 dollars

- 0 - $499
- $500 - $999
- $1000 - $1999
- $2000 - $2999
- $3000 and up

Source: USDA
Farmland values surge again.

**Farm Real Estate Values**

- U.S. (Left Scale)
- Indiana (Right Scale)

Calculations based on USDA data
Farmland values are still booming.

Non-irrigated Cropland Values
Fourth Quarter 2012

Percent change from previous year

Source: Agricultural Finance Databook, Federal Reserve Bank of Kansas
Is farmland over-valued?

Value-to-Cash Rent Multiple for IA, IL, IN Cropland, 1967-2011

Sources: IL and IA compiled from NASS Reports, IN from Purdue Land Value Survey
In California, farmland values held up better than home prices.

What drove CA farmland values – urbanization or farm incomes?

Is farmland overpriced? What is the P/E ratio?

Source: USDA and FHFA
The Fundamental of Agriculture’s Super-Cycles
The Drivers of Past Farm Booms/Busts

- **Demand Shocks**: Persistent demand shocks lead to high land values and capital investment.

- **Supply Shocks**: Persistent supply shocks that lead to production expansions reduce prices.

- **Interest Rate Shocks**:
  - Lower interest rates associated with higher incomes.
  - Lower interest rates yield lower capitalization rates.
What made the 1940s/1950s different?

Past farm booms were characterized by:

- Surging exports
- Tight global supplies
- Negative real interest rates
- Expectations of continued growth

U.S. Corn Prices and Farm Real Estate Values

Dollars per acre (Constant 2011 dollars)

Dollars per bushel

Source: USDA
Farm prices fluctuate with exports.

**Farm Booms**
- 1910s: World War I boosts exports and prices
- 1940s: World War II boosts exports and prices
- 1970s: Russia grain deal sparks exports and prices
- 2000s: Chinese export boom triggers high prices

**Farm Busts**
- Late 1920s & 1930s: Great Depression
- 1980s: Exports collapse

**Why didn’t farmland values boom if exports rose in the 1950s and 1960s?**

Calculations based on U.S. Census Bureau and U.S. Department of Agriculture data deflated with consumer price index from the Federal Reserve Bank of Minneapolis and USDA inflation expectations.
Farmland values rise with low interest rates and capitalization rates.

**Why didn’t farmland values boom during the 1940s?**

Negative real interest rates in the 1910s, 1940s, 1970s, and today.

Historically high real interest rates in the 1920s, 1930s, and 1980s.

What is the role of levering/deleveraging cycles in agriculture?

Farm Debt Soars
- 1910s: farm real estate debt
- 1970s: farm real estate & non-real-estate debt

Farm Debt Collapses
- 1940s: Deleveraging continues
- 1980s: Farm financial crisis

Calculations based on U.S. Census Bureau and U.S. Department of Agriculture data deflated with consumer price index from the Federal Reserve Bank of Minneapolis.
The Wealth Effect in U.S. Agriculture
The Wealth Effect in U.S. Agriculture

• With high wealth and low interest rates, farm capital investments remain strong.
• Farm leverage increases as farmers use debt not income to finance investments.

U.S. Farm Income and Capital Spending

Billions current 2005 dollars

Source: USDA
In first two months of 2013, combine and tractor sales are up more than 40%.

Commercial bank lending for equipment & machinery rose sharply at the end of 2012.
Farm debt started to rise in 2012.

Farm Debt Outstanding at Commercial Banks

Percent change from previous year

Source: FDIC, Call Report data
More debt was used to finance land purchases.

Financing Farmland Purchases in the Tenth District

<table>
<thead>
<tr>
<th></th>
<th>2012 First Quarter</th>
<th>2012 Fourth Quarter</th>
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</thead>
<tbody>
<tr>
<td>Cash Down Payment</td>
<td>22.1</td>
<td>22.6</td>
</tr>
<tr>
<td>Pledged Existing</td>
<td>30.4</td>
<td>27.5</td>
</tr>
<tr>
<td>Equity</td>
<td>47.5</td>
<td>50.2</td>
</tr>
</tbody>
</table>

Source: Federal Reserve Bank of Kansas City
Farm debt appears to be concentrated.

KS Farm Management Farms:

- **Average Debt-to-Asset Ratio**
  - 1979 – 24.6%
  - 2010 – 26.8%

- **Debt-to-Asset Ratio > 40%**
  - 1979 – 19.4%
  - 2010 – 25.6%

- **Debt-to-Asset Ratio > 70%**
  - 1979 – 1.3%
  - 2010 – 5.9%

Source: Featherstone (2012)
Historically, farm bankruptcies spike with the debt-to-asset ratio.

![Graph showing Farm Debt-to-Asset Ratio and Farm Bankruptcies](source)

Source: USDA and Stam and Dixon, 2004
Note: Farm bankruptcy data was not available for the following years, 1982-1986 and 2003 – 2011.
What are the risks to farmland values?
Land values are based on expectations.

**Capitalized Value Formula**

\[
\text{Capitalized Value} = \frac{30\% \times \text{Expected Price} \times \text{Yield}}{\text{Expected Capitalization Rate}}
\]

According to USDA, land costs are projected to account for a quarter of total corn production costs and a third of soybean production costs in 2012 and 2013.

- **Assumption corn yields 160 bushels per acre**

<table>
<thead>
<tr>
<th>Capitalization Rate (percent)</th>
<th>$3.00</th>
<th>$4.00</th>
<th>$5.00</th>
<th>$6.00</th>
<th>$7.00</th>
<th>$8.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%</td>
<td>4,800</td>
<td>6,400</td>
<td>8,000</td>
<td>9,600</td>
<td>11,200</td>
<td>12,800</td>
</tr>
<tr>
<td>4%</td>
<td>3,600</td>
<td>4,800</td>
<td>6,000</td>
<td>7,200</td>
<td>8,400</td>
<td>9,600</td>
</tr>
<tr>
<td>5%</td>
<td>2,880</td>
<td>3,840</td>
<td>4,800</td>
<td>5,760</td>
<td>6,720</td>
<td>7,680</td>
</tr>
<tr>
<td>6%</td>
<td>2,400</td>
<td>3,200</td>
<td>4,000</td>
<td>4,800</td>
<td>5,600</td>
<td>6,400</td>
</tr>
<tr>
<td>7%</td>
<td>2,057</td>
<td>2,743</td>
<td>3,429</td>
<td>4,114</td>
<td>4,800</td>
<td>5,486</td>
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<tr>
<td>8%</td>
<td>1,800</td>
<td>2,400</td>
<td>3,000</td>
<td>3,600</td>
<td>4,200</td>
<td>4,800</td>
</tr>
</tbody>
</table>

**What are your expectations for crop prices and interest rates?**
Will world populations and income rise as expected?

What is the future path of interest rates and cap rates?

Can Agriculture Feed and Fuel the World?

Will global farm demand create its own supply?

Are the necessary resources available?

How high will ag production costs rise?
Farm incomes are projected to retreat.

**U.S. Real Net Farm Income (Annual Average)**
- 1990 to 2003: $69 billion
- 2004 to 2010: $83 billion
- 2011 to 2013: $121 billion
- 2014 to 2022: $94 billion

- Through 2014
  - Crop cash receipts fall
  - Livestock cash receipts hold steady
  - High cash expenses stabilize
- After 2015
  - Crop and livestock receipts rise
  - Cash expenses rise

Source: USDA
Does agriculture face interest rate risk?

- Higher interest rates …
  - boost debt service costs,
  - can trigger lower farm incomes if the value of the dollar rises and exports fall, and
  - raise capitalization rates, which lowers farmland values.
Farm incomes fluctuate with interest rates.

Farm Profits and Interest Rates

Billions of constant 2005 dollars

Percent

Real returns to farm operators (Left Scale)
Real Yield on 10 Year Treasury (Right Scale)

Calculations based on USDA, Dept of Treasury, and BLS data
Will a large monetary base fuel inflation? What is the exit strategy?

Federal Reserve Balance Sheet: Assets

Billion Dollars

- Red: Fed Agency Debt MBS Purchases
- Orange: Liquidity to Key Credit Markets
- Green: Lending to Financial Institutions
- Blue: Long Term Treasury Purchases
- Light Blue: Traditional Security Holdings

Source: Federal Reserve Bank of Cleveland
What level of interest rates have buyers assumed?

Target Fed Funds Rate at Years End

Percent (Appropriate Pace of Policy Firming)
How does federal government debt affect farm policy?

Federal Government Debt as a Percent of GDP

Source: Congressional Budget Office
In conclusion ...

- Agriculture is well positioned.
  - Expectations look promising.
  - Leverage is low.

- How will agriculture respond to the following environment?
  - Margins narrow.
  - Expectations remain bright.
  - Real interest rates are negative.

*Will farmers leverage long-term assets to build working capital?*
Federal Reserve Bank of Kansas City
2013 Agricultural Symposium

The Shifting Nexus of Global Agriculture
Kansas City, Missouri
July 16-17

For an invitation e-mail
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