When Do Farm Booms Become Bubbles?

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Background

• Agriculture’s history includes periods of remarkable boom and bust

• Agriculture is capital intensive
  – Large increases in profitability make fixed assets priced in less profitable times look cheap

Key Questions:

– Will these times last or will we retreat to previous levels?
– Are farmland values in a speculative bubble or responding normally to economic conditions?
Types of Shocks which Alter Farming Profitability

• **Demand driven**: Expansion of demand which calls for more output at all price levels
  – For example, biofuels and income growth and food demand in emerging markets
  – Persistent demand growth can substantially increase land values and capital investment

• **Supply induced**: Supply contraction where less is available at all price levels
  – Short-term weather shocks do not typically impact fixed asset values
  – Inability of supply to keep up with normal demand expansion. If true could lead asset value increases

Current situation is complicated by interaction of both impacts and extremely low interest rates which make future income more valuable
So How Big are the Recent Increases in Farmland Values?
In Real Terms, Today’s Farmland Value Increases are on Par with those of the 70’s

<table>
<thead>
<tr>
<th>Region</th>
<th>Nominal Change</th>
<th>Real Change and</th>
<th>Annualized Growth Rate</th>
<th>Annualized Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td></td>
<td>Percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1971-1981</td>
<td>399</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.4</td>
<td>8.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2001-2011</td>
<td>248</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13.3</td>
<td>10.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>1971-1981</td>
<td>343</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16.1</td>
<td>7.0</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2001-2011</td>
<td>149</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.6</td>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiana</td>
<td></td>
<td>381</td>
<td>114</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.0</td>
<td>7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2001-2011</td>
<td>104</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.4</td>
<td>4.9</td>
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</table>

\(^a\) Iowa farmland values from the Iowa State Farmland Survey (Duffy). Indiana, Illinois, and U.S. Values from National Agricultural Statistics Service. Real values calculated using the CPI index.
What is a Bubble?

• Economists:
  – “Substantial and long-lasting divergence of asset prices from what would be determined from the rational expectation of the present value of cash flows from the asset” (Malkiel)
  – “If the reason that the price is high today is only because investors believe that the selling price will be high tomorrow – when “fundamental” factors do not seem to justify such a price – then a bubble exists.” (Stiglitz)
Economists

• Investors value assets on expectations of fundamentals (the value of future earnings)

• Problem:
  – We don’t really observe expectations just asset prices
  – Bubbles nearly impossible to predict ex ante
  – Most examples of bubbles (tulips, South Sea, etc.) could be plausibly rationalized in hindsight
  – Speculative bubbles by this definition are very rare
On the Other Hand

• Most people associate the term bubble with large price increases and decreases over a short time
• Usually started by shifts that greatly increase the expectations of future profits generated by an asset (Malkiel)
• Investor psychology can play a key role (Shiller)
  – Can be prone to feedback loops – high prices encourage higher prices
  – Shortage illusions
  – Other irrational behavior
Bubbles

.... you get a bubble when a very high percentage of the population buys into some originally sound premise.... that (the premise) becomes distorted as time passes and people forget the original sound premise and start focusing solely on the price action....

Excerpt from Warren Buffett’s interview with the Financial Crisis Inquiry Commission
How Does This Apply to the Farmland Situation?

• Fundamentals have undergone dramatic changes
  – Increased demand
  – Reduced interest rates
  – Supply shocks

Are market participants evaluating these factors when pricing farmland?
Let’s Examine the Fundamentals

1. The price of earnings and interest rates
2. Sector level relationship between returns and values
3. Farm level returns
4. Farm level interaction of returns and interest rates
1. 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
1. Farmland Capitalization Rates and Interest Rates on 10 Year US Treasury Bonds, 1967-2011

Sources: Iowa and Illinois data were compiled from various Land Values and Cash Rent Summary reports published by the National Agricultural Statistics Service. The Indiana data are from the Purdue Annual Land Value Survey, June 2010.
2. Returns to Farm Operators plus Interest and Rent, 1929-2011 (2005 USD)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Average</th>
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<tbody>
<tr>
<td>1931-40</td>
<td>54.5</td>
</tr>
<tr>
<td>1941-50</td>
<td>114.7</td>
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<tr>
<td>1951-60</td>
<td>83.1</td>
</tr>
<tr>
<td>1961-70</td>
<td>76.2</td>
</tr>
<tr>
<td>1971-80</td>
<td>94.3</td>
</tr>
<tr>
<td>1981-90</td>
<td>85.9</td>
</tr>
<tr>
<td>1991-2000</td>
<td>82.1</td>
</tr>
<tr>
<td>2001-2011</td>
<td>82.4</td>
</tr>
</tbody>
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Source: Derived from Purdue Crop Budgets, ID-166, Corn-Soybean Rotation
4. Land Values Under Alternative Capitalization Rates (Multiples) and Income Levels

Value per Acre

- 3% (33)
- 4% (25)
- 5% (20)
- 6% (17)
- 8% (13)

2011 Value HQ IN Farmland $6,521

Current Cash Rental Rate HQ IN Farmland, $230 per Acre
Investor Expectations Drive Prices

• Current values are dependent upon continuation of low interest rates and high farm returns over variable costs

• Conducted and internet survey in Spring 2012
  – What do farmland investors think about future
    • Farmland prices
    • Cash rents
    • Crop prices
The Respondents

- Individuals in CCA database with interest in farmland and farming
- 246 complete responses (28%)
- 73% owned farmland
- 74% want to purchase more farmland in the next 5 years
- Median acres
  - owned = 500
  - rented from others = 1,200
  - rented to others = 240
Percent that Believe Prices are in a Bubble

- All respondents: 53%
- Actively operate a farm: 54%
- Primarily a landowner and rent to others: 50%
- Agricultural lenders, agribusiness, and others: 58%
- Own farmland: 52%
- Do not own farmland: 69%
- Purchased land in the last 5 years: 56%
- Interested in purchasing land in the next 5 years: 52%
Respondents asked to consider: 80 Acres of Farmland with a production capability of 165 bushels of corn per acre under normal rain-fed conditions
Estimates of Farmland Value and Price at Auction, 196 Respondents, Spring 2012

- Perception of the value for 80 with a production capability of 165 bushels of corn per acre under normal rain-fed conditions, $’s per acre

65% felt auction prices were higher than their perception of value
53% believe farmland prices are in a bubble
73% are interested in purchasing more farmland in the next 5 years

Purdue University Center for Commercial Agriculture
Farmland Values

There is a 1 in 10 chance that the farm will be worth less than 4,550.
The farm will most likely be worth 6,953.
There is a 1 in 10 chance that the farm would be worth more than 9,145.
Cash Rental Rate

Average

There is a 1 in 10 chance that the cash rental rate will be less than 201

The cash rental rate will most likely be 267

There is a 1 in 10 chance that the cash rental rate will be greater than 342

Distribution of Expected Cash Rental Rates Over the Next 5 Years, 191 Farmland Value Survey Respondents
On average, respondents expect similar multiples in the future.
There is a 1 in 10 Chance that the average corn price will be less than $3.93
The average corn price will most likely be $5.41
There is a 1 in 10 Chance that the average corn price will be greater than $7.19

Corn price expectations all over the map but generally above $5.00/bu
Almost no systematic relationship between perception of land value and expected corn prices.
Most would use some debt to fund additional purchases.
Summary

• Price increases are on par with most dramatic seen in the last 50 years
• Prices clearly reflect view that returns over variable costs stay high and rates stay low
• It is unlikely that farmland fits the classic economic definition of a bubble, but this does not rule out the possibility that prices could fall substantially
Summary

Investors:
• Show cautious optimism about farmland investments
• Have some concern that market in a bubble
• Appear to be comfortable with multiples approaching 30 -- expect them to be maintained
• Expect corn prices to exceed $5.00/bu on average
• When values compared against corn prices there is little relationship
Conclusions

• Current rates of return are falling to relatively low levels – should point to asset prices leveling off

• Negative demand shock would create significant pressure on land prices

• Despite some warning signs investors appear to be rationally evaluating fundamentals

• Most investors expect modest price increases going forward

• Those with very optimistic views may push prices higher but there is obvious concern on part of others