Risk and Return for Farmland Today

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Outline of Topics

• Trends in Inflation Rates
• Trends in Interest Rates
• Land as an Inflation Hedge
• Sources of Land Earnings
• P/E and P/rent Ratios
• Summary and Implications
Trends in Inflation Rates
Inflation Rates: Implicit Price Deflators

PCE  PCE Less Food and Energy
Excess Reserves of Depository Institutions (EXGRESNS)

Source: Board of Governors of the Federal Reserve System

Shaded areas indicate US recessions.
2013 research.stlouisfed.org
Trends in Interest Rates
Nominal and Real Prime Interest Rate

- Real
- Nominal


Graph showing the comparison between nominal and real prime interest rates over time.
Ten-Year Treasury Interest Rate and Its Reciprocal, 1960 to 2012.
## Projections
### Survey of Professional Forecasters

<table>
<thead>
<tr>
<th>Period</th>
<th>Real GDP</th>
<th>Unemployment Rate</th>
<th>PCE</th>
<th>10-Year T Bond</th>
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<tr>
<td>2013</td>
<td>1.9</td>
<td>7.7</td>
<td>1.8</td>
<td>2.1</td>
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<tr>
<td>2014</td>
<td>2.8</td>
<td>7.2</td>
<td>2.0</td>
<td>2.6</td>
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<td>2015</td>
<td>2.9</td>
<td>6.7</td>
<td>2.0</td>
<td>3.3</td>
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<td>2016</td>
<td>3.0</td>
<td>6.3</td>
<td>N/A</td>
<td>3.8</td>
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</table>

Land as an Inflation Hedge
Is Farmland a Good Inflation Hedge?

• Over the long-run, farmland has been highly correlated with inflation
  – Correlation coefficient of 0.63 from 1914-2011
• Regression of nominal US Farmland against inflation using the CPI:
  – $\%\Delta LandPrice = 0.720 + 0.957(\%\Delta CPI)$
  – $R^2 = 0.394$ (a lot of the movement in land prices unexplained)
• Farmland has moved close to 1 to 1 with the CPI.
• However, the relationship is more complex than this model suggests, therefore we broke inflation into expected and unexpected components
Inflation and Real Land Values

- Regression of real U.S. farmland price against expected and unexpected inflation (1914-2011):
  - \( \%\Delta LandPrice = a + b \) (expected inflation) + c (unexpected inflation) + \( \varepsilon \)
  - Expected and unexpected inflation were not significant
Effect of High Inflation in the Current Environment?

• Expected inflation is low
• Effect of high unexpected inflation would depend on its effects on
  – Interest rates
  – The US and world economies
  – Exchange rates
• Depending on how high unexpected inflation came about it could have a large negative impact on real farmland prices
Sources of Land Earnings
Sources of Land Earnings

• Two Sources:
  – Rent
  – Change in Value

• Figure on next page shows 10-year moving average rent and change in value for West Central Indiana.
Sources of Land Earnings, 10-Year Moving Averages

- Rent
- Change in Value
P/E Ratios
P/E and P/rent Ratios

• P/E Ratio for Stock
  ▪ P/E = Market Value per Share / Earnings per Share
  ▪ A high P/E ratio indicates that investors anticipate higher growth of earnings in the future.

• P/rent for Farmland
  ▪ P/rent = Farmland Price / Cash Rent
  ▪ West Central Indiana
P/E and P/rent Ratio Graphs

- West Central Indiana Farmland Price, Cash Rent, and Owner Operator Returns
- Actual and Average P/rent Ratios
- Farmland P/rent Ratio and the Reciprocal of Ten-Year Treasuries
West Central Indiana Farmland Price (left axis), Cash Rent (right axis), and Owner Operator Returns (right axis), 1960 to 2012.
Farmland Price to Cash Rent Multiple for West Central Indiana, 1960 to 2012.
Farmland P/rent Ratio and the Reciprocal of Ten-Year Treasuries, 1960 to 2012.
Cyclically Adjusted P/E and P/rent Ratios

• P/E Ratios
  – Shiller uses a ten-year moving average for earnings (P/E10) to remove the effect of the economic cycle.
  – P and E are expressed in real dollars.

• P/rent Ratios
  – Use real farmland price as numerator
  – Use five-year or ten-year moving average of real rent (P/rent5 or P/rent10) for denominator

• P/OO Ratios
  – Use real farmland price as numerator
  – Use five-year or ten-year moving average of real owner operator returns (P/OO-5 or P/OO-10) for denominator
P/E and P/rent Ratio Graphs

- Cyclically Adjusted P/rent10, P/OO-10, and P/E10 Ratios, 1960 to 2012
- 10-Year Rate of Return and P/rent10 at Time of Purchase, 1960 to 2002
- Cyclically adjusted P/rent10 ratio, 1930 to 2012
- 10-Year Rate of Return and Cyclically Adjusted P/rent10 at Time of Purchase, 1930 to 2012
Ten-Year Rate of Return (left axis) and Cyclically Adjusted P/rent10 at the Time of Purchase, 1960 to 2002.

Note Negative Relationship!
Ten-Year Rate of Return (left axis) and Cyclically Adjusted P/rent10 at the Time of Purchase (horizontal axis), 1930 to 2002.
Summary and Implications
Back of the Envelope Computations: Predicted Land Values

• Scenario #1: Long-run averages

• Scenario #2: Current cash rent; 2012 average rates

• Scenario #3: Current cash rent; long-run average rates

• Scenario #4: Current cash rent; 5-year average rates

• Scenario #5: 5-year average operator returns and rates
### Back of the Envelope Computations: Predicted Land Values

<table>
<thead>
<tr>
<th>Scenario</th>
<th>T-Rate (1)</th>
<th>Risk Premium (2)</th>
<th>Inflation Rate (3)</th>
<th>Cap Rate (1+2-3)</th>
<th>Cash Rent</th>
<th>Land Value</th>
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<tr>
<td>#1</td>
<td>0.0654</td>
<td>0.0199</td>
<td>0.0342</td>
<td>0.0511</td>
<td>200</td>
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<td>#2</td>
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<td>#3</td>
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<td>0.0324</td>
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<td>#5</td>
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<td>Variable</td>
<td>Mean % return 1911-2011</td>
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<td>US farmland price</td>
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<td>IN farmland price</td>
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<td>Inflation (CPI)</td>
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<td>GOLD price</td>
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<td>S&amp;P 500 return</td>
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<td>Case-Shiller housing prices</td>
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</table>
Summary and Implications

• Inflation and interest rates are likely to increase
• Current P/rent ratio is relatively high
• Negative relationship between rate of return on farmland and P/rent ratio at the time of purchase
• Cyclically adjusted P/rent ratio is relatively high

• Caution!