Business and Credit Cycles in Agriculture

• Motivation:
  – Operating margins tightening
  – Potential farmland price decline
  – How does this affect lending?

Based on: Kuethe and Hubbs “Business and Credit Cycles in Agriculture” (under review) – The views expressed are those of the authors and should not be attributed to USDA or ERS.
Linkage between asset values and credit

Credit Cycle Boom
- More People Willing to Lend
- Financing Easier
- Asset Demand Increases
- Asset Prices Increase
- Default Rate Decreases
- Perceived Lending Risk Decreases

Credit Cycle Bust
- Fewer People Willing to Lend
- Financing More Difficult
- Asset Demand Decreases
- Asset Prices Decrease
- Default Rate Increases
- Perceived Lending Risk Increases
Keys to credit cycle

• Longer frequency and greater amplitude than business cycle
• Peaks are closely related to banking failures
• Recessions during credit cycle downturns are deeper and longer
Credit cycle in agriculture

- Debt is collateralized by a factor of production
  - Farmland primary source of collateral in farm loans
- Link between assets and credit played a major role:
  - 1920s boom and bust
  - 1980s Farm Financial Crisis
# Modeling the credit cycle

- Agricultural sector compliment of macroeconomic model (1960 – 2014)

<table>
<thead>
<tr>
<th>Aggregate Economy</th>
<th>Agricultural Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Cycle:</strong></td>
<td></td>
</tr>
<tr>
<td>Gross domestic product (GDP)</td>
<td>Gross value added (GVA)</td>
</tr>
<tr>
<td><strong>Credit Cycle:</strong></td>
<td></td>
</tr>
<tr>
<td>(i) Total credit to private non-financial sector</td>
<td>Total farm debt</td>
</tr>
<tr>
<td>(ii) Residential property prices</td>
<td>Farm real estate values</td>
</tr>
<tr>
<td>(iii) Credit-to-GDP ratio</td>
<td>Farm debt-to-GVA ratio</td>
</tr>
</tbody>
</table>

Some technical information

www.farmdocdaily.illinois.edu
Variables

(a) Macroeconomy

- GDP
- Total credit
- Credit-to-GDP
- Residential prices

(b) Agricultural economy

- GVA
- Total debt
- Debt-to-GVA
- Farm real estate

www.farmdocdaily.illinois.edu
The model

- Decompose series into trend and cyclical component
  
  \[ y_t = \tau_t + c_t \]

- Business cycle duration: 1 to 8 years
- Credit cycle duration: 8 to 50 years
- Credit cycle is the average of the cyclical components of debt, real estate, and out-to-debt ratios

Some technical information

www.farmdocdaily.illinois.edu
Estimation

Christiano-Fitzgerald Asymmetric Filter of gva.t

Cyclical component (deviations from trend)

www.farmdocdaily.illinois.edu
Business cycles in agriculture and the aggregate economy

www.farmlandaily.illinois.edu
Agricultural business cycle

www.farmdocdaily.illinois.edu
Credit cycles in agriculture and the aggregate economy
Credit cycles in agriculture and the aggregate economy

• The credit cycle is a leading indicator of financial distress

• Federal Reserve “Agricultural Finance Databook”
  – Delinquent real estate loans
  – Nonperforming non-real estate loans
  – Agricultural bank failures

• Farm bankruptcies from USDA-ERS

www.farmlandcdaily.illinois.edu
Delinquent real estate loans
Nonperforming non-real estate loans
Agricultural bank failures

www.farmdocdaily.illinois.edu
Farm bankruptcies
Synchronization of cycles

Exactly counter-cyclical

Exactly procyclical

Some technical information
www.farmdocdaily.illinois.edu
Synchronization of cycles

- Credit and business cycles are *slightly procyclical*
- Agricultural and aggregate *business* cycles are *slightly counter-cyclical*
  - In the *short-run*, agricultural and aggregate economies move in opposition to one another
- Agricultural and aggregate *credit* cycles are *slightly procyclical*
  - In the *long-run*, agricultural and aggregate economies move together
Key takeaways

- Asset prices and credit are intrinsically linked
- Agricultural **credit** cycle exhibited three periods of boom and bust since 1960

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1992 - 2010</td>
<td>2011 -</td>
</tr>
</tbody>
</table>
Key takeaways

• Agriculture **credit** cycle currently in a **downturn** since 2011
  – Previous downturn durations of 5 years (68-72) and 9 years (83-91)
  – Signals increasing risk of financial distress

• Agricultural **business** cycle currently in a **recession** since 2013
  – Mean duration since 1960 of 1.85 years
Technical notes

Data
• All data in real terms (deflated by CPI, 2000 = 100) and normalized to 1985 value
• Expressed as cumulative growth rates beginning in at 0 in 1960

Estimation
• Estimated with Christiano-Fitzgerald Band Pass Filter

Synchronization
• Harding and Pagan (2002) Concordance index

www.farmdocdaily.illinois.edu