Where I am coming from today

- Dissertation research on crop insurance in the early 1990s
- Worked at ERS in the 1990’s mostly on risk management issues
- Moved to Mississippi State in 1997 and have researched risk issues – many related to crop insurance
  - Demand, rating, interaction of crop insurance, Title I programs
  - Actuarial studies for RMA
- In 2013, got invited to help with Senator Cochran’s Ag Committee staff on a part-time basis
- Back to academia
Ranked 3rd in AP Poll

Dak for Heisman!
The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk. Risk management guides us over the vast range of decision making from allocating wealth to safeguarding public health, from waging a war to planning a family, from paying insurance premiums to wearing a seatbelt; from planting corn to marketing cornflakes.

*Peter Bernstein in “Against the Gods: The Remarkable Story of Risk*

- 112th United States Congress Joint Select Committee on Deficit Reduction (aka the “Supercommittee”), but the Supercommittee failed
- Congress did not adopt a new farm bill in 2012 as scheduled
  - Senate adopted farm bill legislation
  - House Ag Committee bill was not considered by the full House
- 2008 farm bill was extended through the end of 2013
- Senator Cochran is named Ranking Minority Member of the Senate Committee on Agriculture, Nutrition, and Forestry
  - Senate passed farm bill legislation in June 2013
  - House Ag Committee reports out a bill that is defeated on the House floor
  - Nutrition programs are stripped out of House bill. Remaining titles are adopted by House in July. Nutrition legislation is adopted later
- The Agricultural Act of 2014 completed on January 27, 2014
  Now in the hands of USDA to implement
The fascinating inner working of a conference committee
My perspective on how we got here

-- Some driving factors to consider
The Farm Bill was couched in the context of budget deficits = cuts
Crop Insurance had grown by five-fold
--- apparently supplanted Ad hoc programs
--- Insured price risk
--- Insured area yield and revenue

![U.S. Crop Insured Acres Graph](image.png)
FAPRI’s Baseline reports confirmed a general perception we were in a period of high prices.
The Evolution of Farm Program Policy & Analysis
2013 Soybean Coverage Levels

2013 Soybean Average Coverage Level

Avg_cover_level: 50–65, 65–70, 70–75, 75–85
Base Acres Versus Planted Acres
-- became a hot button issue
-- distortion versus risk protection

<table>
<thead>
<tr>
<th>Crop</th>
<th>CBO Estimate of Base Acres millions</th>
<th>CBO Estimate of Planted Acres millions</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>84.1</td>
<td>90.0</td>
<td>7%</td>
</tr>
<tr>
<td>Soybeans</td>
<td>50.1</td>
<td>76.7</td>
<td>53%</td>
</tr>
<tr>
<td>Wheat</td>
<td>73.8</td>
<td>52.5</td>
<td>-29%</td>
</tr>
<tr>
<td>Cotton</td>
<td>18.1</td>
<td>10.9</td>
<td>-40%</td>
</tr>
<tr>
<td>Rice</td>
<td>4.4</td>
<td>3.1</td>
<td>-31%</td>
</tr>
<tr>
<td>Peanuts</td>
<td>1.5</td>
<td>1.3</td>
<td>-9%</td>
</tr>
</tbody>
</table>
Agricultural Act of 2014 Budget Implications
(Total Savings of $23,008 million)

- $14,307 Commodity Programs
  - $6,400 Sequester
  - $3,967 Conservation
- $8,000 Nutrition
  - $139 Trade
  - $228 Rural Development
  - $1,145 Research & Extension
  - $10 Forestry
  - $879 Energy
  - $694 Horticulture
  - $5,722 Crop Insurance
  - $953 Miscellaneous

Change in Baseline Funding (Millions)
CBO Baseline Update shows lower prices = lower baseline not higher because it lowers crop insurance subsidy

<table>
<thead>
<tr>
<th>CBO Baseline</th>
<th>4/1/2013</th>
<th>4/1/2014</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-23 projected cost</td>
<td>$58,835</td>
<td>$33,848</td>
<td>-42%</td>
</tr>
<tr>
<td>2014-24 projected cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Title I Crop Payments</td>
<td>$58,835</td>
<td>$33,848</td>
<td>-42%</td>
</tr>
<tr>
<td>Total Crop Insurance Cost</td>
<td>$95,979</td>
<td>$93,288</td>
<td>-3%</td>
</tr>
</tbody>
</table>
So what do lower prices do to these Baselines?

2007-2013 CBO Actual and April 2014 Projected Outlays

- **Lower Insurance Cost**
- **Higher Title I Cost**
### The Splintering into Commodity “Teams”

<table>
<thead>
<tr>
<th>Teams</th>
<th>Commodities</th>
<th>Preferred Policy</th>
<th>Motive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue-ers</td>
<td>Corn and Soybeans</td>
<td>Shallow Loss Revenue (County ARC)</td>
<td>Negative price-yield correlation, Buying high levels of crop insurance coverage, liked Olympic average price</td>
</tr>
<tr>
<td>Traditionalists</td>
<td>Rice, Peanuts</td>
<td>Price targets (PLC)</td>
<td>Rice has mostly price and input cost risk, peanuts are highly contracted, buy lower crop insurance coverage</td>
</tr>
<tr>
<td>Bold Movers</td>
<td>Cotton</td>
<td>STAX</td>
<td>WTO, Recognized Title 11 was golden and Title 1 controversial</td>
</tr>
<tr>
<td>The other white crop</td>
<td>Milk</td>
<td>Dairy margin/supply control</td>
<td>Wanted ‘pseudo-margin insurance’ (insurance with legislated premiums)</td>
</tr>
<tr>
<td>Big County Crowd</td>
<td>Mountain State wheat</td>
<td>Individual ARC</td>
<td>Perceived county triggered programs will not work in large counties</td>
</tr>
<tr>
<td>Wallflowers</td>
<td>Sugar</td>
<td>Status quo</td>
<td>It is good to not score at CBO</td>
</tr>
</tbody>
</table>
So where are we today?

1. The fundamentals of area products like SCO STAX, & ARC
2. Price-yield & county yield-farm yield correlation
3. Need to avoid the fallacy of small numbers
4. Will these programs have significant impacts?
5. What about hedging?
Area Products – SCO & STAX
- a shallow loss version of area insurance

Example County Yield Trend

Actual Yield
From the history one must predict expected yield two years out

Example County Yield Trend

Actual Yield  predicted yield  2015 Pred

Department of Agricultural Economics
Now for the hard part- Using Historic Deviations from trend to assess the odds of deviation from trend next year

What will the weather of 1976 for do to yields today?
Now for the hard part- Using historic deviations from trend to assess the odds of deviation from trend next year

Example County Yield Trend

Actual Yield  predicted yield  2015 Pred

Frequency
Many counties lack long series
- How to augment rating short series?
- How to accommodate missing series?
Yield are often not normally distributed
Agricultural Crop Risk
Spectrum of Risk Independence

- Hail
- Yield
- Revenue
- Price

Independent risk
Positively Correlated risk

Insurance
Futures Markets
Midwest Corn & Soybean Rates Influenced by Price Yield Correlation – but is it linear?

Negative Yield-Price Correlation

![Graph showing the relationship between corn price and yield, indicating a negative yield-price correlation.](image-url)
The effect of farm-county yield correlation on SCO (farm-county correlation = 0.79)

<table>
<thead>
<tr>
<th>Farm Level</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield % APH</td>
<td>92%</td>
<td>54%</td>
<td>92%</td>
<td>93%</td>
<td>123%</td>
<td>133%</td>
<td>107%</td>
<td>82%</td>
<td>122%</td>
<td>71%</td>
</tr>
<tr>
<td>% SCO paid</td>
<td>30%</td>
<td>100%</td>
<td>31%</td>
<td>26%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>72%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>SCO payment needed</td>
<td>$46.5</td>
<td>$155.0</td>
<td>$48.1</td>
<td>$40.3</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$111.6</td>
<td>$-</td>
<td>$155.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>County Level</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield % APH</td>
<td>86%</td>
<td>79%</td>
<td>95%</td>
<td>103%</td>
<td>117%</td>
<td>109%</td>
<td>109%</td>
<td>87%</td>
<td>115%</td>
<td>105%</td>
</tr>
<tr>
<td>% SCO paid</td>
<td>57%</td>
<td>85%</td>
<td>19%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>53%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>SCO payment</td>
<td>$84.6</td>
<td>$126.2</td>
<td>$28.2</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$78.7</td>
<td>$-</td>
<td>$-</td>
</tr>
</tbody>
</table>
The Law of Small Numbers and Agricultural Risk

- Nobel Prize winner Daniel Kahneman posited the psychological error of “Law of Small Numbers”
- The law of large numbers implies large samples will be representative of the population from which they are drawn. People's intuition often incorrectly assume a small sample is representative.
- In the case of yield and revenue associated with crop agriculture we get essentially one observation per year.
- Kahneman was focused on statistically trained scientists not laymen
### McLean Co. Ill Example of the Small sample problem

<table>
<thead>
<tr>
<th></th>
<th>75% Corn RP</th>
<th>Corn SCO 86-70</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=15</td>
<td>mean $23.13</td>
<td>$20.37</td>
</tr>
<tr>
<td></td>
<td>std dev $15.15</td>
<td>$10.15</td>
</tr>
<tr>
<td></td>
<td>c.v. 65%</td>
<td>50%</td>
</tr>
<tr>
<td>n=10</td>
<td>mean $23.13</td>
<td>$20.37</td>
</tr>
<tr>
<td></td>
<td>std dev $17.62</td>
<td>$11.81</td>
</tr>
<tr>
<td></td>
<td>c.v. 76%</td>
<td>58%</td>
</tr>
<tr>
<td>n=5</td>
<td>mean $26.05</td>
<td>$17.45</td>
</tr>
<tr>
<td></td>
<td>std dev $26.05</td>
<td>$17.45</td>
</tr>
<tr>
<td></td>
<td>c.v. 113%</td>
<td>86%</td>
</tr>
</tbody>
</table>
Will the New Farm Bill Change Crop Insurance Participation?

Scenarios Evaluated

- Individual-level crop revenue insurance only,
- Individual-level crop revenue insurance and a county-level revenue program and ARC,
- Individual-level crop revenue insurance and county-level supplemental revenue insurance and SCO and
- All farms are assumed to have purchased enterprise unit coverage at the individual level.
Producer welfare effects

<table>
<thead>
<tr>
<th>Crop</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crop Revenue Insurance Only</td>
<td>Crop Revenue Insurance and ARC</td>
<td>Crop Revenue Insurance PLC and County-level SCO</td>
<td>Acre weighted Percent of county representative farms Preferring PLC+SCO</td>
</tr>
<tr>
<td></td>
<td>Certainty Equivalent</td>
<td>Certainty Equivalent</td>
<td>Increase in CE from Crop Insurance Only CE</td>
<td>Increase in CE from Crop Insurance Only CE</td>
</tr>
<tr>
<td>Corn</td>
<td>$676,848</td>
<td>$710,293</td>
<td>$704,268</td>
<td>$704,268</td>
</tr>
<tr>
<td>Soybeans</td>
<td>$468,813</td>
<td>$488,757</td>
<td>$478,815</td>
<td>$478,815</td>
</tr>
<tr>
<td>Rice</td>
<td>$871,154</td>
<td>$923,368</td>
<td>$1,031,823</td>
<td>$1,031,823</td>
</tr>
<tr>
<td>Wheat</td>
<td>$243,979</td>
<td>$254,458</td>
<td>$261,632</td>
<td>$261,632</td>
</tr>
</tbody>
</table>
Regional Differences
- driven by correlation
- yield risk

Soybean Simulated Average ARC payments Per Base Acre

$4 to $10
$11 to $12
$12 to $14
$14 to $21
## Estimated volume of individual and shallow loss insurance

<table>
<thead>
<tr>
<th>Crop</th>
<th>Base individual liability</th>
<th>Individual Liability under new Farm Bill</th>
<th>SCO Liability under New Farm Bill</th>
<th>Sum of Individual &amp; SCO Liability under new Farm Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Millions</td>
<td>Millions</td>
<td>Millions</td>
<td>Millions</td>
</tr>
<tr>
<td>Corn</td>
<td>$41,396</td>
<td>$41,052</td>
<td>$170</td>
<td>$41,222</td>
</tr>
<tr>
<td>Rice</td>
<td>$1,243</td>
<td>$994</td>
<td>$716</td>
<td>$1,710</td>
</tr>
<tr>
<td>Soybeans</td>
<td>$21,159</td>
<td>$20,792</td>
<td>$327</td>
<td>$21,119</td>
</tr>
<tr>
<td>Wheat</td>
<td>$5,693</td>
<td>$5,295</td>
<td>$1,191</td>
<td>$6,485</td>
</tr>
<tr>
<td>Total</td>
<td>$69,492</td>
<td>$68,133</td>
<td>$2,404</td>
<td>$70,537</td>
</tr>
<tr>
<td></td>
<td>-1.96%</td>
<td></td>
<td>1.50%</td>
<td></td>
</tr>
</tbody>
</table>
Let’s not forget hedging and forward pricing

Early Season Hedging & Crop Insurance Revisited

PERCENT OF EXPECTED CROP TO HEDGE

COVERAGE LEVEL

PERCENT OF EXPECTED CROP TO HEDGE

EARLY SEASON HEDGING & CROP INSURANCE REVISITED

APH
RPPE
RP
The Basis Risk of Area Products Lowers the Optimal Hedge
ARC & SCO slightly Increase Optimal Hedge

EARLY SEASON HEDGING ADDING ARC & SCO TO RP

PERCENT OF EXPECTED CROP TO HEDGE

COVERAGE LEVEL

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

RP  RP+ ARC  RP + SCO
So where are we headed?
Five Big Questions for the Future of Farm Policy & Crop Insurance

1. Can we push the envelop of insurability
   - Insuring revenue risk without futures markets?
   - Price risk is not normally considered insurable

2. Can we harness ‘big ag data’ and technology to improve risk management in change climates and production systems?
   - Verifiable knowledge of soils, inputs, practices & risk
   - Privacy issues, policy issues

3. Will behavioral economics provide insights into risk management decision making & marketing?
   - The error of small samples
   - The implication of the demand for insurance & subsidy
Five Big Questions for the Future of Farm Policy & Crop Insurance

4. What is the proper role of the private sector versus government?
   - World reinsurance market
   - Does proportional A&O work best?

5. What will the next farm bill look like?
   - Budget cuts?
   - Shallow versus deep loss
   - ARC versus SCO
   - Environmental issues
Questions

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- @DrKeithHCoble
- www.agecon.msstate.edu
The Backroom of the Farm Bill Conference Committee