

# Current Issues in Crop Insurance

CAS Conference “In Focus: Taming Cats-Managing Natural and Man-Made  
Catastrophe Risks”

October 4-5, 2012

Baltimore Marriott Waterfront, Baltimore, MD

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## CAS Session Description

- The crop insurance program has undergone significant changes in recent years. The session will review changes introduced by the 2008 Farm Bill, the renegotiation of the Standard Reinsurance Agreement that became effective in 2011, and the outlook for the 2012 Farm Bill. The discussion will also touch on the impact of recent rate activity and the introduction of the Combo policy on program experience.

# What is NCIS?

- National Crop Insurance Services
  - Not-for-profit crop insurance industry trade association
  - Licensed statistical agent to State Insurance Departments
  - In existence, in some form, since 1915
- Members are crop insurance companies
- Every company writing Federally sponsored Crop Insurance is an NCIS Member
  - 97% + of all Crop Hail policies are written by an NCIS member company
  - International insurance and reinsurance companies

# NCIS Functions

- MPCl and Crop-Hail Program Development and Analysis
  - Policy Analysis, Loss Adjustment Procedures, Legal Analysis, Agronomic Research
- Economic and Actuarial Analysis
- Education and Training
  - Loss Adjuster Schools – 15 (1,482 attendees)
  - National Conferences – 4 (1,041 attendees)
  - Annual Regional/State Meetings – 13 (466 attendees)
- Crop-Hail Advisory Organization and Statistical Agent
  - Licensed by Individual State Insurance Department
- Public Relations and Industry Outreach
  - (2011 Southwest Case Study – YouTube)
  - (Crop Insurance 101)
  - (2011 Midwest Case Study – YouTube)

# Crop-Hail Insurance

# Crop-Hail Program

- Private sector program
  - Written by 20+ insurers
  - 2011 premium of \$840 million
  - 200+ crops
  - Pays based on percent damage to crop
- Standard Perils
  - Hail, fire, lightning, transit
- Optional perils
  - Tobacco wind and setup
  - Cotton wind
- Other perils (not currently supported by NCIS)
  - Green snap, freeze, etc.

# NCIS Role in Crop-Hail Program

- Advisory organization and Statistical agent
- Policy language and forms
- Loss adjustment procedures
  - Conduct crop research in multiple locations
    - Investigate new varieties or different growing conditions
    - Evaluate agronomic response of crop to hail damage
    - Defoliation and stand reduction
  - Update adjustment procedures based on research
  - Ensures uniformity of loss data across companies
- Loss Cost estimation

# NCIS Loss Cost Methodology

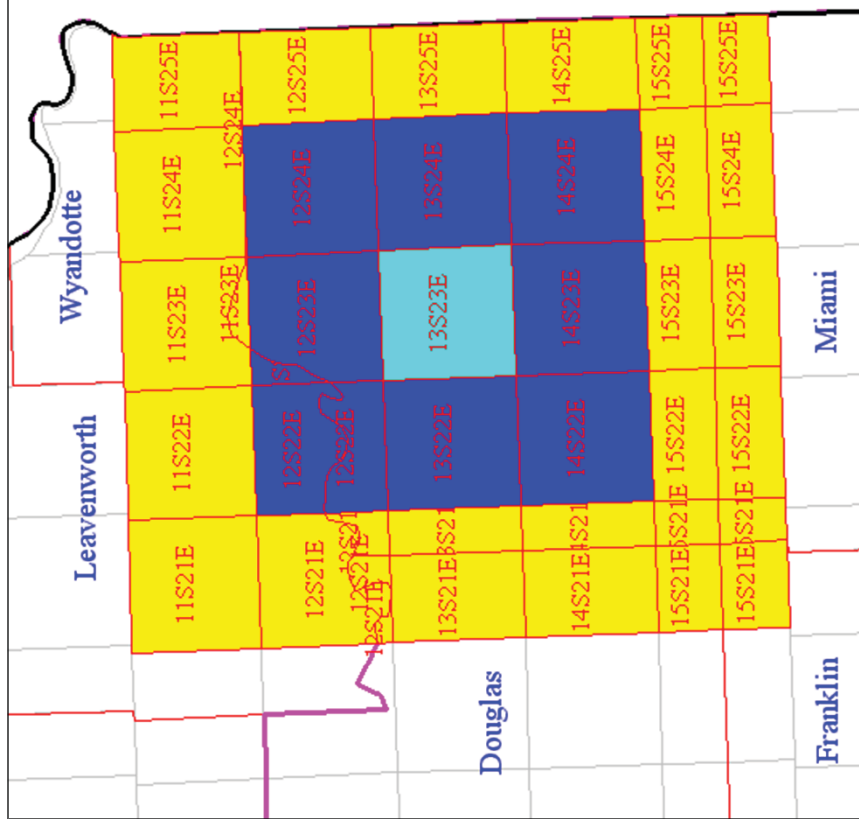
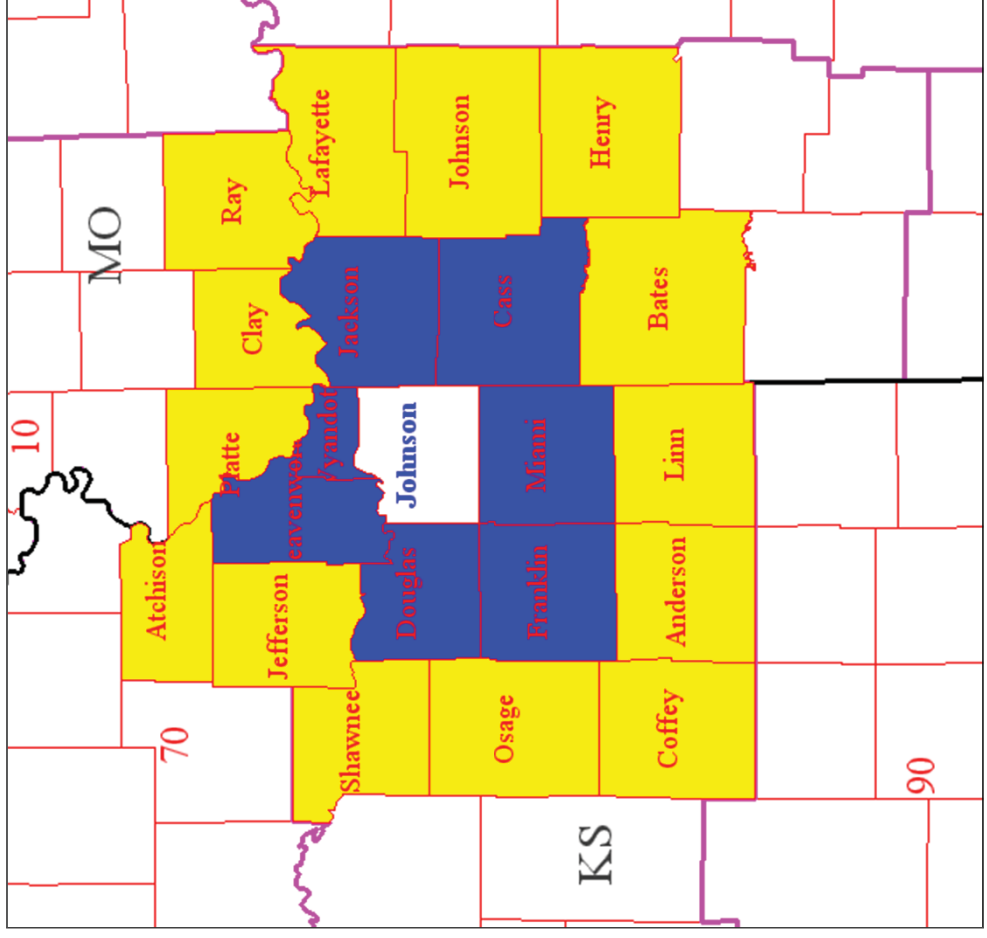
- Prepare Final Average Loss Costs (FALCs)
  - Pure Premiums
  - No loading for expenses or profit
- Data from 1948 to present
- No loss cost trend or loss development
- No formal use of credibility
  - Credibility is only weakly related to exposure volume due to high correlation between exposures
- Thousands of years of experience needed for “full credibility”



# NCIS Loss Cost Methodology (cont'd)

- **Base crops**
  - Rated by township or county
  - Spatial smoothing technique
    - Neighboring locations should have similar expected loss costs
    - Rare exceptions due to topography
- **Minor crops**
  - State/multistate rates or factor of base crop
  - Sparse data
    - Spatial
    - Inter-temporal
  - External factors
    - Distance from coast

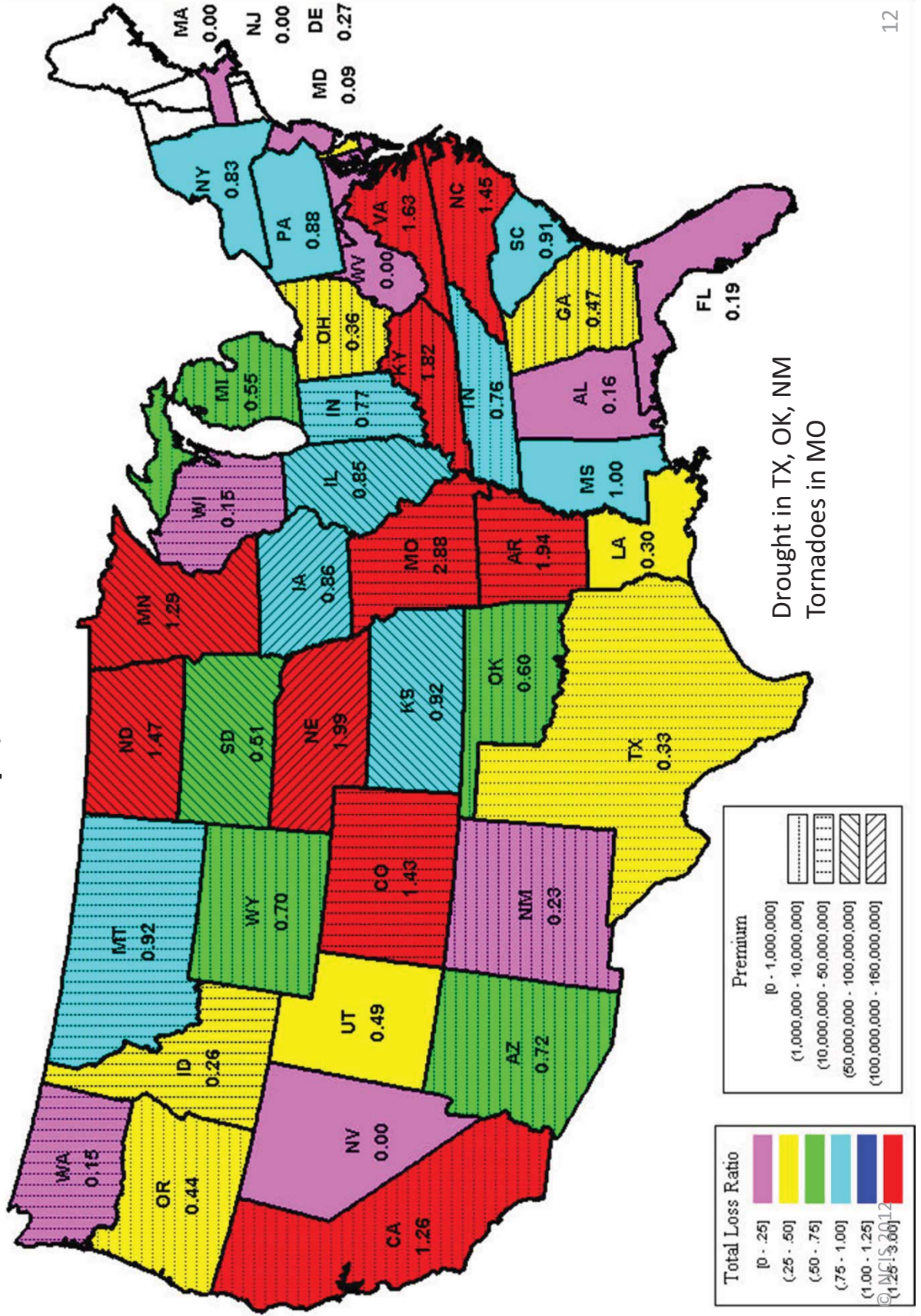
# 9-25-Townships and County Concentric Circle Rating District





# 2011 US Crop Hail Premium and Loss Ratios

All Crops, Plans Combined





# Federal Crop Insurance Program

## *Multiple Peril Crop Insurance or MPCl*

# Federal Crop Insurance Program

- Multiple Peril risk protection
  - Covers drought, flood, insects, other natural perils
    - Excludes inadequate farm management practices
  - Pays for farmer's loss of yield or revenue
    - As compared to guaranteed level
    - Guarantee based on expected yield or revenue
      - 50% to 85% (90% for Area plans)
    - Farmer's expected yield determined from historical yields
  - Prices from commodity markets

# Public/Private Partnership

- Risk Management Agency (RMA)
  - USDA Agency
  - Regulator
  - Federal Crop Insurance Corporation (FCIC)
  - Full access to Treasury funds as needed
- Approved Insurance Providers
  - 15 AIPs in 2012
  - Issue policies & settle claims
  - Obligated to sell coverage to all eligible farmers
  - AIPs also sell Crop-Hail

# The U.S. Partnership

	<i>Private Companies (AIPs)</i>	<i>Government (FCIC/RMA)</i>
Players	15 approved companies 16,000 agents & adjusters	550 staff \$80 mil annual budget
Products	May develop products	May develop products
Sales	Sell and adjust all policies; must sell to any farmer wanting coverage	Sells no policies; makes a payment to AIPs for delivery costs
Premiums	Collect premiums	Sets premium rates; subsidizes premiums
Underwriting	Bear underwriting risk; share gains/losses with gov.	Sets underwriting standards; shares gains/losses with AIPs
Claims	Pay all claims	Pays no claims
Quality control	Performs QC	Ensures QC compliance
Education	Train agents, adjusters, informs producers	Informs producers



# Federal Crop Insurance vs. Private Crop-Hail Insurance

	Federal Crop Insurance	Private Crop-Hail Insurance
Regulator	Risk Management Agency (RMA) of USDA	State Departments of Insurance
Subsidized?	Yes	No
Premium Rate	Set by RMA	Set by Individual companies
Perils covered	All risk basis: Yield losses due to natural causes; Also revenue losses due to price movements and yield losses.	Named perils basis: Losses due to hail and others (fire, lightning, transit, etc)

# RMA Role

- Develop policy language
- Loss adjustment procedures
- Set rates
- Program management and oversight
  - Standards for AIPs to enter program
  - 2011 flooding
- Regulate company activity
  - Quality control
    - Program eligibility
    - Monitor claim adjustment
- Financial support
  - Farmer premium subsidies (approx. 40%)
  - Pays A&O to insurers
    - Due to no expense loading in premium
  - Reinsurance
    - Proportional and non-proportional

# Unusual Characteristics

- Insures an “uninsurable” risk
  - Very high correlation among exposures
  - No ability to underwrite risks
  - No control over rates
    - No ability to recoup losses
    - Uncertainty regarding rate adequacy
  - Extensive governmental oversight
- Insures business activity, not property
  - Creates need to limit waste, fraud & abuse
  - Low incidence of fraud
- Requires highly specialized insurance operation
  - Very different from P&C
  - Massive data reporting requirements / High IT costs

# Numerous Challenges

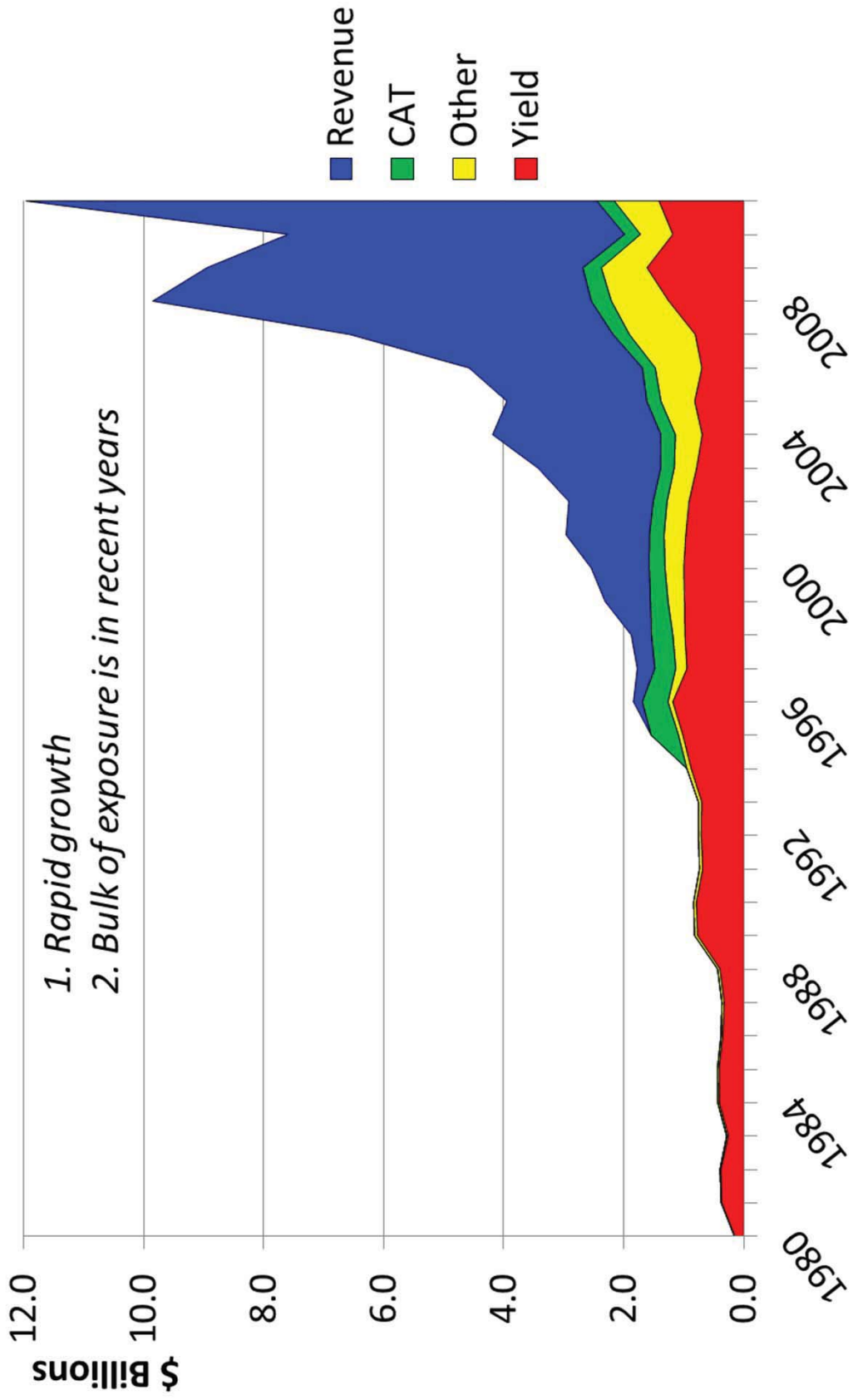
- Farm Bills - every 5 years
  - Supporters introduce enhancements
  - Opponents propose cuts or elimination
    - Farmer Premium Subsidies
    - Private sector delivery; A&O; Underwriting Gains
- Administration
  - Presidential Budget proposals – Annual
  - OMB, OIG reports
- Renegotiate SRA - every 5 years
- New ratemaking methodology
- Maintaining reinsurer participation
- Cash flow
- Rate of return concerns
- Insufficient A&O
- 2012 Cost of Delivery study

# Overview of MPCl Protection

# Types of MPCl Protection

- Individual risk
  - Yield
  - Revenue
  - Revenue with harvest price exclusion
- Group risk
  - County yield
  - County revenue
- Specialty programs
  - Rainfall & vegetation indices
  - Trees
  - Plant nurseries
  - Livestock margin coverage
  - Oysters, catfish

# MPCI Premiums

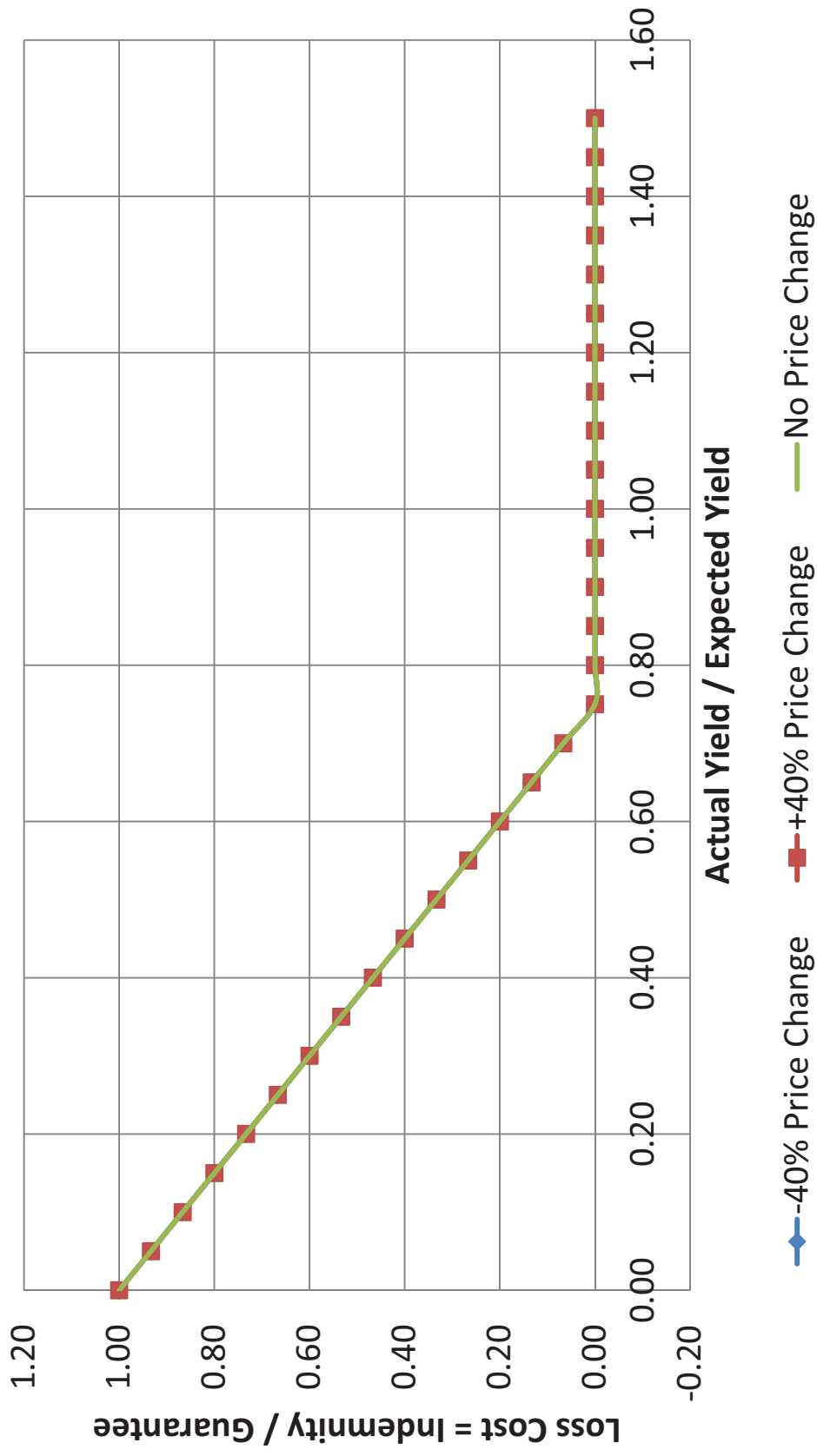


# Yield Protection Insurance

- Yield Guarantee per acre
  - APH x Coverage Level
    - APH = Farmer's average historical yield
    - Coverage Levels: 50% to 85%
    - Deductible = 100% - Coverage Level
- Indemnity per acre
  - Replaces lost bushels
  - Pays when Harvested Production < Guarantee  
(Yield Guarantee – Harvested Production) x Base Price

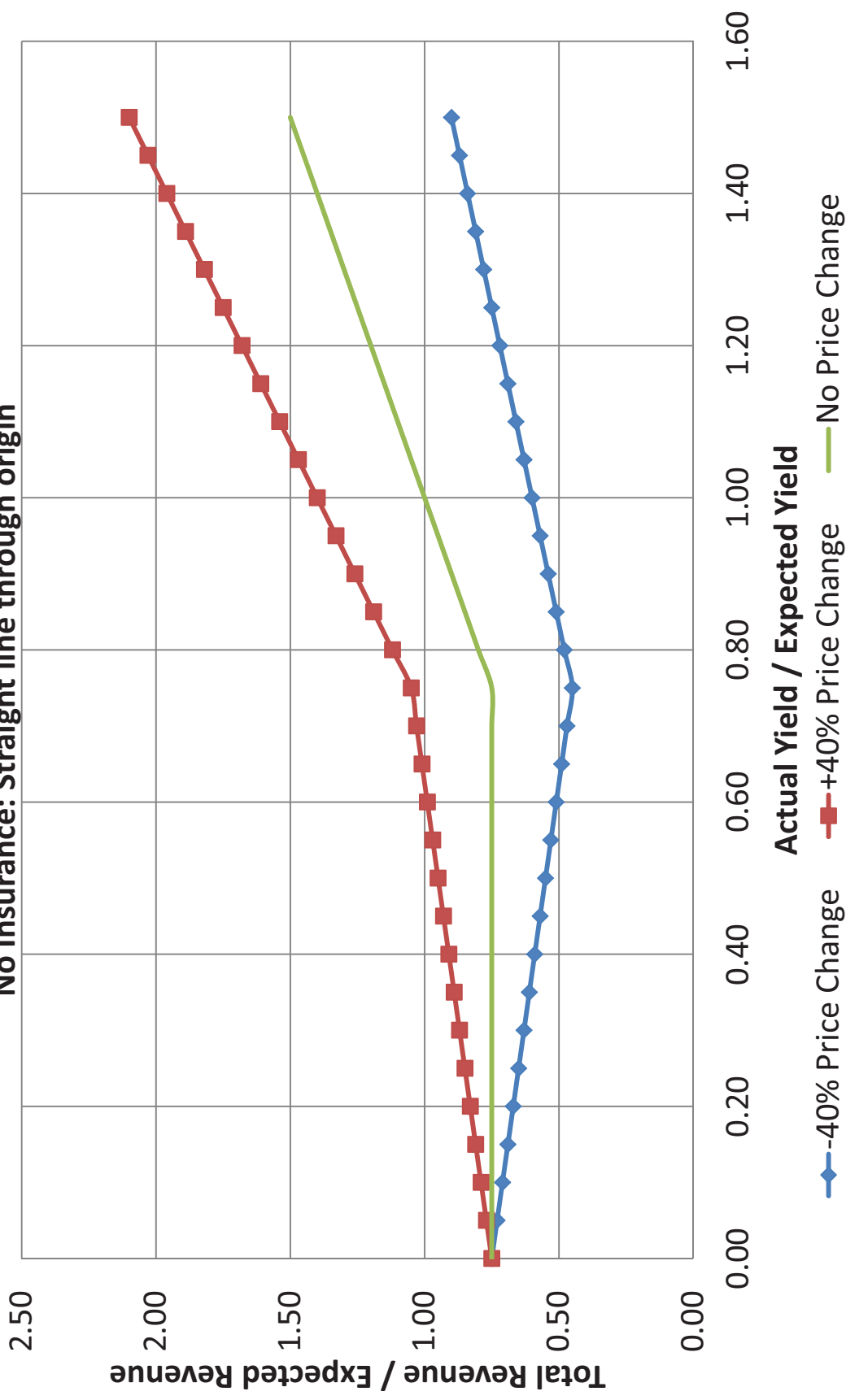


## Yield Protection Plan – Indemnity Guarantee = 75% of expected yield



# Yield Protection Plan - Farmer Revenue

No Insurance: Straight line through origin



# Revenue Protection Insurance

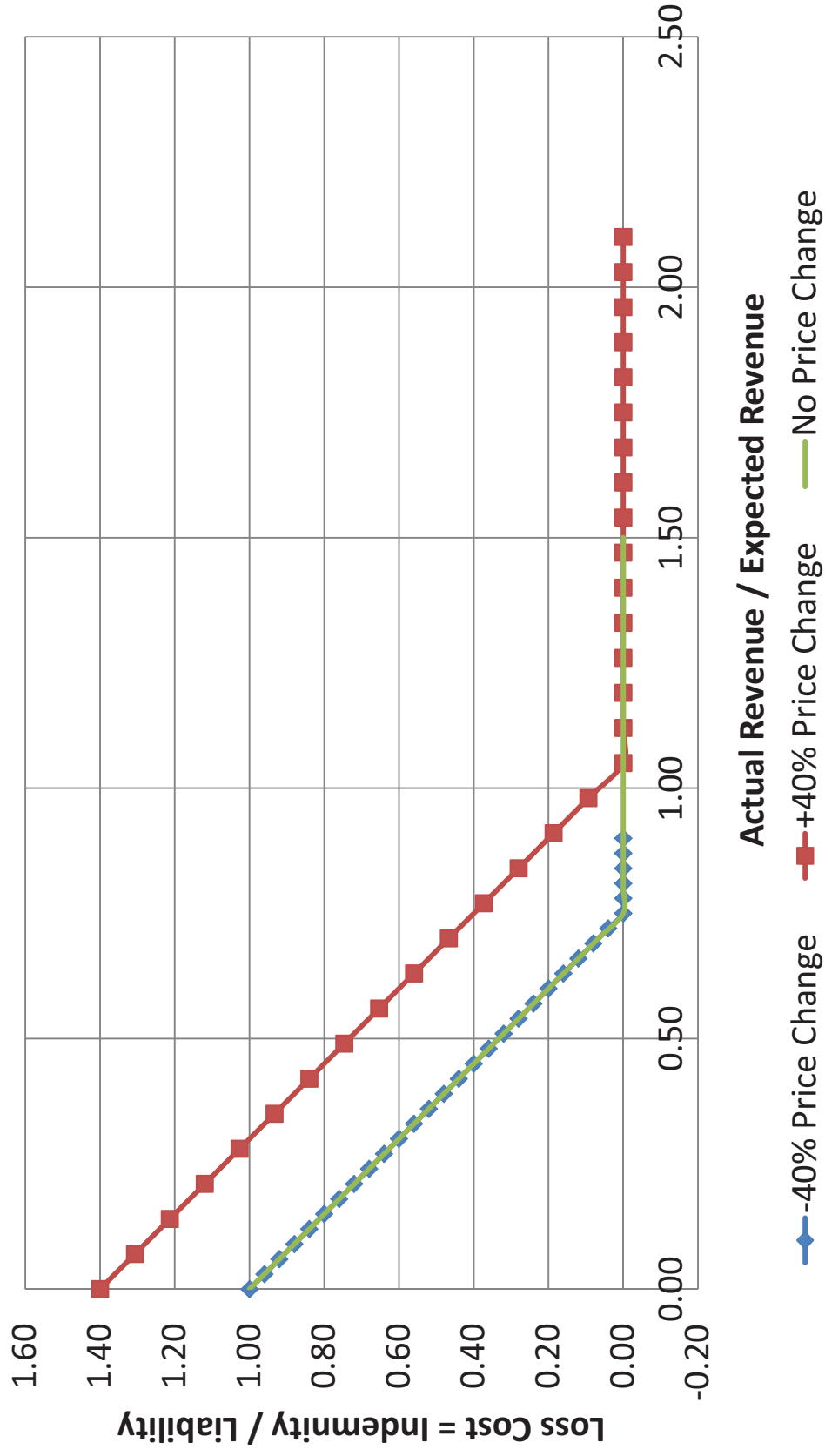
- Revenue Guarantee
  - $APH \times \text{Coverage Level} \times \text{Base Price}$
  - Guarantee can increase at harvest
    - $APH \times \text{Coverage Level} \times \text{Max}(\text{Base Price}, \text{Harvest Price})$
    - Applies to RP only, not RP with Harvest Price Exclusion
- Actual Revenue
  - Harvested Production  $\times$  Harvest Price
- Indemnity
  - Pays loss of revenue, not yield
  - Protects farmer when forward marketing his crop
  - Pays when  $\text{Actual Revenue} < \text{Revenue Guarantee}$   
Revenue Guarantee – Actual Revenue

# Base and Harvest Crop Prices

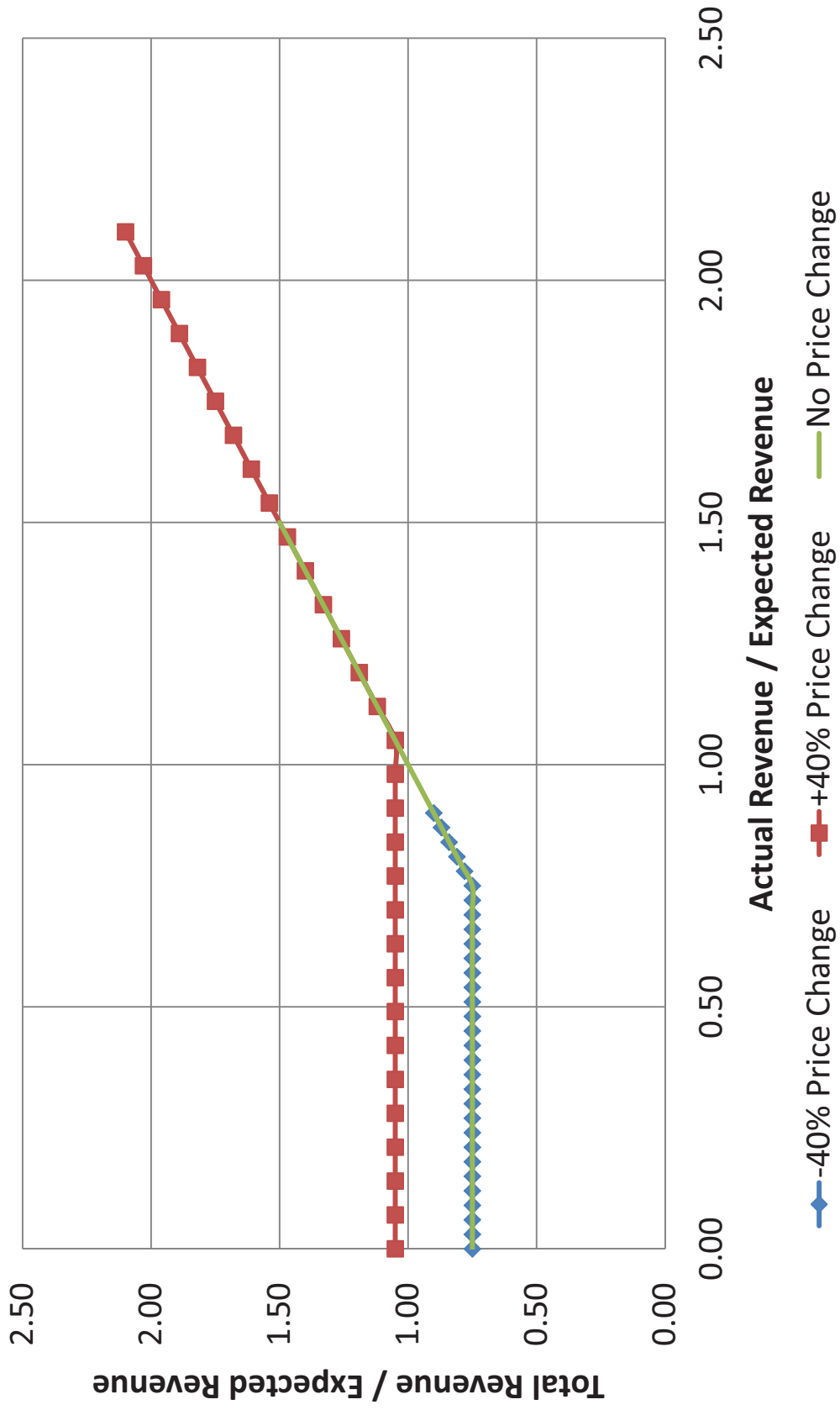
- Uses options on futures contracts sold on commodity exchanges
  - Crop price
    - Sets Base Price prior to planting
    - Sets Harvest Price in month of normal harvest
  - Volatility
  - Extended price discovery period
- Iowa corn example:
  - Futures contract for December delivery
  - Base Price discovery period Feb. 1 – Feb. 28
  - Harvest Price discovery period Oct. 1 – Oct. 31

## Revenue Protection Plan – Indemnity

Guarantee = 75% of expected revenue



## Revenue Protection Plan - Farmer Revenue



# RMA Ratemaking Methods

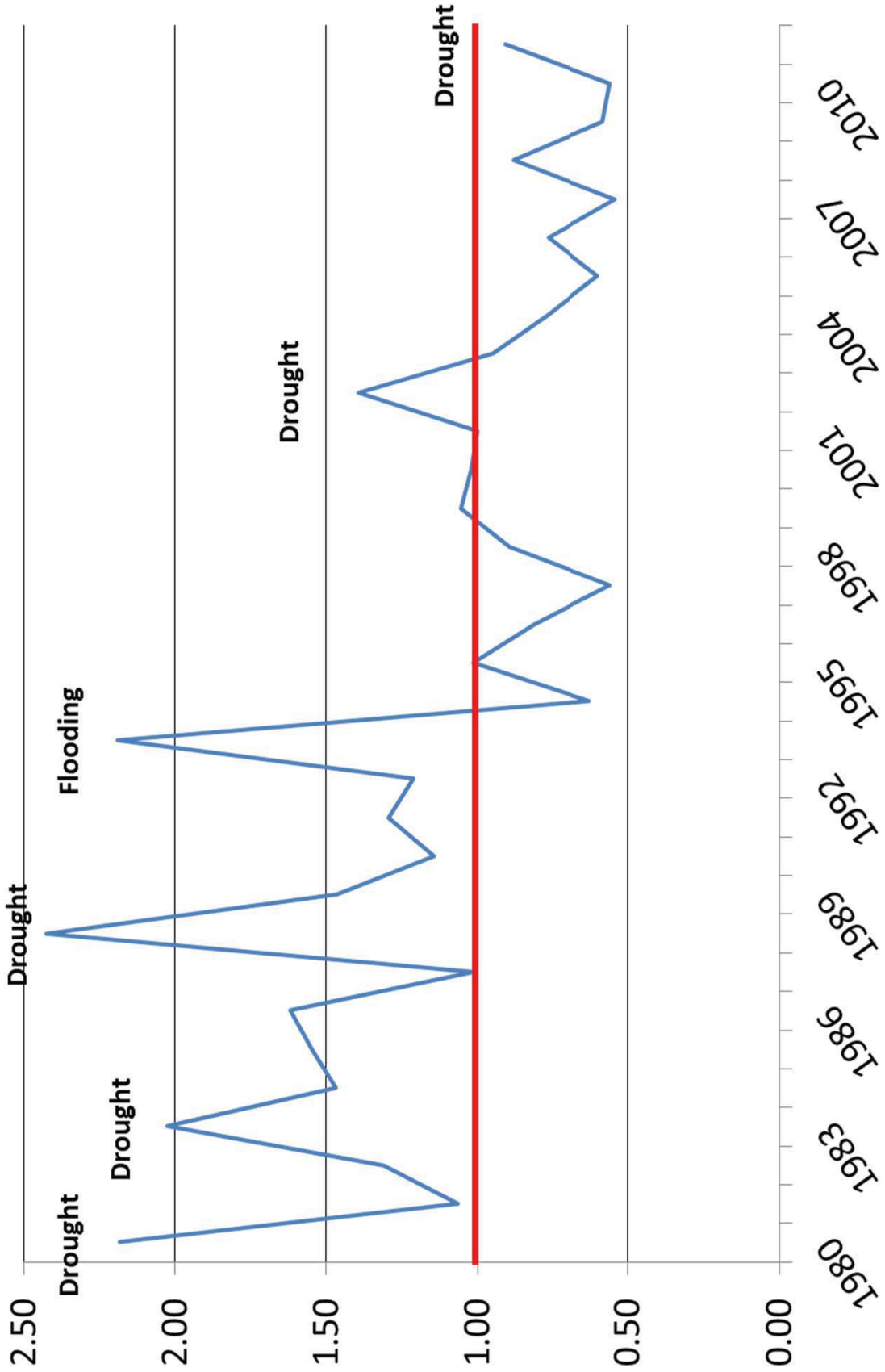
# MPCI Ratemaking Methodology

Used through 2011

- Loss Cost method
  - County base rates
  - Exclude loading for expenses or profit
  - Based on loss costs from 1975 to present
    - Convert Revenue Plan experience to Yield Protection
    - Exclude CAT experience
    - Adjust to 65% coverage level
    - Cap county LC's at 80<sup>th</sup> percentile
    - Smooth county LC with neighboring counties
  - Loadings
    - State excess load
    - Prevented Planting
    - Disaster Reserve (contingency loading)



# Historical Performance / Loss Ratios Breakeven = 100%



# New Ratemaking Methodology

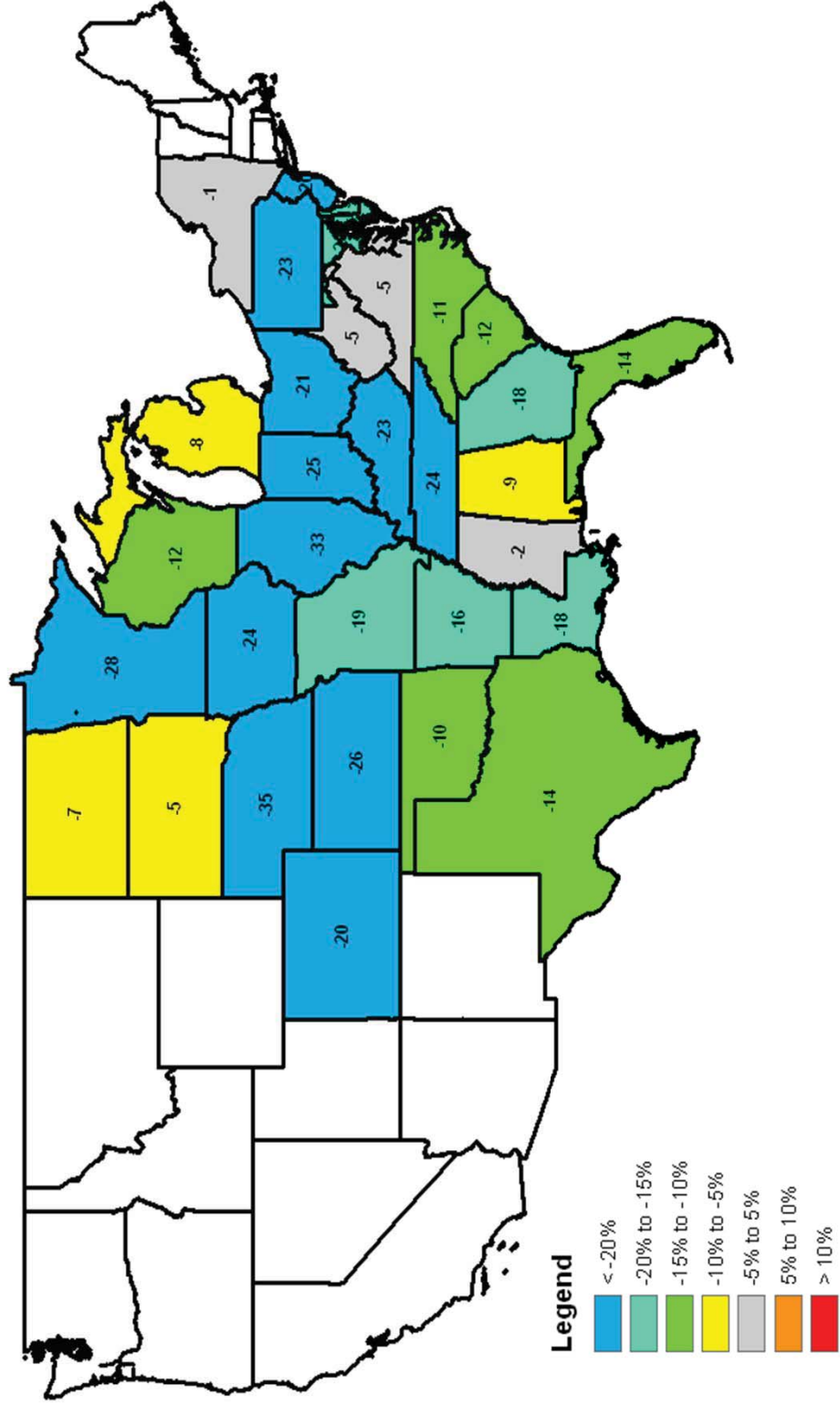
- Uses same historical experience
  - Modifies weighting to account for rare events (e.g. 1 in 500 year event)
  - Revamps other aspects of methodology
- 2012
  - Reductions to Corn & Soybean rates
- 2013
  - Further reductions to Corn & Soybean rates
  - Introduce methodology to Wheat & other crops
    - Amount still not known





# Overall Impact of All Changes (2012/2013)

Soybean: Percent Change in Overall Premium



# NCIS Expert Review

- “Methodology Analysis for Weighting of Historical Experience” Prepared by National Crop Insurance Services, Inc. October 17, 2011, Executive Summary

In conducting this review, it is imperative to state that the primary objective of our review was to determine if the newly proposed procedure is the product of sound analytical and empirical technique and that the resulting estimates are technically accurate and can be reliably replicated.
- In general, NCIS finds that the ratemaking study is not governed by the formal development of an analytical framework which can be used to systematically estimate the relationship between crop insurance loss data and the appropriate weighting of such data in the context of climate experience.

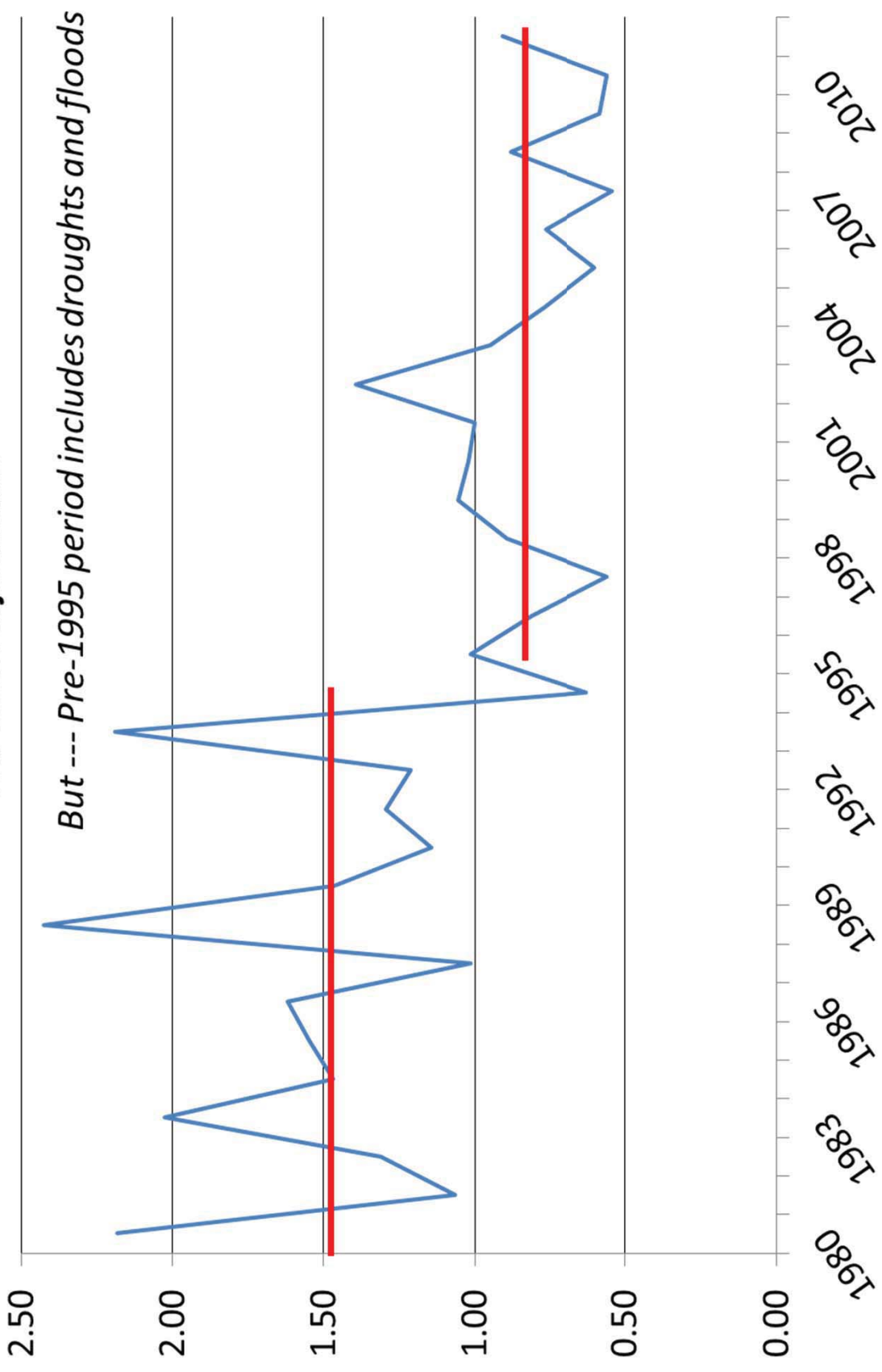
# Major Concerns with New Approach

- Weather weighting (“bins”)
  - Original purpose of study
    - Reduce weight assigned to years with rare events
  - Limited effectiveness
    - Does not improve performance of ratemaking process
  - Statistical justification
    - Model chosen based on correlation
      - Additional variables increase correlation
- Unanticipated methodology changes
  - Reduce influence of data from older years
  - Very large impact



# MPCI Loss Ratios

## Pre-1995 Adjustment





# Triple Modification to Older Experience

- Pre-1995 adjustment
  - Not supported in the literature
  - *When is a total loss not a total loss?*
- Net acreage adjustment
  - Weights historical experience based on acreage
  - Program has grown rapidly in recent years
    - Effect is to assign less weight to earlier years
  - *But credibility is not a function of exposure volume*
- Use of 20 year experience period
  - Formerly 1975 to present
  - Currently 1992 to 2011
  - 1993 drops out in two more years
- All three modifications target the older years
  - *Major weather events in 1983, 1988, 1993*

# Standard Reinsurance Agreement

# Standard Reinsurance Agreement (SRA)

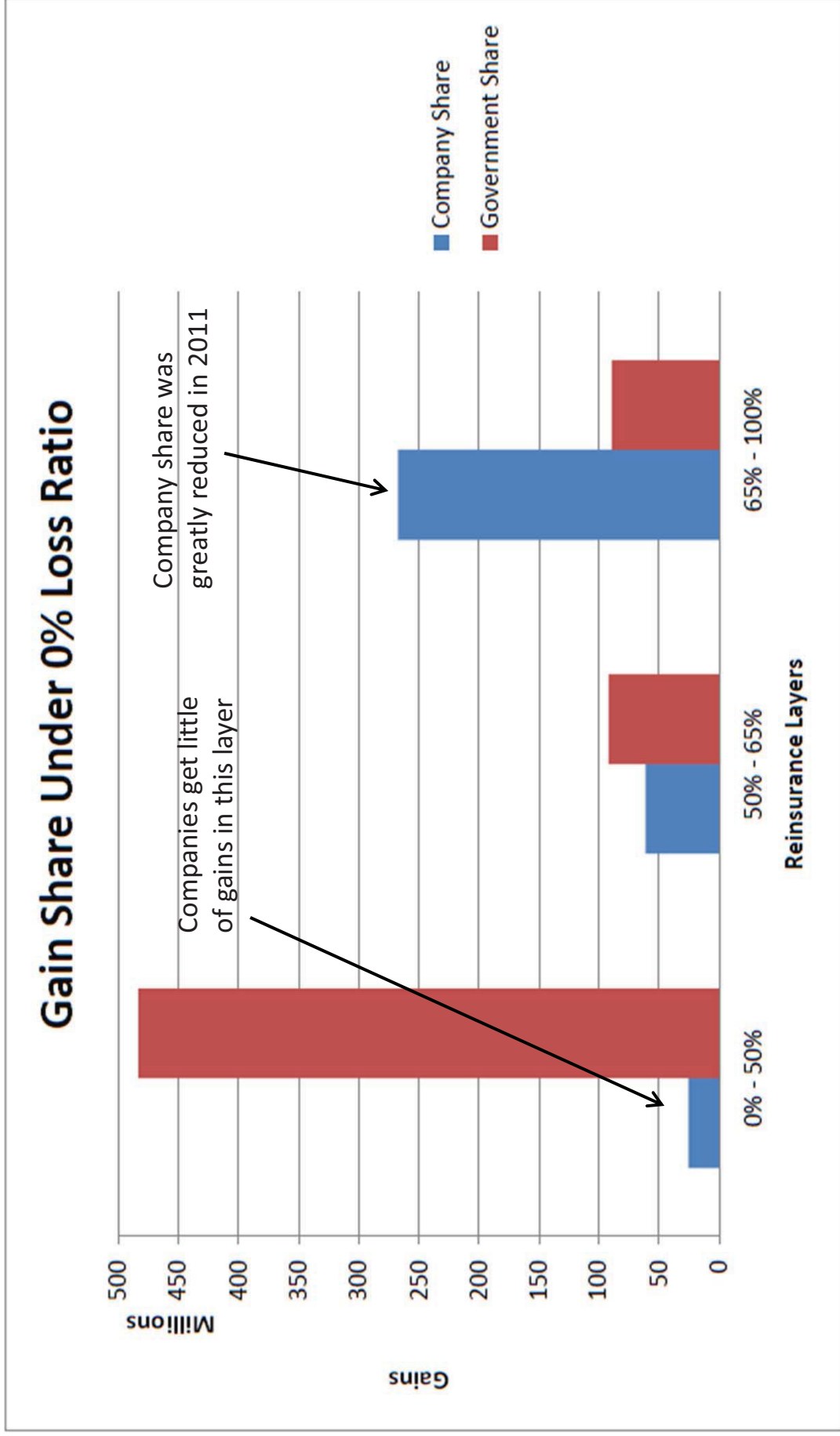
- Cooperative Financial Assistance Agreement
  - Between the Federal Crop Insurance Corporation (FCIC) and Insurance Company
  - Administered by RMA
  - Establishes Terms Under Which FCIC Provides Reinsurance and Subsidies on Eligible Crop Insurance Contracts Sold by the Insurance Company

# 2011 SRA

- Reduced industry revenues by \$6 B over 10 years
  - Reduced U/W gains
    - Particularly in Corn Belt
    - Gov't also took larger share of U/W losses
  - Cut number of reinsurance funds from 7 to 2
  - Capped A&O
  - Restricted Agent Compensation
    - Capped at 80% of A&O, by state
    - Allows up to another 20% for profit sharing
  - Increased incentives to write in underserved states

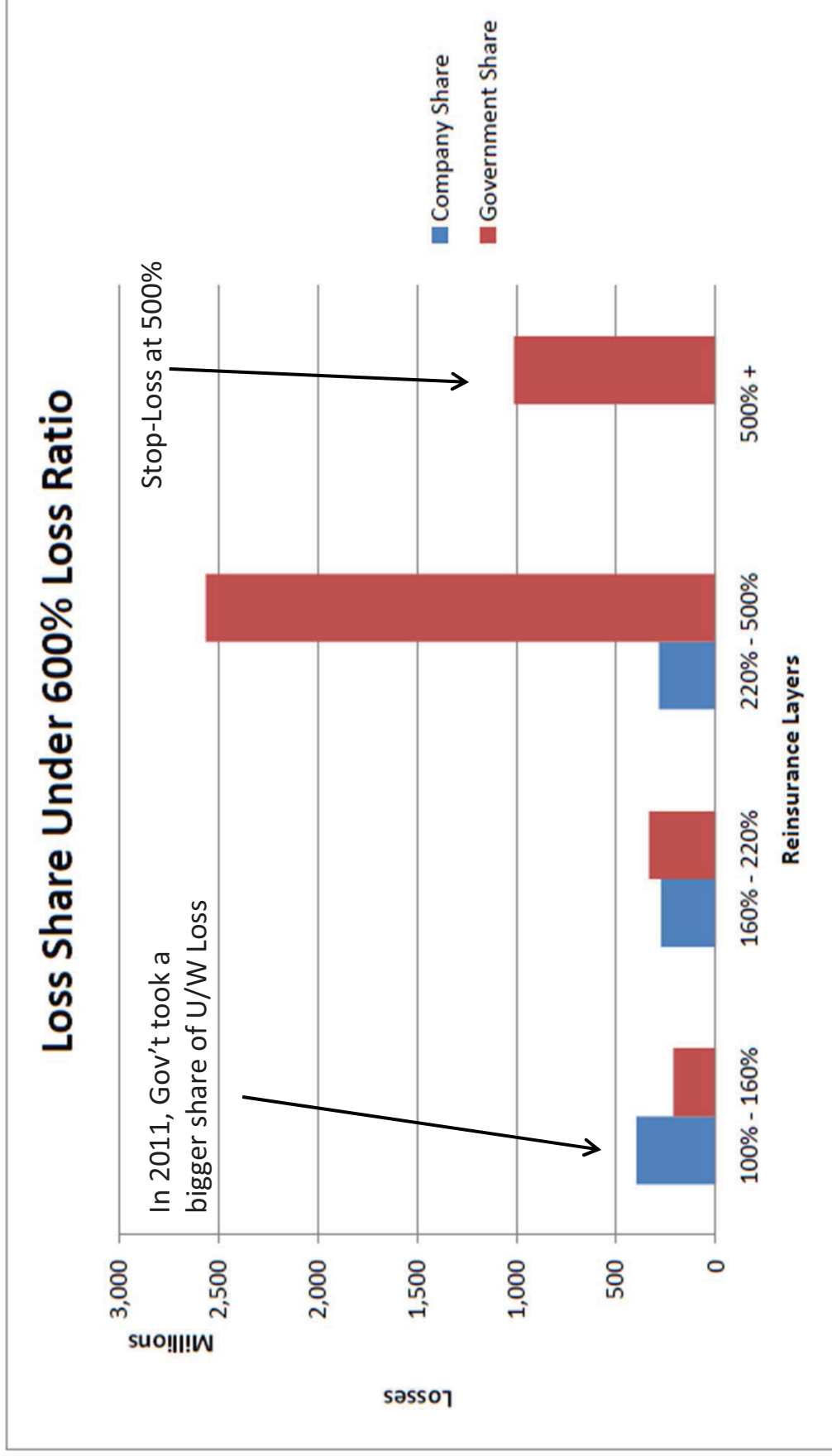
# Underwriting Gains

## Iowa scenario under 2011 SRA



# Underwriting Loss Scenarios

Iowa scenario under 2011 SRA



# A&O & CAT LAE Payments

- Compensates AIPs for delivery costs
- Nominal rates
  - As % of unloaded premium
    - CAT: 6%
    - Area plans: 12%
    - Revenue plans: 18.5%
    - Other (including Revenue with HPE): 21.9%
- Maximum A&O for 2012
  - \$2.06 B - reduced to \$1.32 B
  - 18.6% - reduced to 11.9%
- No minimum A&O

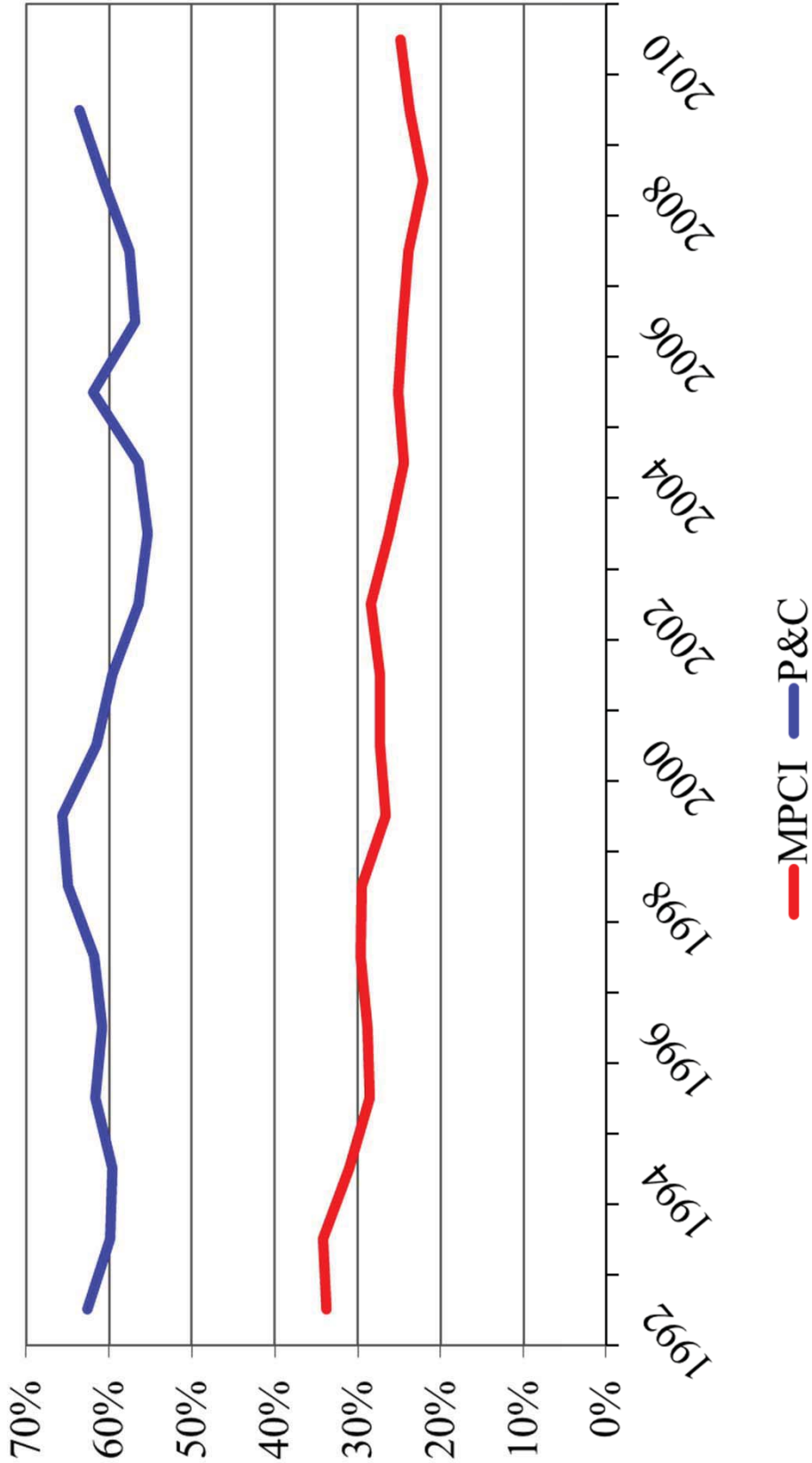
# Profitability and Expense Studies



# MPCI Has Much Lower Delivery Costs than P&C

## Expenses / Expected Benefits

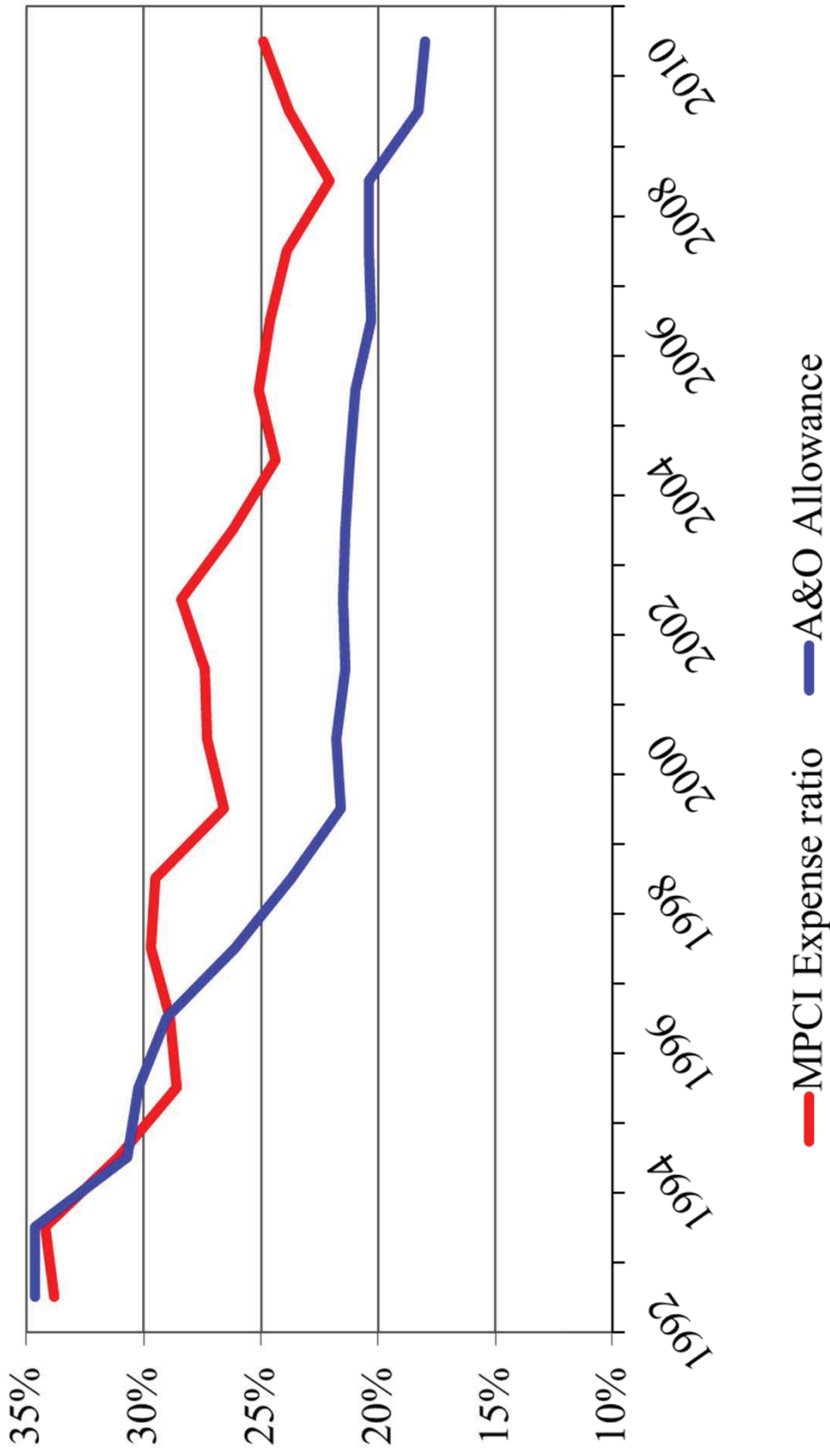
(Expected Benefits = Industry Premium - Expense)  
 (This is an approximation for Present value of Indemnity Payments)



Profitability and Effectiveness of the Federal Crop Insurance Program; Ben Wilner, Ph.D., Laura Carolan, and Frank Schnapp;  
 Crop Insurance Today; May 2011  
 © NCIS 2012  
<http://www.ag-risk.org/NCISPUBS/Today/2011/Today05-11.pdf>

# A&O Not Sufficient to Cover Industry Expenses

Projected to fall to 11-12% in 2011/2012



*Profitability and Effectiveness of the Federal Crop Insurance Program*; Ben Wilner, Ph.D., Laura Carolan, and Frank Schnapp; Crop Insurance Today; May 2011

© NCIS 2012 <http://www.ag-risk.org/NCISPUBS/Today/2011/Today05-11.pdf>

# 2012 RMA Cost of Delivery Study

- Study of industry delivery costs
  - Mostly focused on Agent Compensation
  - 2012 expense projection: 16.9% of premium
  - 2012 A&O projection: 11.9% of premium

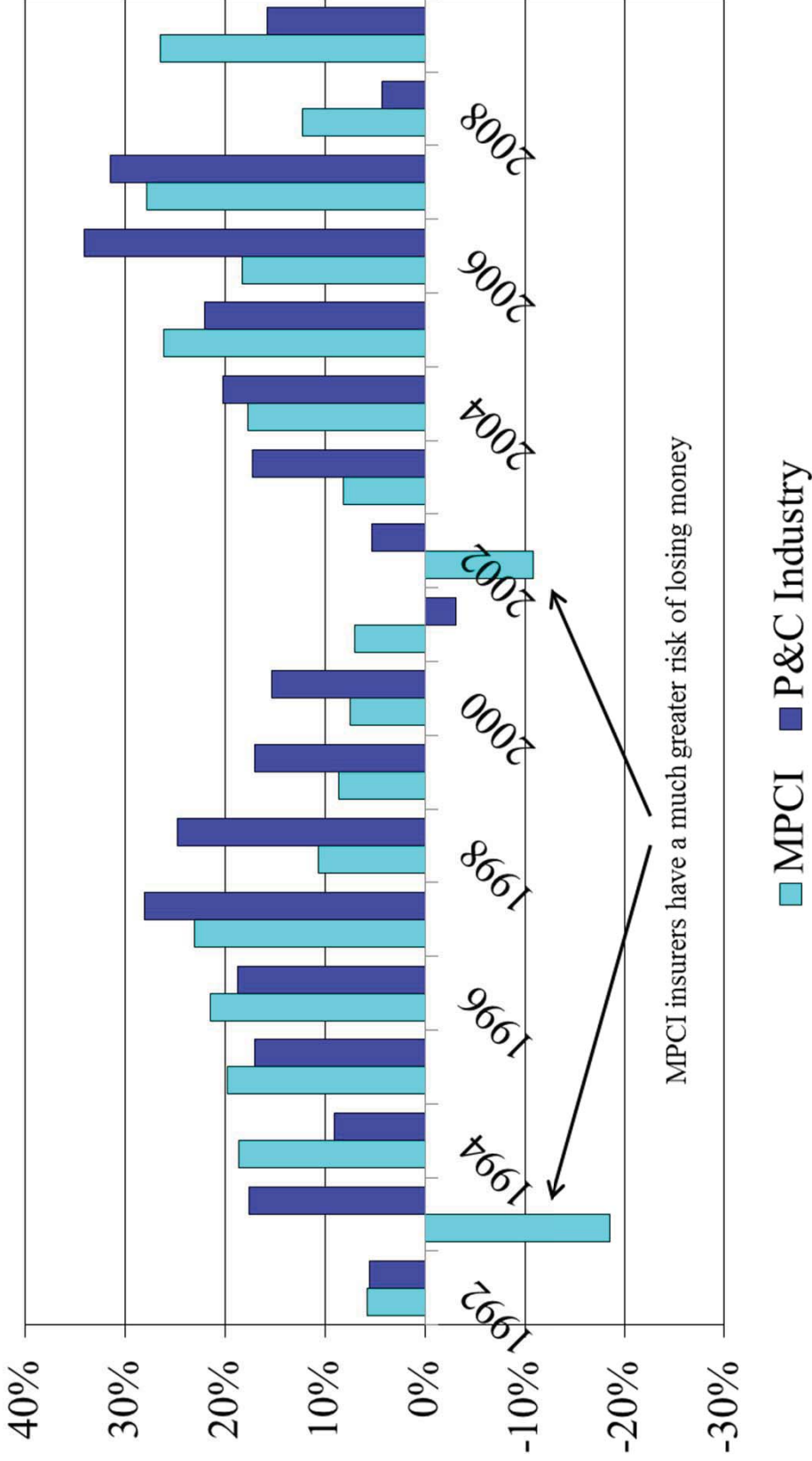
2012 Projected Expenses and Premium		
	Amount (\$MM)	% of Premium
Loss Adjustment & Company Overhead	\$0.629	6.0%
Agent Compensation	\$1.132	10.9%
Premium	\$10.417	---

*Crop Insurance Rate of Return: Issues and Concerns*; Frank Schnapp  
 Crop Insurance Today, August 2012  
[http://www.ag-risk.org/NCIS PUBS/Today/2012/Aug\\_2012\\_TODAY.pdf](http://www.ag-risk.org/NCIS PUBS/Today/2012/Aug_2012_TODAY.pdf)

# MPCI vs. P&C Industry Profitability

MPCI is riskier yet less profitable when evaluated on a consistent basis

Note: earlier drought years of 1980, 1983, 1988 not shown



Profitability and Effectiveness of the Federal Crop Insurance Program; Ben Wilner, Ph.D., Laura Carolan, and Frank Schnapp; Crop Insurance Today; May 2011  
 © NCIS 2012  
<http://www.ag-risk.org/NCIS/PUBS/Today/2011/Today05-11.pdf>

# Profitability Metrics

- Motivation
  - SRA Renegotiation
  - President's Budget
  - Sources
    - The 2013 President's Budget states: —A Department of Agriculture commissioned study found that when compared to other private companies, crop insurance companies' rate of return on investment (ROI) should be around 12 percent, but is currently expected to be 14 percent. The Administration is proposing to lower the crop insurance companies' ROI to meet the 12 percent target, saving \$1.2 billion over 10 years.
    - Vilsack asked how much return on investment is needed to be solvent and retain integrity in the program. A USDA study pegged 12% as a sufficient rate of return today. “Crop insurance companies are making 14-17%,” he said, “so there is a little cushion there.”
    - \*Vilsack Takes on Crop Insurance Question, Thursday, March 1, 2012, @11:34 PM CST, Chris Clayton DTN

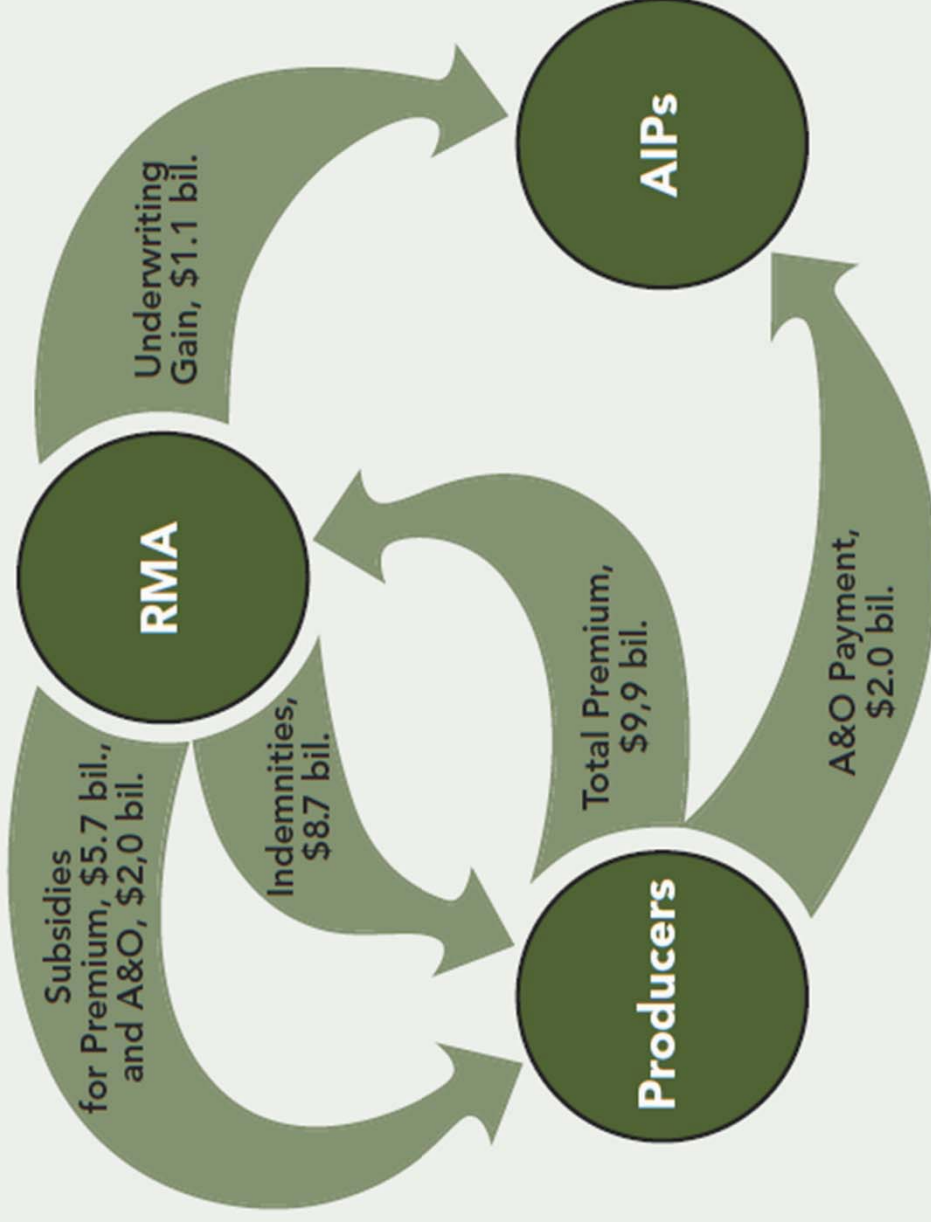
# Profitability Metrics cont'd

- SRA Negotiated on Return on Retained Premium (RORP)
  - Gross Calculation
- Grant Thornton – Retained Premium – Net of Expenses
- USDA Pre-Testimony: ROI (Return on Investment)
- Millman: ROE (Return on Equity)
  - ROI is not the same as ROE
  - Equity = Surplus (Close Enough)
- Industry ROE (all about the denominator)
  - Net Computation
  - Actual Expenses versus A&O
  - “*Results May Vary By State*”
- USDA Testimony March 15, 2012: Back to Retained Premium (“Target Rate of RORP ...14%...12% Sufficient”)  
Industry/USDA Workgroup – Stay Tuned (“Peace in the Valley”)

Crop Insurance Industry Income Statement (2012 Forecast, not including impact of drought)	
In Millions of Dollars	
Premium and Equity	
Gross Premium	10,417
Retained Premium after reinsurance and Quota Share	8,265
Equity	10,871
Revenue	
Underwriting Gain/Loss	1,033
Investment Income on Equity	353
A&O Payments	1,332
Expense	
Loss Adjustment and Company Overhead	(629)
Commissions and processing fees	(1,132)
Cost of borrowed funds due to delay in payment of A&O and Underwriting Gain	(42)
Income = Revenue – Expense	
Pretax Income	915
Federal Income Tax	(287)
After-tax Net Income	628
Rate of Return	
Return on Equity (ROE)	5.8%
Cost of Capital (Required Return on Equity)	12.7%

“Crop Insurance Rate of Return: Issues & Concerns”, Crop Insurance Today, August 2012, Vol. 45, No 3

Figure 1. The Financial Flows Underlying Crop Insurance for 2008



*Explaining the Costs of the Federal Crop Insurance Program*; Keith Collins, Ph.D., and Frank Schnapp;  
Crop Insurance Today; Feb. 2012

© NCIS 2012 [http://www.ag-risk.org/NCIS/PUBS/Today/2012/Feb\\_2012\\_TODAY.pdf](http://www.ag-risk.org/NCIS/PUBS/Today/2012/Feb_2012_TODAY.pdf)



**Table 2. Crop Insurance Program Outlays (million dollars)**

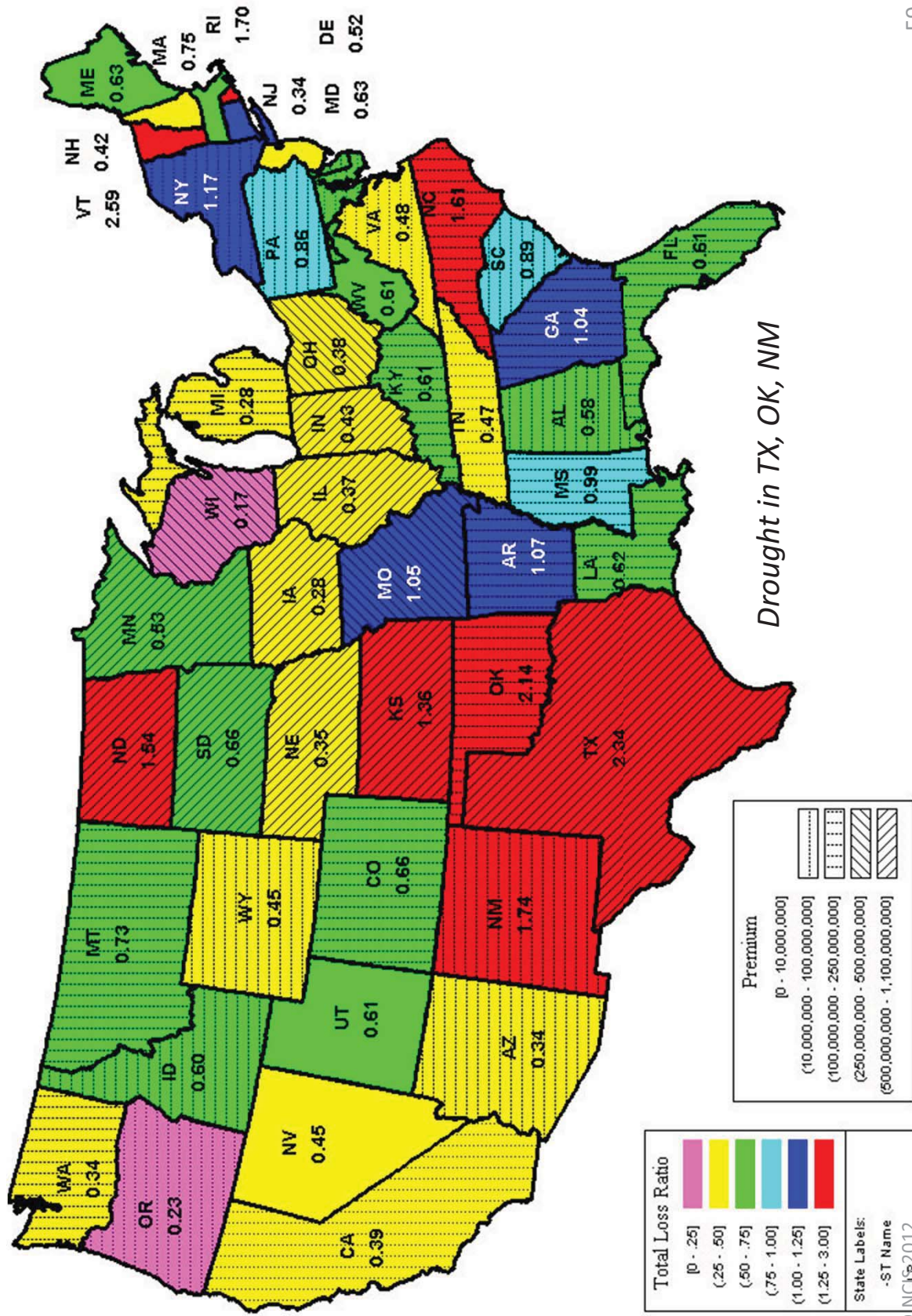
Year	Gross Premium (1)	Producer Share of Premium (2)	Gross Indemnities (3)	Loss Ratio (4)	UNDERWRITING GAINS		PRODUCER SUBSIDIES		AIP Actual A&O Expenses (10)	Program Outlays (8) + (9) - (7) (11)
					Gross (5)	AIP Share 1/ (6)	FCIC Share (7)	For Premium (8)		
2001	2,978	1,206	2,965	1.00	12	346	-334	1,772	816	2,741
2002	2,909	1,168	4,058	1.39	-1,149	-48	-1,101	1,741	826	3,470
2003	3,434	1,392	3,259	0.95	176	377	-201	2,042	900	2,980
2004	4,186	1,709	3,291	0.79	895	691	203	2,477	1,021	3,167
2005	3,945	1,601	2,341	0.59	1,604	915	689	2,344	990	2,488
2006	4,709	2,027	3,551	0.75	1,158	822	336	2,682	1,159	3,308
2007	6,547	2,724	3,465	0.53	3,082	1,572	1,510	3,823	1,565	3,648
2008	9,832	4,141	8,719	0.89	1,113	1,095	18	5,691	2,173	7,686
2009	8,949	3,522	5,216	0.58	3,733	2,298	1,435	5,427	2,130	5,611
2010	7,592	2,882	4,235	0.56	3,357	1,919	1,438	4,710	1,815	4,643
Total	55,081	22,372	41,100	0.75	13,981	9,987	3,993	32,709	13,394	39,742

- Government Outlays (column 11) =
  - Producer Premium Subsidies (8) + A&O (9) – FCIC UW Gains (7)
  - Net Indemnity ((3) – (2)) + AIP UW Gains (6) + A&O (9)
  - Gross Indemnity (3) – Gross Premium (1) + AIP UW Gains (6) + Producer Premium Subsidies (8) + A&O (9)

# 2011 Actual & 2012 Conditions

# 2011 MPCl Premium and Loss Ratios

## All Plans Combined

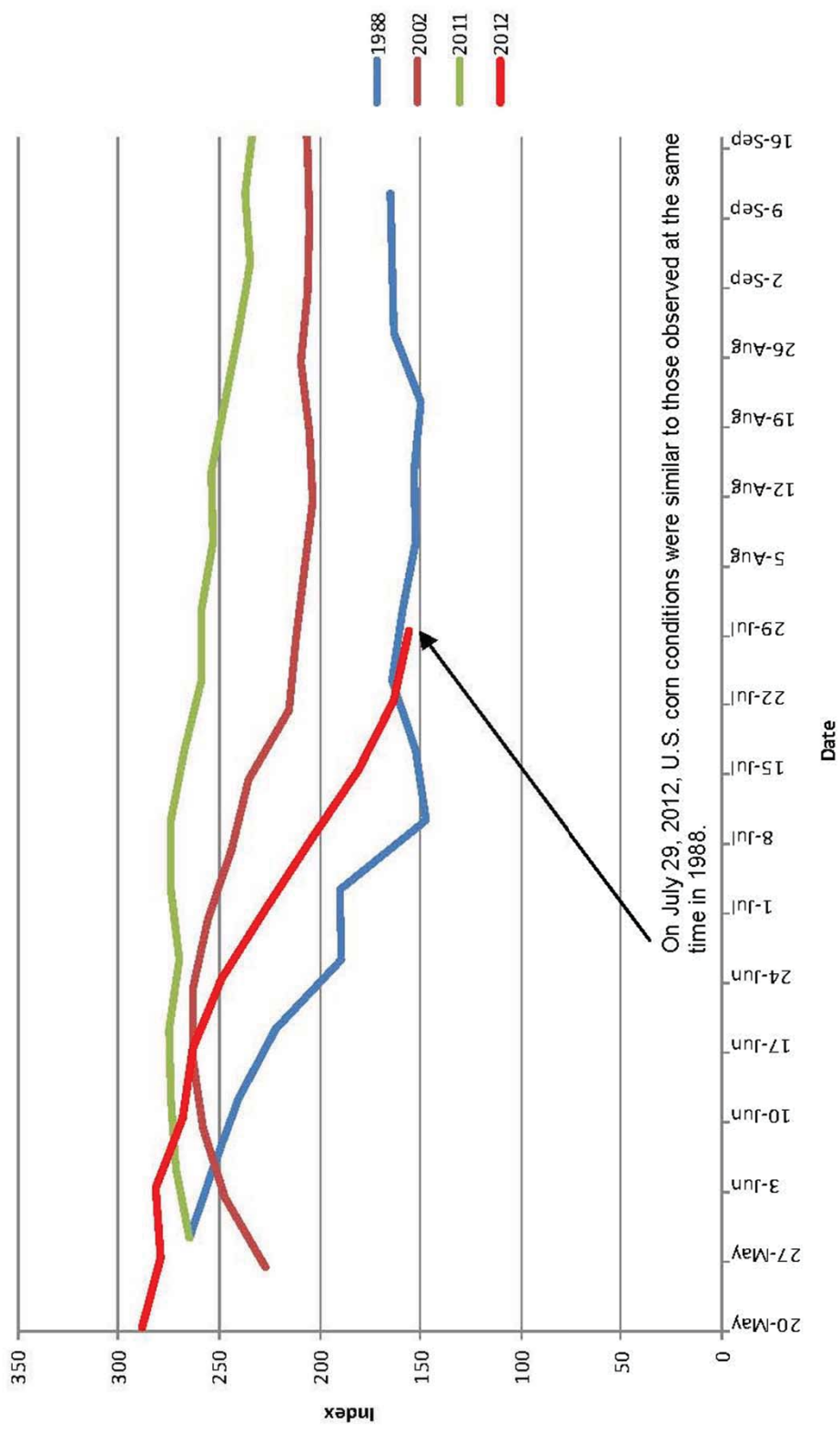


# 2012 Drought

- Affects Corn Belt and Great Plains
- Published estimates
  - Loss Ratios: 120% to 270%
  - Indemnities: \$13 to \$30 Billion
  - Gross U/W Loss: \$2 to 18 Billion
  - Industry U/W Loss: \$1 to 4 Billion

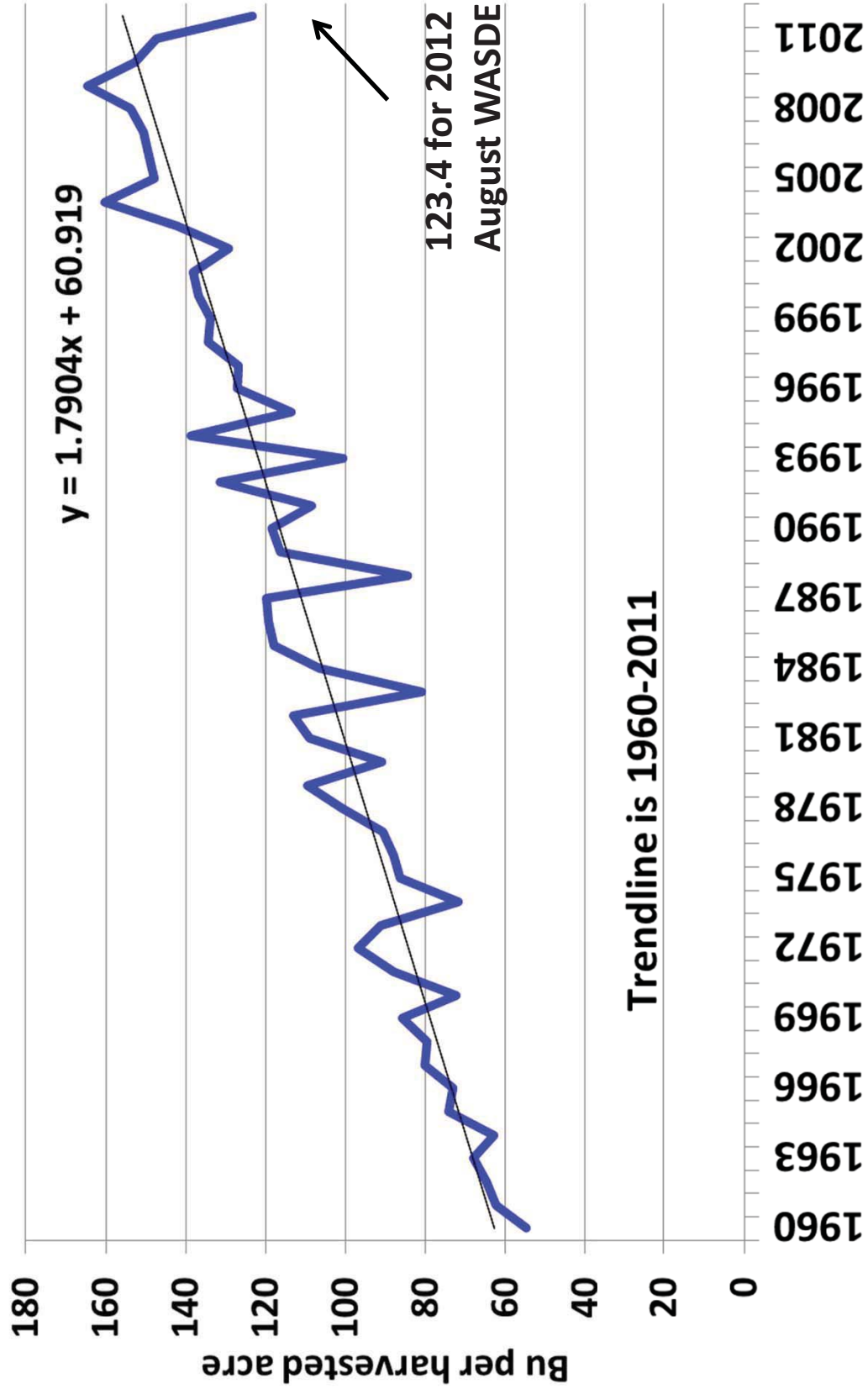


# U.S. CORN Condition Index

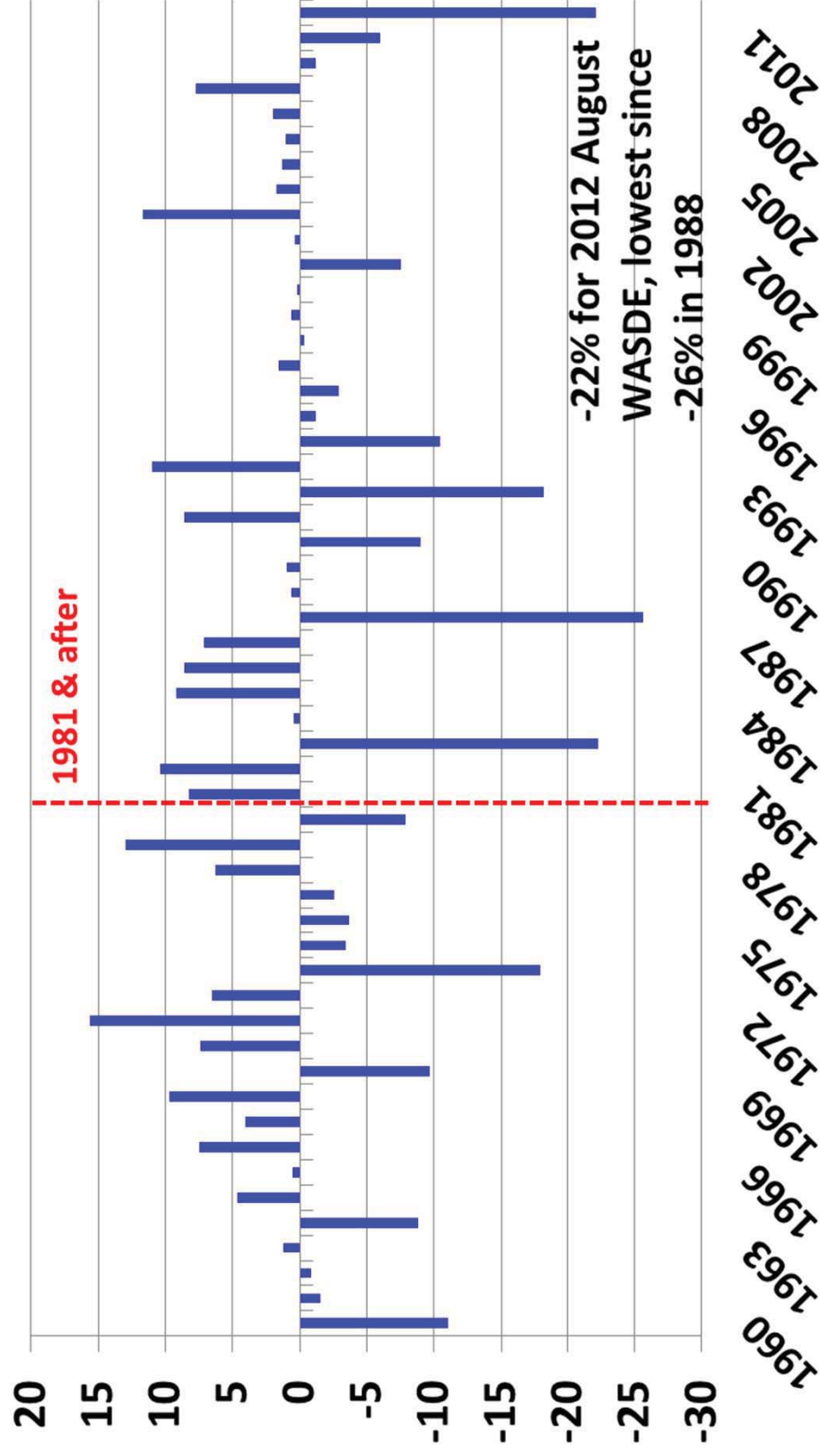


Based on NASS crop progress data. Index Weighting: Excellent = 4; Good = 3; Fair = 2; Poor = 1; Very Poor = 0

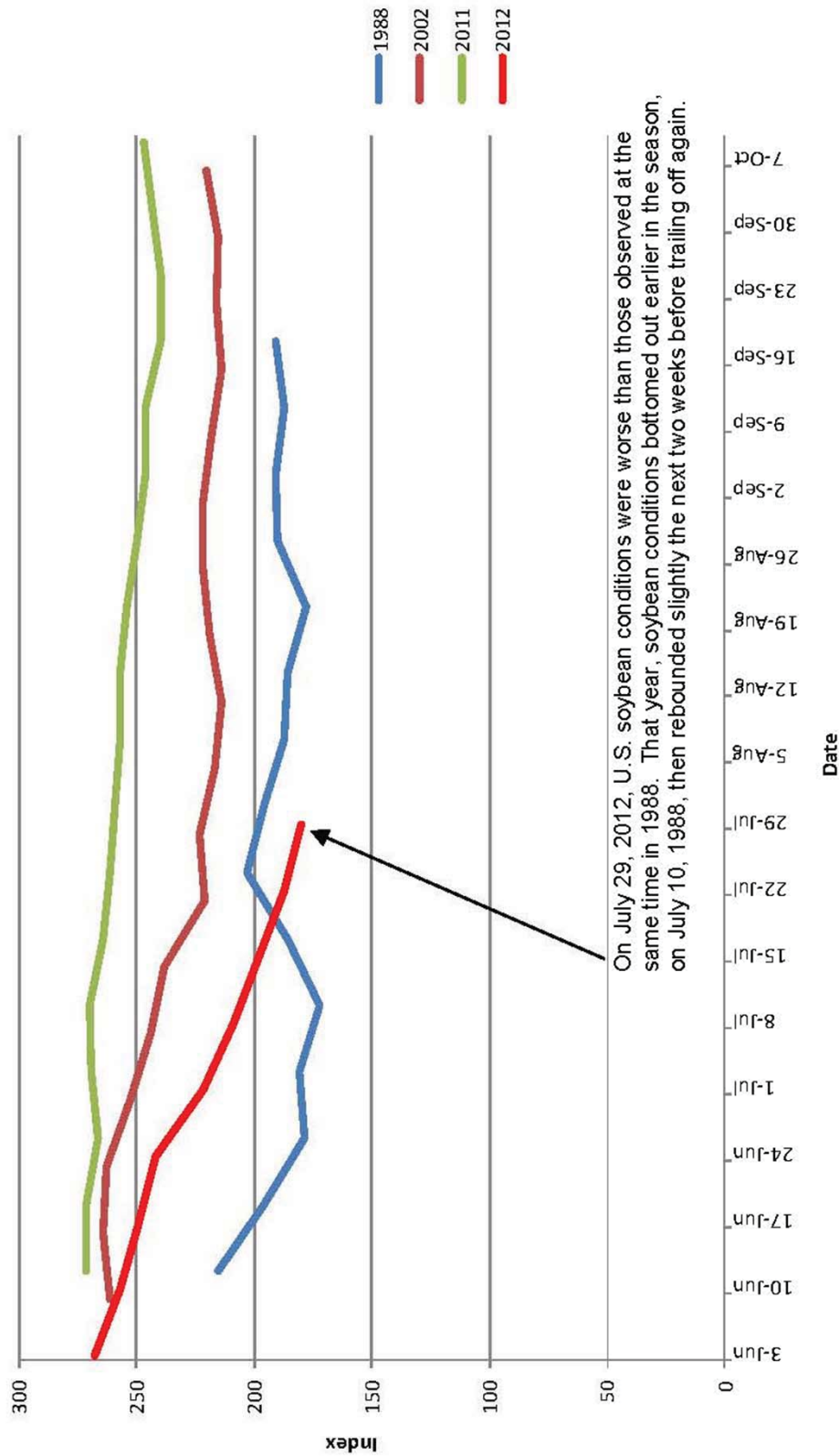
# Corn Yield per Harvested Acre



# Corn Yield Percent Deviation from Trend



# U.S. SOYBEAN Condition Index



On July 29, 2012, U.S. soybean conditions were worse than those observed at the same time in 1988. That year, soybean conditions bottomed out earlier in the season, on July 10, 1988, then rebounded slightly the next two weeks before trailing off again.

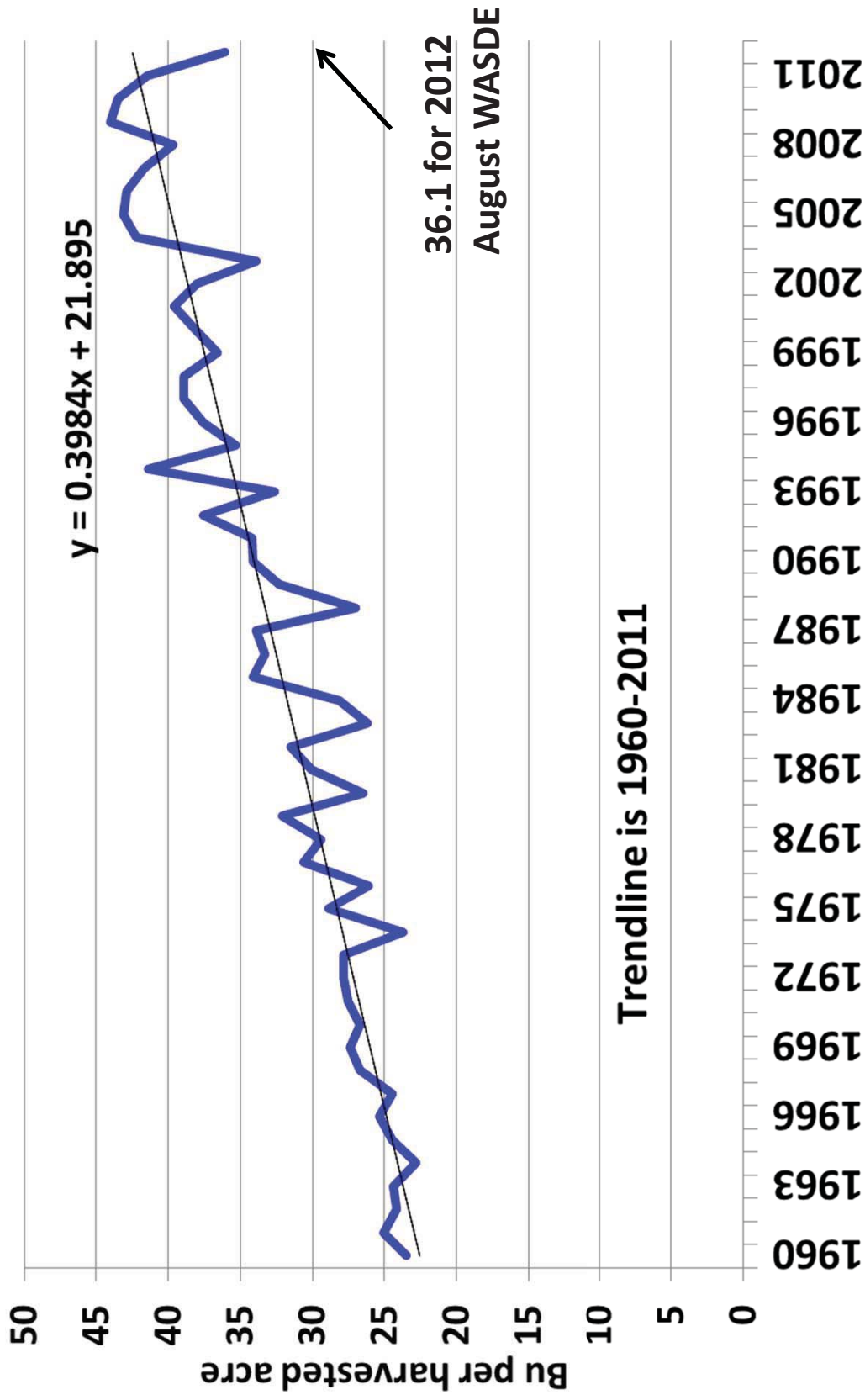
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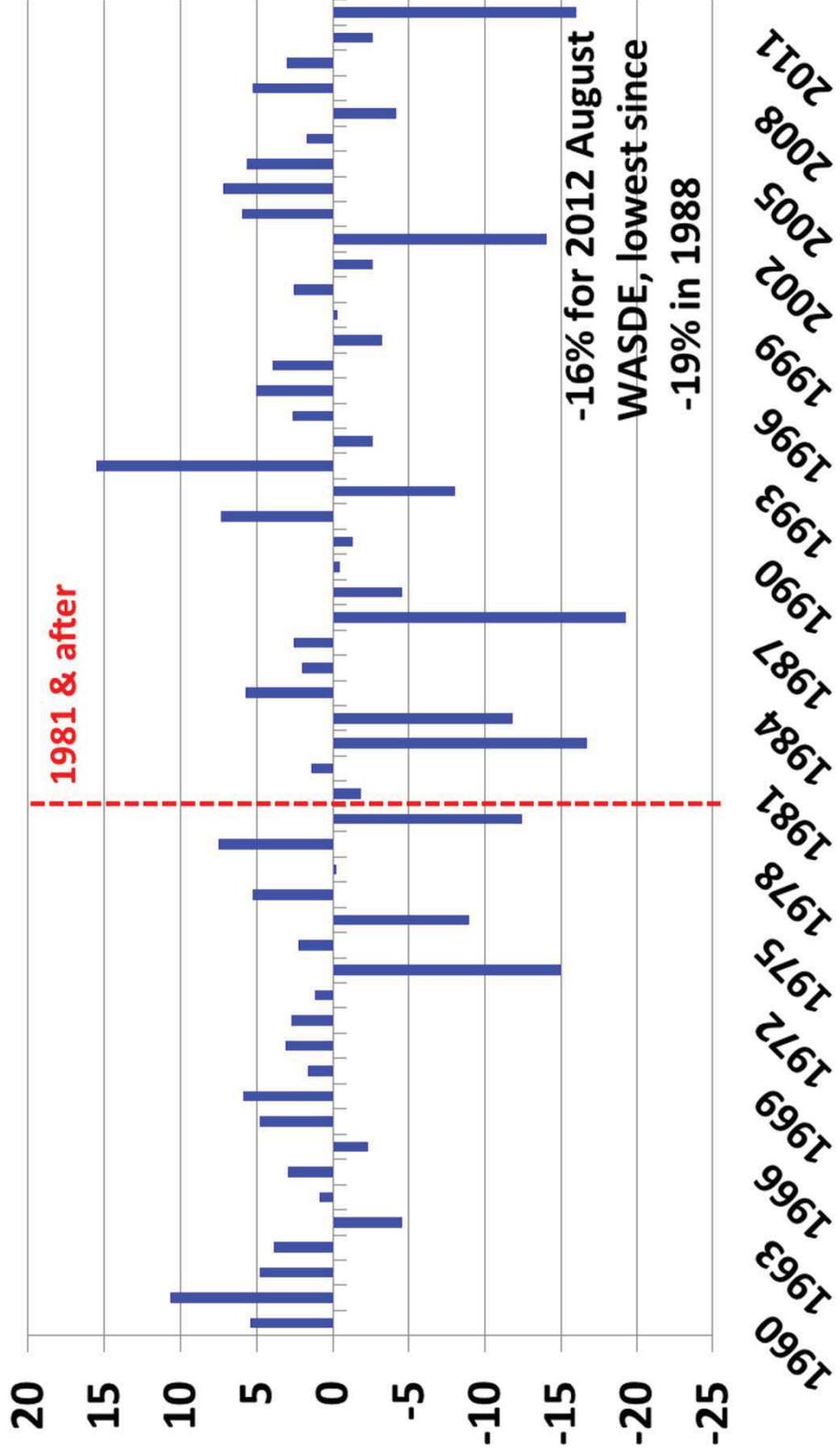
NOAA Weekly Weather and Crop Bulletin, July 31, 2012



# Soybean Yield per Harvested Acre



# Soybean Yield Percent Deviation from Trend



# Low Yield Years for Corn since 1981

- Years of 5% or more drop in yield from trend:

Year	Yield deviation from trend	Loss cost
1983	-22.3%	13.4%
1988	-25.6%	15.3%
1991	-9.0%	6.4%
1993	-18.1%	17.4%
1995	-10.4%	5.2%
2002	-7.5%	11.0%
2011	-6.0%	6.3%
2012	-22.1%	?

# Farm Bills

# The Crop Insurance Farm Bill Perspective

“Primum Non Nocere”

Or in the Latin

“First, Do No Harm”

## 2008 Farm Bill

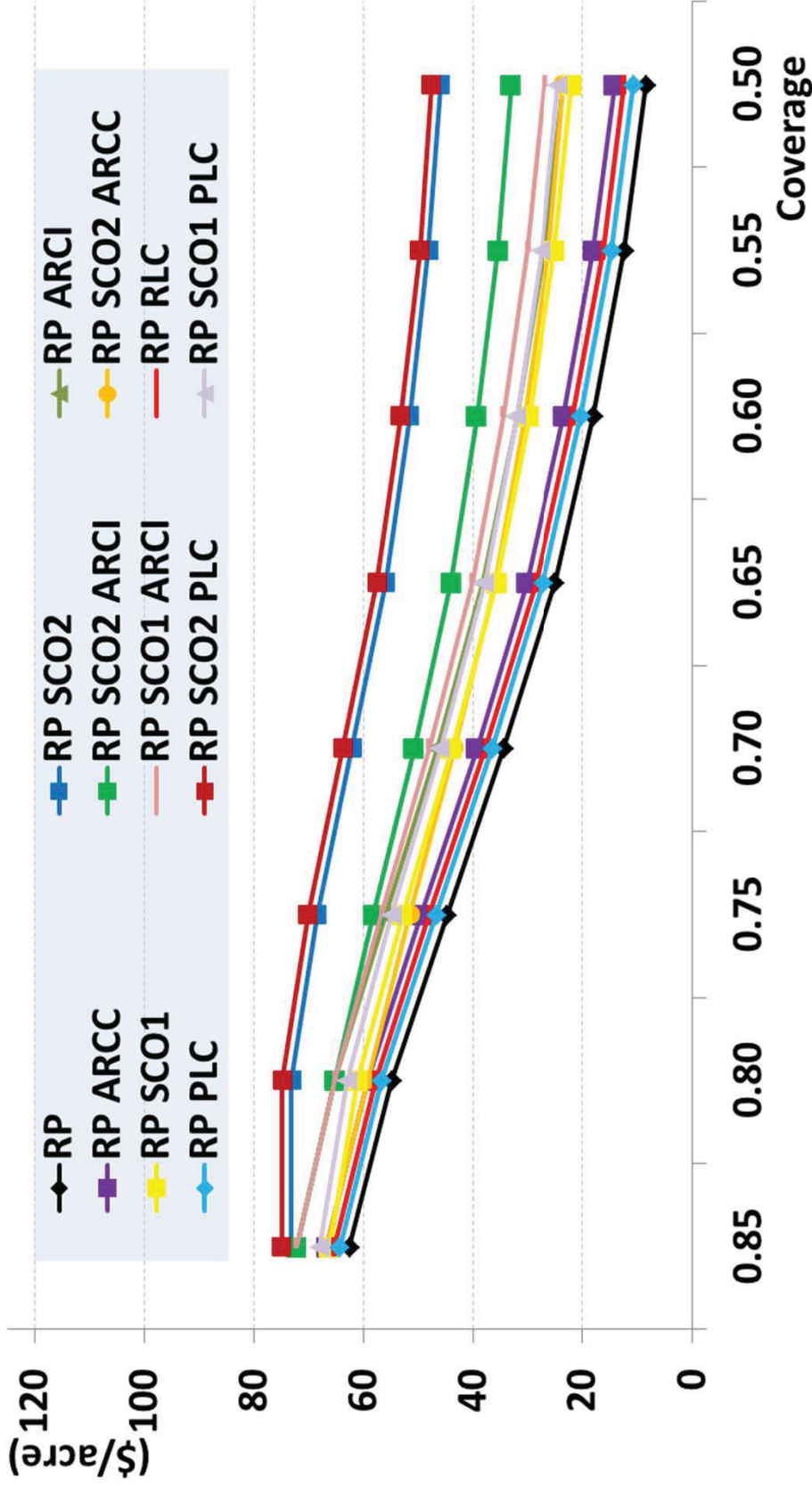
- A&O reduced 2.3 points
- Delays payments to companies
  - A&O delayed 3 months
  - U/W gains delayed 8 months
- Cash flow issues
- Achieved Budget savings of \$6 B over 10 years

# 2012 Farm Bill

- Final bill still in progress
  - Eliminates Direct Payments
    - \$4 B per year
  - Protects crop insurance
  - Makes farm programs more like crop insurance

# Value of 2012 Farm Bill Programs with RP in 2012\*

(CI: Optional Units Subsidy Rates, Simulated Fair Premium Rates ;  
 SCO: 70% Subsidy Rate, Simulated Fair Premium Rates)

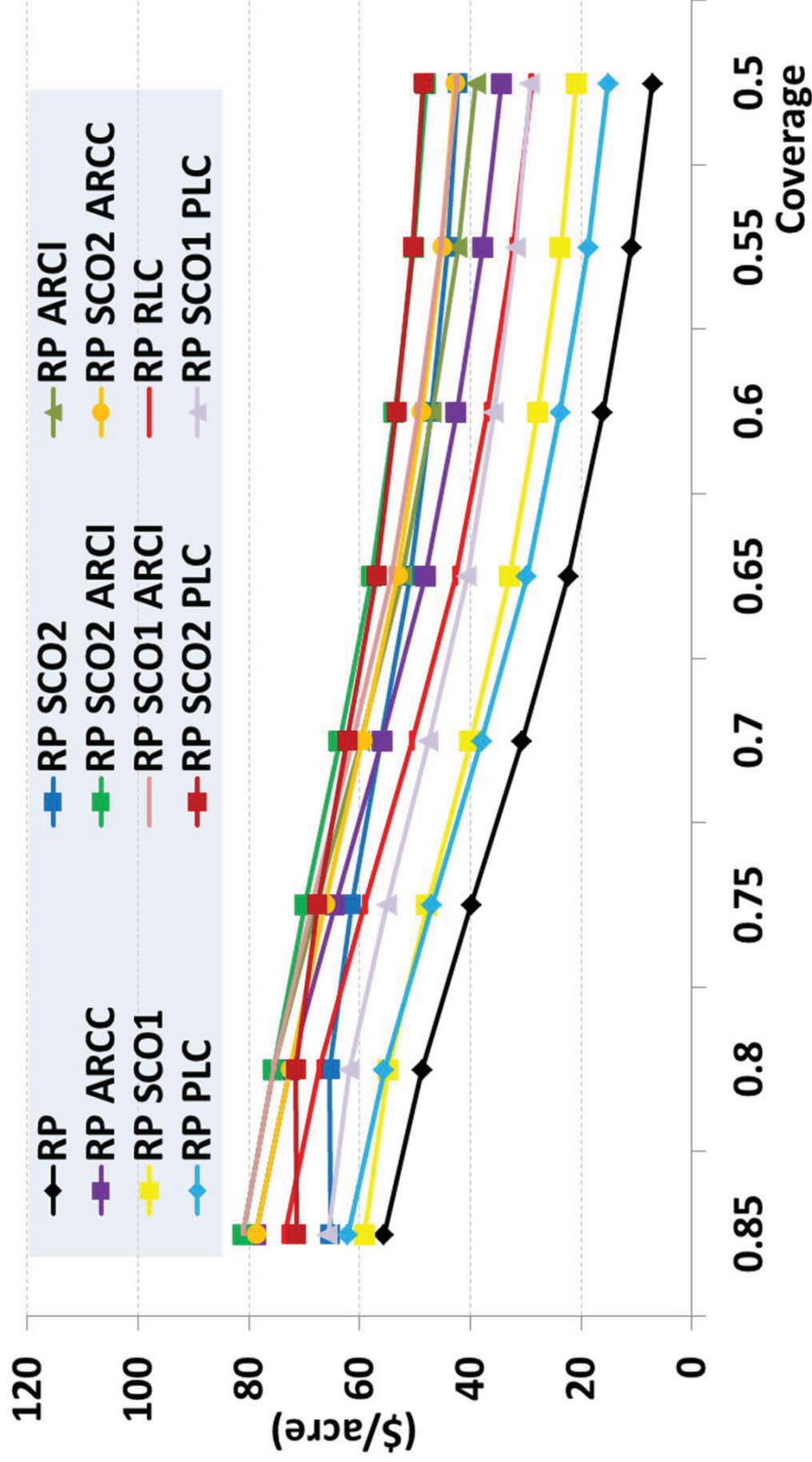


- For a representative corn farm in Champaign County, IL with 100 acres, Certainty Equivalent (CE) of wealth with the option minus CE of wealth without the option (no government support). The difference is divided by the number of acres. Notation: SCO1: SCO Yield Policy; SCO2: SCO Revenue Policy for RP; ARCI: ARC Indiv; ARCC: ARC County; RLC: Revenue Loss Coverage; PLC: Price Loss Coverage. Analysis as of 9/5/12



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 Notation: SCO1: SCO Yield Policy; SCO2: SCO Revenue Policy for RP; ARCI: ARC Indiv.; ARCC: ARC County; RLC: Revenue Loss Coverage; PLC: Price Loss Coverage. For the 2013 base insurance price \$5.063/bu is used (in line with the \$4.72/bu Marketing Year Average price assumption). Analysis as of 9/5/12.

# Why Crop Insurance is Now in a Position of Strength

- 1--Producers share program cost
- 2--Producers take personal responsibility for risk management
- 3--Producers get individual risk management solutions
- 4--Producers receive indemnities in the timeliest way
- 5--Program can be quickly adjusted and is self-correcting
- 6--Payments are not in excess of losses
- 7--Protection can be used as collateral for loans
- 8--Program enables pre-harvest marketing
- 9--Producers not subject to payment limits
- 10--Producers benefit from the efficiencies of private sector delivery
- 11--Crop insurance can be green box under the WTO and has flexibility to meet WTO support limits
- 12--Crop insurance has contributed to deficit reduction



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# National Crop Insurance Services

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