Overview

• The Production Plan Concept
• Performance of the Program
• Ratemaking Methodology
• Implications for Crop-Hail Data Reporting and FALC Estimation
The Production Plan Concept

Crop-Hail vs. MPCI Protection

- **Crop-Hail (CH)**
  - Covers all or most of a crop
- **MPCI (MP)**
  - Pays the portion of hail loss in excess of the MP deductible
- **Coverage may overlap**
  - Large hail losses can be paid under both policies
Companion Plan (CP)

- Caps loss at MP deductible
  - Any remaining loss is paid by MP policy
  - Pays small losses fully
  - Reduces overlap
  - Claims adjusted independently of MP
  - Reduces premium
    - Popular in high rate states
  - Per acre basis

Some Overlap Still Exists

- Arising from use of hail loss adjustment charts
  - Represents average yield loss due to hail
  - Actual yield loss will differ for each claim

- Crop may recover from hail damage
  - Under favorable growing conditions
  - May compensate for loss due to hail
Example of Overcompensation

- CP policy
  - Hail damage of 23% = 23 bushels
  - Indemnity = 23 bushels

- MP policy
  - Guarantee = 75 bushels
  - Production to count = 90 bushels
  - Actual loss = 10 bushels
  - No MP indemnity

- Indemnity exceeds actual loss
  - Payment exceeds loss by 13 bushels

Production Plan (PP) Policy

- Similar to Companion Plan
- Covers losses within the MP deductible
  - Limit of insurance = MP deductible
  - Direct coordination of benefits with MP policy
    - Pays smaller of hail loss and MP loss
      - Accounts for ability of crop to recover
    - Caps larger losses at the MP deductible
      - Any remaining hail loss is paid under MP policy
    - Provides coverage on a unit basis
  - In prior example, PP would pay only 10 bushels
  - Lower premium than CP with similar protection
APH Modifier Feature

- Increases the amount of PP hail protection
  - Yields tend to increase over time
  - APH may understate producer’s expected yield
  - Allow mods up to 1.20
- Hail Guarantee = APH x Selected Modifier
- Total Liability = Hail Guarantee x Acres x Price
- PP Amount of Insurance
  - Difference between Total Liability and MP Liability
  - Increases as Mod rises

**APH Modifier Feature**

**PP Amount of Insurance Increases as Mod Rises**

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Adjusting PP Losses

• Complicated
• NCIS Loss Adjustment procedure:
  – Determine the hail damage in bushels
    • Hail Guarantee x Damage %
  – Compute the MP loss of production in bushels
    • Hail Guarantee – Production to Count
  – Use smaller of Hail Loss and Production Loss
  – Convert to dollars at the base price
  – Apply the minimum loss %
  – Cap indemnity at the PP Limit of Insurance

Hail and Production Loss vs. APH Mod

• Hail loss increases slowly as Mod rises (at 30% of Guar)
• Production loss increases rapidly (at 100% of Guar)
• PP pays the smaller amount ➔ usually the Hail loss
  – At high mod, PP is like CP coverage with high $ Ins per Acre
Program Performance

Production Plan Market Share

Liability: 2005 to 2011
NCIS Involvement

• Industry asked NCIS to file Production Plan
  – Standardized policy language
  – Rating factors
• NCIS Production Plan Filings
  – 2012
    • IA, MN, NE, KS, ND, SD
    • Corn, soybeans, wheat
    • Coverage levels: 50% - 85%
    • Modifiers: 1.00, 1.05, 1.10, 1.15, 1.20
  – 2013
    • CO (Corn, Wheat, Potatoes)
    • ID (Barley, Wheat, Potatoes)
Ratemaking Methodology

Production Plan Ratemaking Issues

• Historical data isn’t usable
  – Too few years of data
  – Data is subdivided into various options
    • Coverage Level
    • APH Mod
  – Wide variety of company coverages
    • Deductibles
    • Minimum Loss Percentages
    • Indemnification provisions (e.g., Basic, XS10IP)
  – Concerns about accuracy in adjusting claims
  – Inability to restate all plans on common basis
Selected Ratemaking Methodology

- **Simulation Method**
  - Recompute indemnities for individual claims
    - Under each Production Plan option
  - “Monte Carlo” approach
    - If we know how the components behave
    - Combine the components to estimate the whole
    - Assumes we know how the components interact
  - Ensures consistency between rates at various Coverage Levels and Mods
  - Less certainty that the overall rates will be accurate
    - But, the Companion Plan policy form factors can be used as a test of reasonableness
Simulating Indemnities

- Hail damage %
  - Use NCIS hail severity distribution
- Producer’s yield loss %
  - Use producer yield distribution implied by MP rate
- Givens:
  - Coverage level
  - APH modifier
  - Minimum loss (5%)
  - PP Limit of Insurance
- Size of unit needs to be considered

Hail Severity Distribution

- Choices:
  - Actual hail losses under Basic form (selected PP method)
  - Fitted distribution based on all reported claims (used to develop policy form factors for all but Production Plan)

![Sample Hail Severity Distribution](image)
Producer Yield Distribution

- Find the average base rate for the state
- Adopt the censored normal yield distribution
  - Used in Combo policy rating
- Determine the specific yield distribution that matches the rate

Harvested Yield Distribution
Censored Normal with APH = 100
The distribution corresponds to a specific rate
Simulate Production Plan Indemnities

• For each hail claim:
  – Determine the hail damage %
  – Determine the % of acres damaged by hail
    • Accounts for differences in insured acres
    • Used to include the effect of unit size
  – Select the percentage yield departure
    • From the producer yield distribution
    • Apply separately to damaged and undamaged acres
  – Calculate the indemnity
    • Repeat process for randomly selected yield departures

• Repeat for each coverage level and APH Mod

Production Plan Policy Form Factors

• Find average indemnity over all claims
  – PP vs. Basic form

• Policy Form Factor =
  – PP Indemnity / Basic Indemnity
  – PP is by Coverage Level and APH Mod

• Compare to Companion Plan policy form factors
  – Coverage Levels 50, 65, 75
  – PP APH Mod = 1.00
Smoothing the Final Factors

• Want consistent rates across Coverage Levels and Mods
• Decompose losses into layers by Mod
  – 100-105%, 105-110%, 110-115%, 115-120%
  – Cost of each layer should be less than prior layer
• Smooth and recombine
• Applied to ND, SD, KS, CO, and ID
  – Will apply to MN, IA, NE in next review

Rating Formulas
Excludes Company Loading for Expense & Profit

• Crop-Hail:
  Liability x FALC x Policy Form Factor

• Companion Plan:
  CP Liability x FALC x Policy Form Factor
  x Increasing Payment Factor (2, 3, or 4)

• Production Plan
  PP Liability x FALC x Policy Form Factor
  APH Modifier – Coverage Level
Implications for Crop-Hail Data Reporting and Ratemaking

Big Problem

- PP data can’t be used for CH ratemaking
  - NCIS restates each claim to a common level
    - Usually, Basic form
    - Example for claim under XS10 form
      - Add the 10% deductible to the paid loss
  - But PP loss is smaller of hail and production loss
    - We don’t know what the hail loss is
    - Unable to restate it as if it were written on Basic form
  - We’ve ignored the problem till recently
    - PP volume of business was small
    - But volume has grown rapidly – up to 50% of exposure
  - Endangers ability to set CH FALCs in the future
Solution – Starting with 2012 Cropyear

• Require companies to report PP policy data in much greater detail
  — Report PP and CH statistics for each PP policy
  — Basic form liability
  — Actual Hail damages in $
    • Prior to deductibles & other indemnification provisions
  — Data must then pass NCIS edits

• The underlying CH data can be used in our usual FALC estimation procedure

• May be able to use PP data in developing rating factors for PP

End of Presentation