Insurance Purchase Decision: With a Focus on Cherries

Roy Black

Agriculture, Food and Resource Economics

Michigan State University

Starting Point: What Are a Grower's Risk Management Choices?

1. Farm accepts the risk exposure; no reason to modify vision and plans.
2. Farm structures production and marketing schemes and enterprise diversification to mitigate risk exposure
3. Farm uses contracts, such as insurance, to transfer a portion of the risk to another entity
4. Combinations of (2) and (3)

Examples:

- Accept risk exposure:
  - Adequate equity and equity liquidity on Financial Balance Sheet has to handle a bad event should it occur.
  - And, not materially interrupt future business prospects.

Examples:

- **Manage risk exposure:**
  - Example 1: Invest in irrigation of corn in SW MI: Increase average yield and profitability and reduce revenue variability by mitigating moisture shortfalls .
  - Example 2: Enterprise diversification
    - Correlation between corn and wheat revenue in MI is 0.2 to 0.3. Rotation offers good potential to reduce revenue risk.
    - Correlations among apple, tart cherry and sweet cherry revenues are low in non-disaster event years; but, tend to be very high in disaster years.

- Transfer: (Insurance examples)
  - Impact of crop insurance on dryland wheat growers in Eastern Montana (total precipitation ranges from 6” to 15”) capacity to grow.
  - Red River Valley sugar beet grower
  - Michigan potato growers with Frido contracts

Grower Crop Insurance Focus Groups:

- Coverage too low
- Contract design does not adequately match risks I face: key risks not adequately covered
- Premium too high for coverage and risks not covered
- Contract and underwriting are too complicated

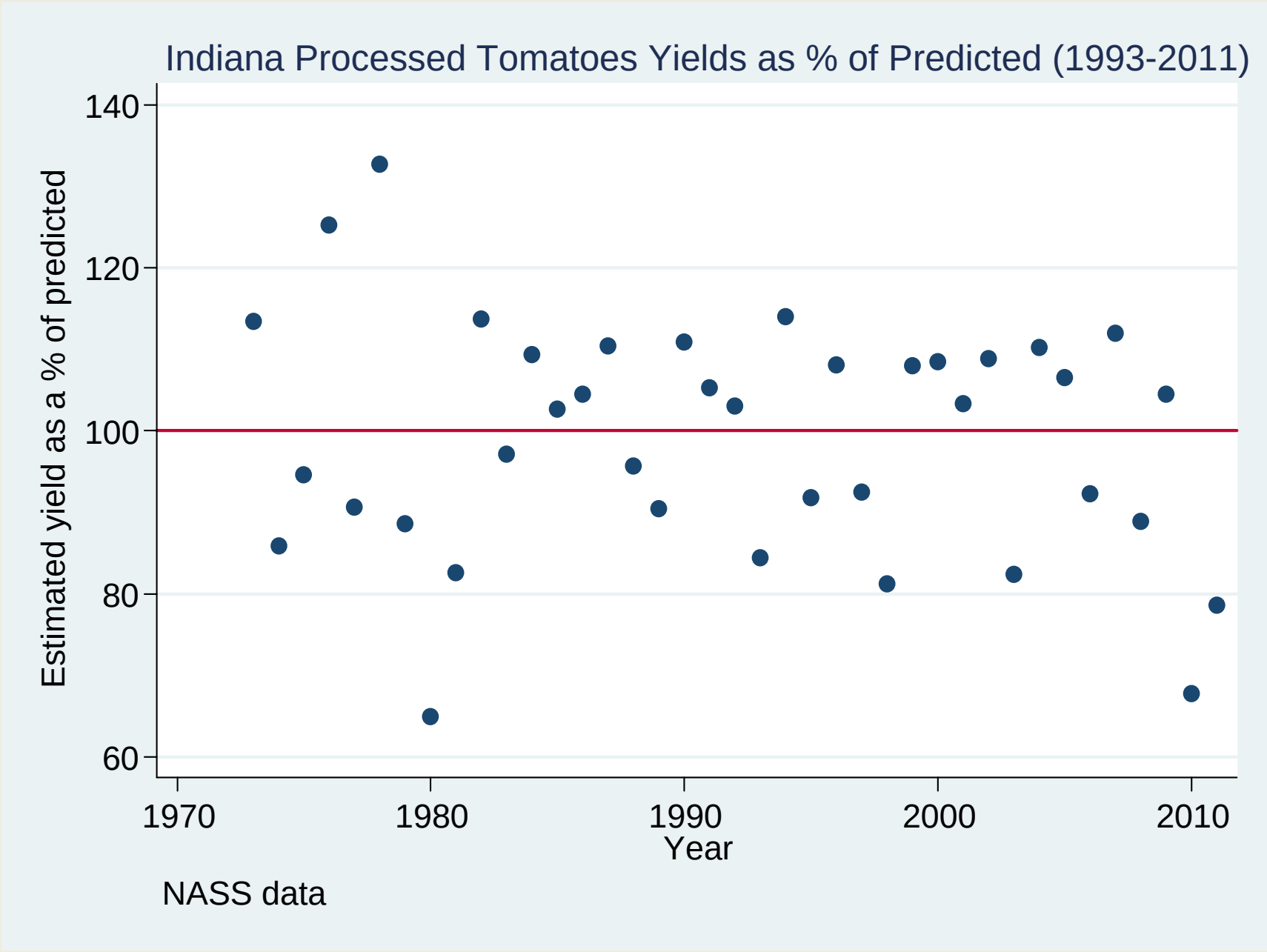
Forming Judgments:

- Risk assessment
- Capacity to bear risk
- Willingness to bear risk
- Net Cost of risk mitigation and transfer

Are Farmers better risk “assessors” than managers in other sectors and consumers?

An Experiment in Evaluating Farmers Skill in Assessing and Pricing "Risk"

- Sample and tasks
  - Sample: Corn Belt farms raising corn with long corn yield records (25 to 30 years)
  - Task 1: Generate trend adjusted mean yield.
  - Task 2: Generate frequency distribution of yield as a percent of trend yield.


Indiana Processed Tomatoes Yields as % of Predicted (1993-2011)
Estimated yield as a % of predicted
140
120
100
80
60
1970
1980
1990
2000
2010
Year
NASS data

An Experiment in Evaluating Farmers Skill in Assessing and Pricing "Risk"

- Tasks
  - Task 3: Calculate 'current' trend yield and the relative frequency of alternative yields (volatility)
  - Task 4: Calculate the "price" of the insurance contract to transfer the observed yield risk using standard models for a specified deductible.
  - Task 5: Elicit growers estimate of current 'expected yield' and of the relative frequency of alternative yields.
  - Task 6: Calculate the "price" of the insurance contract to transfer the elicited yield risk using standard models for a specified deductible.
  - Task 7: Compare "let the data speak" vs. "let the grower speak" results

Results:

- Farm operator's judgments were similar to those farm in other businesses.

Results

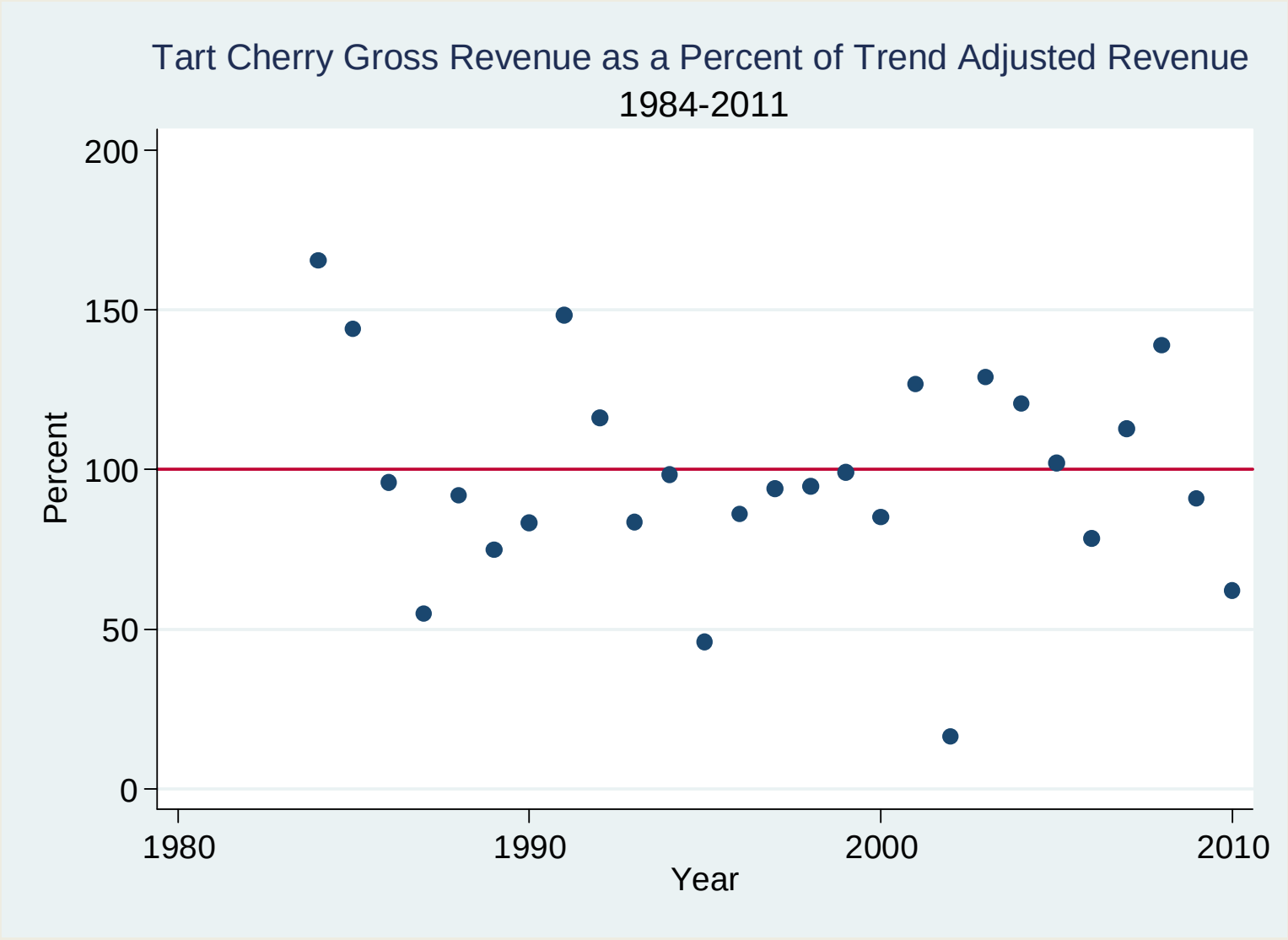
1. Growers overestimated their current ‘trend’ yield
2. Growers underestimated their yield variability/volatility
3. The calculated insurance premium based on grower assessments was ½ what the grower’s data suggested.

What Do We Know About Tart Cherry Yield and Gross Revenue Volatility?

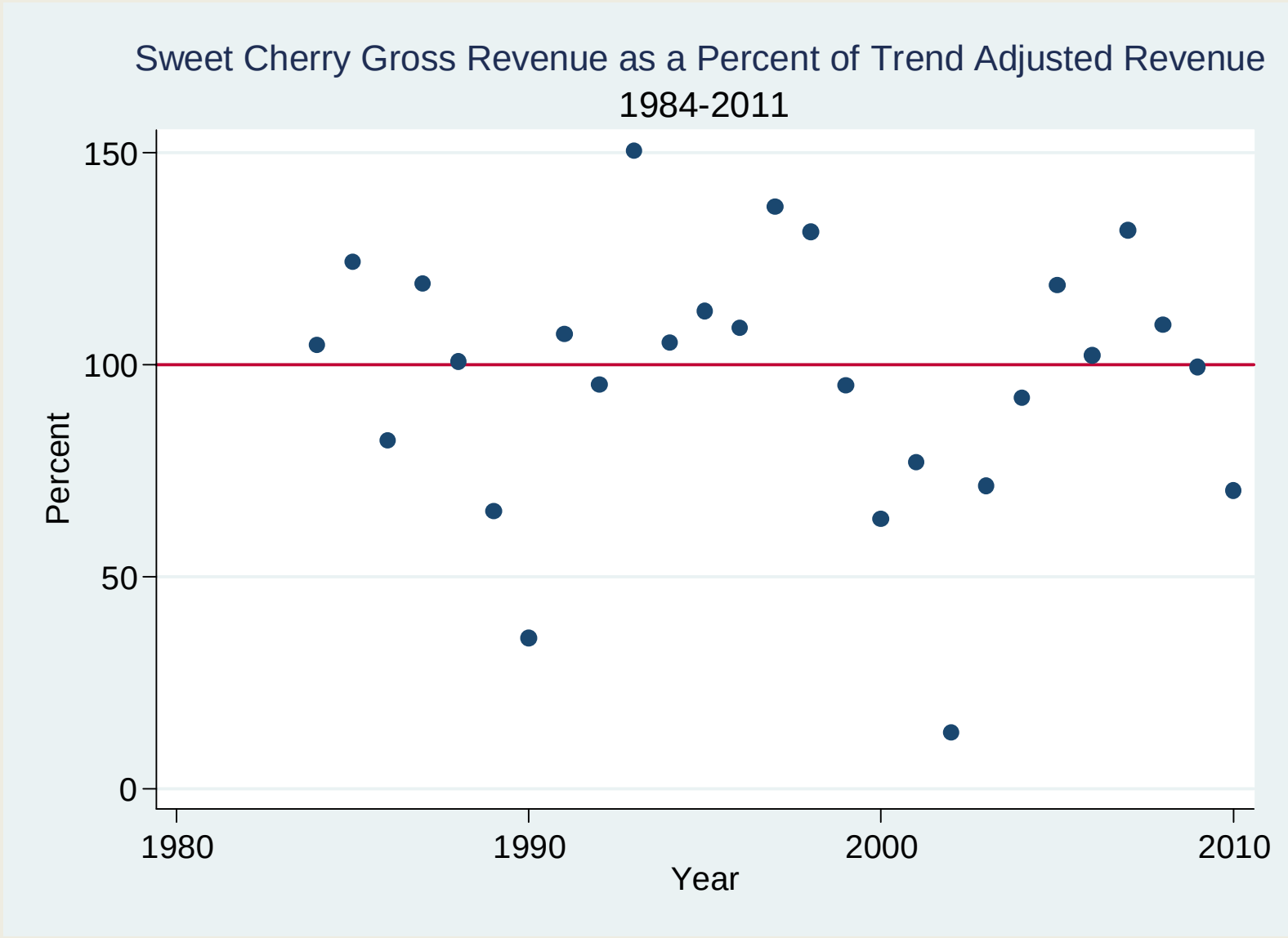
1. Site characteristics, location, and management matter
2. In NW Michigan, market price and farm yield are meaningfully negatively correlated. Thus, gross revenue is much less volatile than either market price or yield volatility.

What Are We Less Certain About?

Growers, other members of the value chain, and potential insurers are struggling to assess whether the frequency and severity of adverse events is increasing and, if so, how much.


Tart Cherry Gross Revenue as a Percent of Trend Adjusted Revenue
1984-2011
200
150
100
50
0
Percent
1980
1990
2000
2010
Year

How Does The Variability in Tart Cherry Revenue Compare to the Variability in Sweet Cherry Revenue?


Sweet Cherry Gross Revenue as a Percent of Trend Adjusted Revenue
1984-2011
150
100
50
0
Percent
1980
1990
2000
2010
Year

Capacity to Bear Risk

- Balance sheet equity as percent of assets (Green, Yellow, and Red metrics)
- Balance sheet equity liquidity
- Loan repayment capacity
- Impact of revenue shortfalls on ability to facilitate and maintain business plans

Crop Insurance as a Risk Transfer Tool: USDA/RMA Facilitated Contract Designs

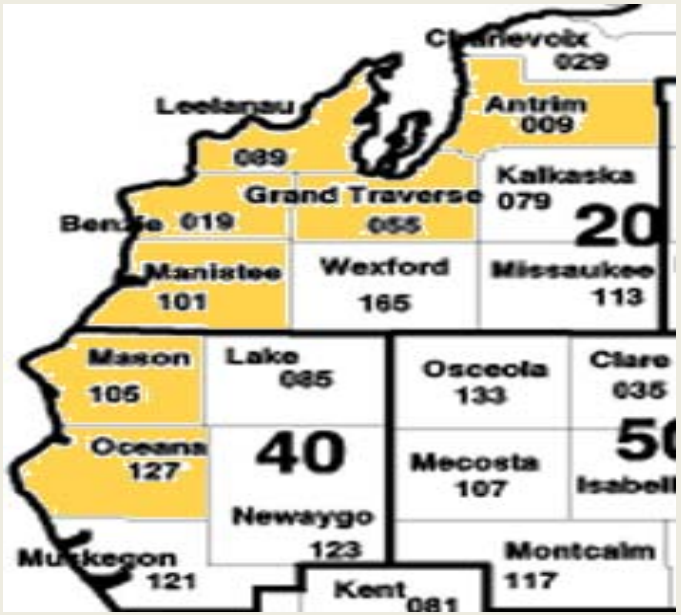
- **Yield**
  - Examples: apples; pears; corn (yield option)
- **Gross revenue**
  - Crops with futures and options on futures markets:
    - Examples: Corn, soybeans, wheat (revenue options)
  - Selected specialty crops (ARH: Actual revenue history)
    - Examples: Sweet cherries, navel oranges, dry peas

Crop Insurance Contract Contrast

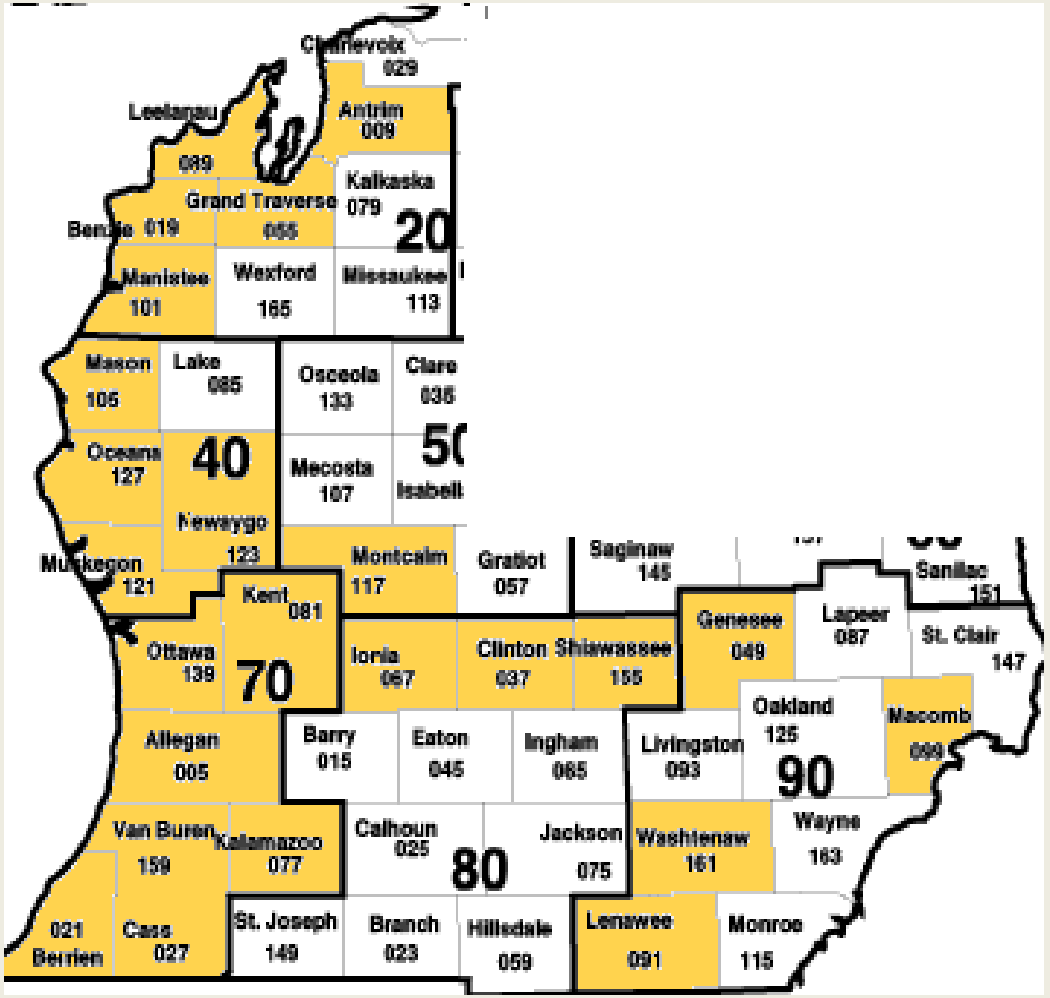
- **Yield Contract**
  - Historical yield is used to establish “insurance” yield (four to 10 years)
  - Guarantee = insurance yield × coverage
  - Loss = greater of (Guarantee – yield, 0)
  - Indemnity = loss × insurance price set by RMA
- **ARH Gross Revenue Contract**
  - Historical gross revenue is used to establish “insurance” gross revenue (five years)
  - Guarantee = insurance gross revenue × coverage
  - Indemnity = max(Guarantee – gross revenue, 0)

Participating Michigan Counties

- Sweet cherry pilot



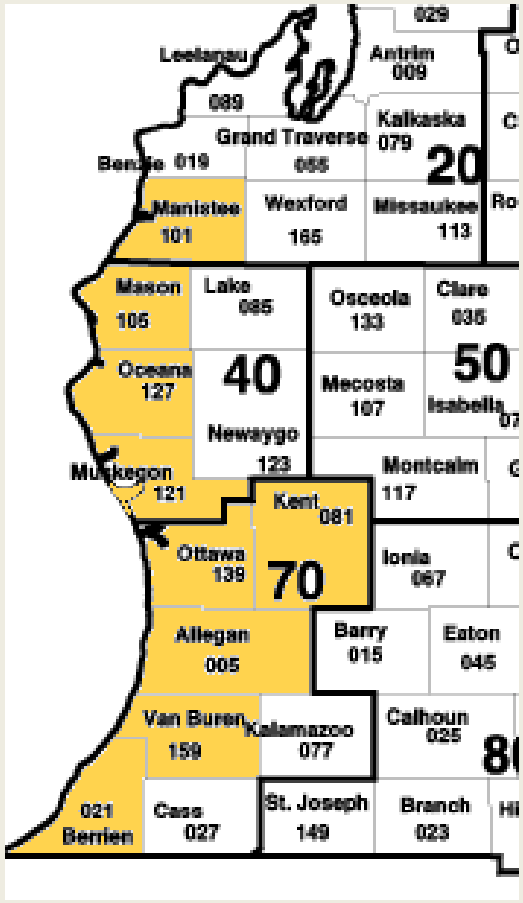
- Apples



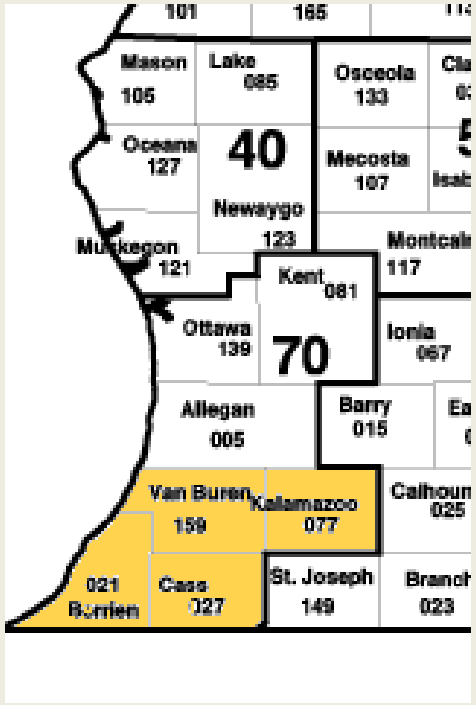
About ½ of the eligible sweet cherry acreage was insured under RMA pilot policy in 2012.

Participating Michigan Counties

- Peaches



- Grapes



Tart Cherry Example: "Potential" Contract for 2014

- What is the insurance unit that will be used to calculate the "insurance" gross revenue, actual revenue for insured year?
- What are the minimum yield requirements for participation?
- How is a year like 2012 treated in the calculation of historical average revenue? Is there a replacement yield that can be used when extreme events occur so as to not distort the average?
- How are quality of crop issues handled?
- Diversion?

Tart Cherry Example: "Potential" Contract for 2014

- What are coverage choices are available?
  - 55%, 60%, 65%, 70%, and 75% of historical gross revenue
  - "Plug" revenues probable for 2012
  - Impact on USDA/NAP yield contract availability. Since tart cherry will be a pilot, if it is introduced, NAP 50% coverage with losses indemnified at 55% of "market" price will continue to be available.

Cherry Policy Design

- **ARH** – Revenue based, not yield based, as in apples, pears, etc.
- **Challenge:**
  - Revenue polices dominate corn, soybean, and wheat RMA facilitated crop insurance.
  - The grain crops are built around the futures market for establishing the price used and options on futures for estimating price risk.
  - ARH contract design uses historical gross revenue as a basis for calculating guarantee.

Example: Suppose Tart Cherry Insurance Had Been Available in 2012

- "Insurance" Gross Revenue
  - Based on previous five years
  - Must meet minimum required yield to qualify
- Coverage choices
  - Revenue guarantee @ 55%, 60%, 65%, or 75% of insurance yield

Establishing “Insurance” Yield: Example

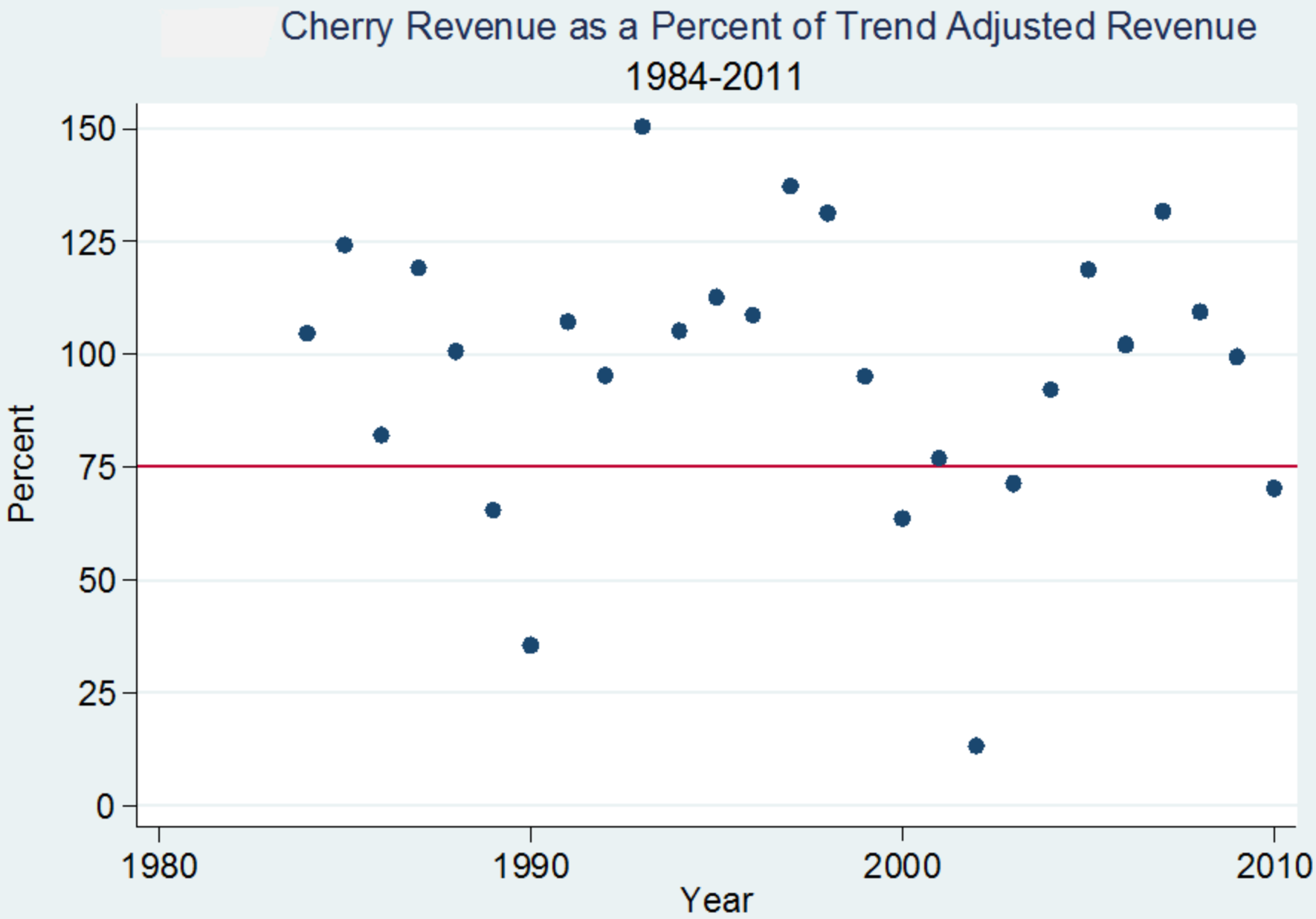
Year	Yield (lbs/acre)	Price ($/lb)	Gross Revenue ($/acre)
2007	7,510	$0.264	$1,983
2008	6,370	$0.382	$2,433
2009	10,230	$0.157	$1,606
2010	5,150	$0.212	$1.092
2011	10,200	$0.301	$3,070
		Average	$2,037

Calculating Indemnity

- Suppose 75% coverage has been chosen
  - Insurance revenue = $2,037 / acre
  - Revenue guarantee = $2,037 × 0.75 = $1,528
- **Realized revenue in 2012: $0.00 / acre**
- **Indemnity**
  - Greater of ($1,528 - $0.00, 0) = $1,528 /acre
  - 2002 and 2012 were “worst case” scenarios
  - In 2012, there was typically no harvest. In all likelihood, the variable cost of what harvest would have been based on the historical average yield would have been will be subtracted from the indemnity payment.

What Is the "Price" of the Risk Transfer?

- Suppose the "farmer pay" premium were 7% of liability?
- Liability is equal to a 100% loss.
- Premium = $1,528 × 0.07 = $107 /acre
- Pay $107 every year to cover shortfalls that occur, on the average, ?? percent of the time including (hopefully) rare but catastrophic events.


Cherry Revenue as a Percent of Trend Adjusted Revenue
1984-2011
Percent
150
125
100
75
50
25
0
1980
1990
2000
2010
Year

Deadlines for Federally Facilitated Insurance

- Perennials, fall seeding (winter wheat)
  - Have fall deadlines for signing (late November)
- Spring crops (annuals, spring seeded)
  - March 15 deadline