CROP INSURANCE AND AD HOC DISASTER ASSISTANCE

AGEC 421 Class Lecture

April 18, 2012

Eric J. Belasco

Objectives of this Lecture

- Discuss agricultural risk management programs
- Overview of crop insurance (1938 Act through 2000 ARPA)
- Discuss recent history of ad hoc disaster relief payments

Federal Crop Insurance

- Private insurance available in U.S. since 1797 (usually single-peril)
- Federal crop insurance program introduced in 1938
- Editorials of the day:
  - *Christian Science Monitor*: *"Will the program become, in effect, an underwriting of high-risk farming areas which, in fact, ought to be retired from farming . . . instead of burdening steadier farms with cutthroat competition in good years and a demand on them for assistance in bad years?"*
  - *Barron's*: *"[don't let it become] . . . a subsidy to the politically important agricultural industry."*

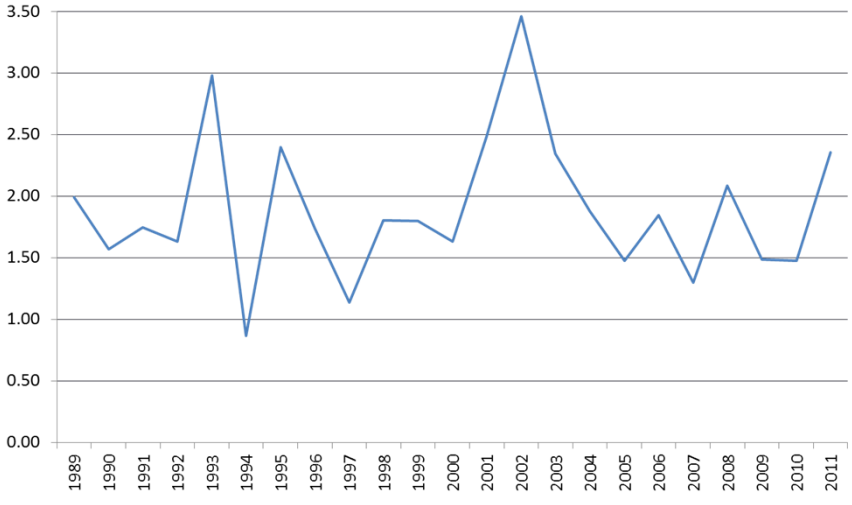
Agricultural Adjustment Act of 1938

"It is the purpose of this title to promote the national welfare by improving the economic stability of agriculture through a sound system of crop insurance and providing the means for research and experience helpful in driving and establishing such insurance."

U.S. Crop Insurance Today

- Significantly expanded by 1994 CIRA and 2000 ARPA legislation
- Each $1 paid by average farmer returns more than $1 in indemnities every year except 1994
- Does not necessarily imply inaccurate rates (average subsidies 50-60% of premium)
- Subsidies also paid to companies to market and service program (estimated at 20-25% of total net premium)

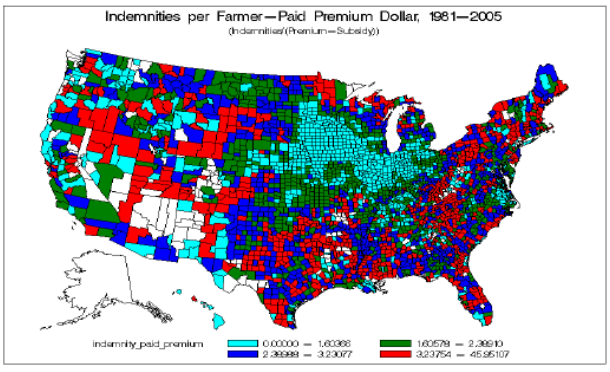
Farmer's Loss Ratio: All Commodities



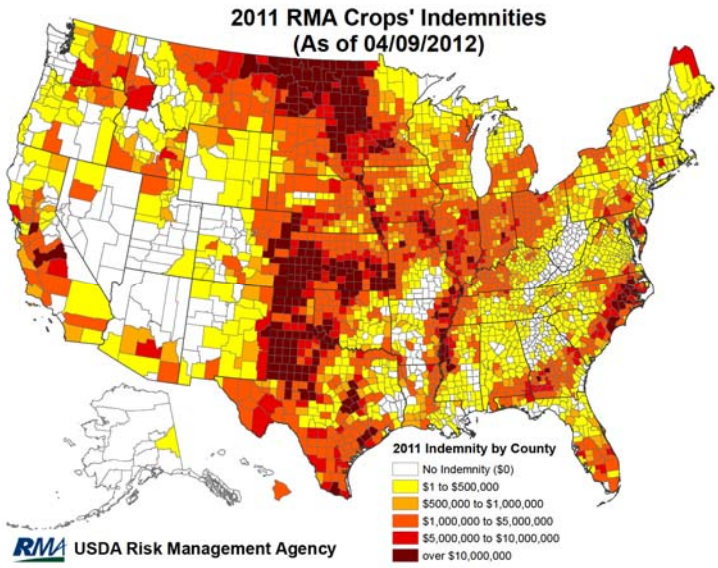
U.S. Crop Insurance Today

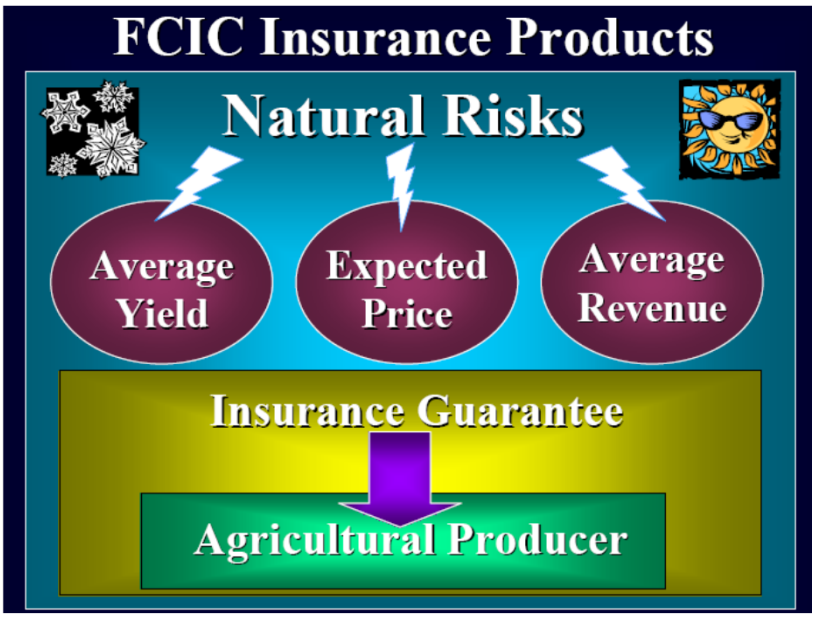
- Companies also benefit from SRA, which allows risk shifting to federal government
- Subsidies are paid as percentage of premium ⇒ More Risk = More Subsidy
- Raises questions about subsidizing risk and potentially distorting production
- Goodwin et al. (2004) found very small production effects in Corn Belt, larger (though modest) in Northern Great Plains
- NAP program also offers coverage for noninsured crops (similar to CAT insurance)

Ratio of Indemnities to Subsidy-Adjusted Premiums



Source: Unpublished RMA data


2011 RMA Crops' Indemnities
(As of 04/09/2012)
2011 Indemnity by County
No Indemnity ($0)
$1 to $500,000
$500,000 to $1,000,000
$1,000,000 to $5,000,000
$5,000,000 to $10,000,000
over $10,000,000
RMA USDA Risk Management Agency


FCIC Insurance Products
Natural Risks
Average Yield
Expected Price
Average Revenue
Insurance Guarantee
Agricultural Producer

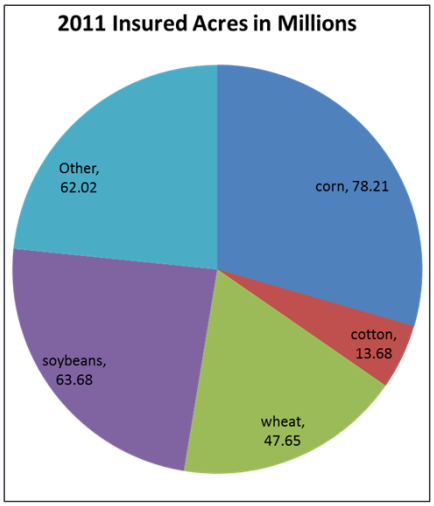
Federal Crop Insurance Program Status

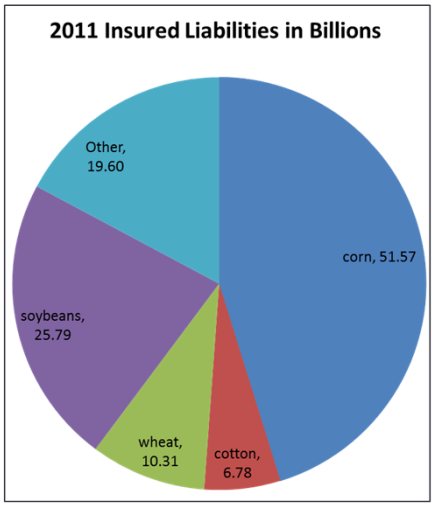
$40+ Billion Coverage	218 Million Acres	100+ Commodities

22 Existing Crop Insurance Plans

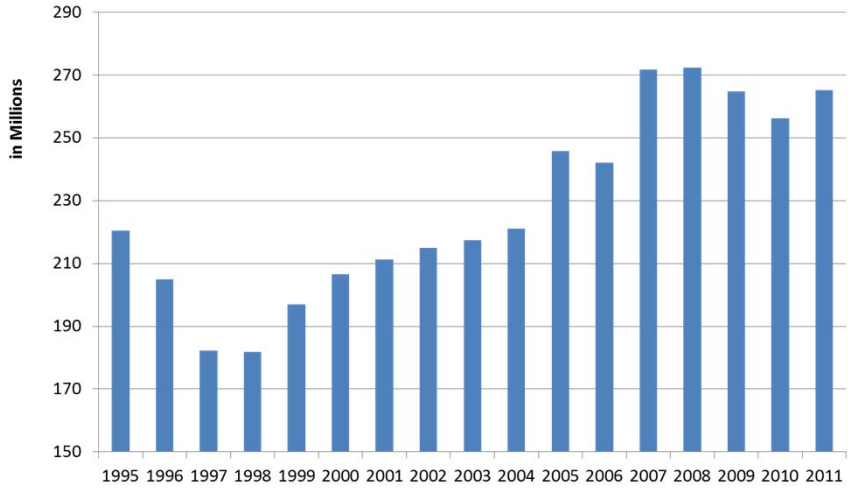
Actual Production History (APH)	Group Risk Protection Income Protection (GRIP)
Adjusted Gross Revenue (AGR)	Income Protection (IP)
Adjusted Gross Revenue Lite (AGR-Lite)	Indexed Income Protection (IIP)
Aquaculture Dollar	Livestock Gross Margin (LGM)
Avocado Revenue Coverage	Livestock Risk Protection (LRP)
Crop Revenue Coverage (CRC)	Pecan Revenue
Dollar Amount of Insurance	Revenue Assurance (RA)
Fixed Dollar	Tobacco - Guaranteed Production
Grower Yield Certification (GYC)	Tobacco - Quota
Grower Yield Certification Span (GYC Span)	Tree Based Dollar Amount of Insurance
Group Risk Plan (GRP)	Yield Based Dollar Amount of Insurance

Insurance Coverage by Crop

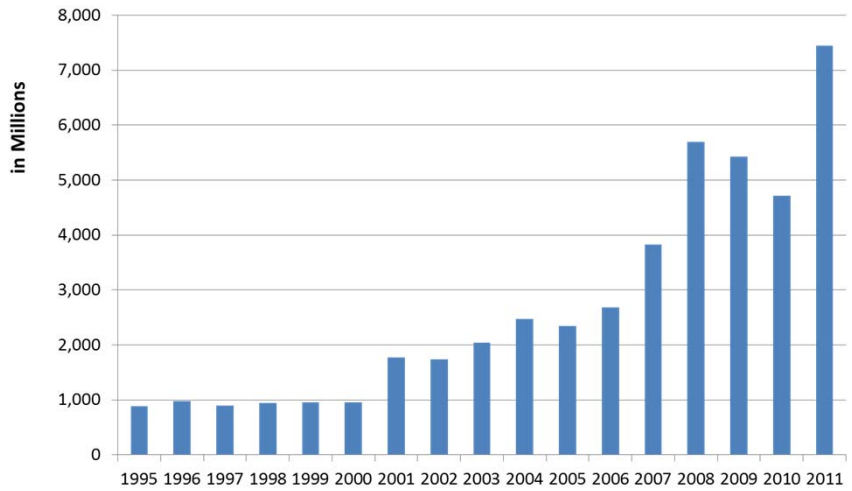


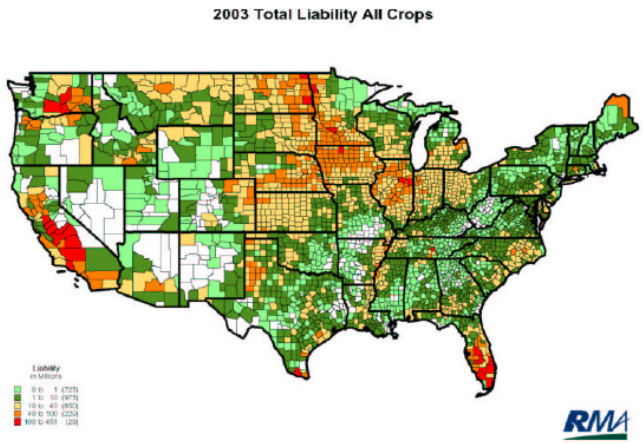


Acres Insured – All Products



Subsidies for Acres Insured (in $M)





History of Disaster Payments

- 1803 federal relief for fire victims in Portsmouth, New Hampshire
- 1803-1947, at least 128 specific legislative acts of disaster relief (Moss (1999))
- The Disaster Relief Act of 1950 established a permanent federal disaster relief fund
- 1950 Act often amended, provided relief to agriculture, and supplemented through FmHA
- Agricultural and Consumer Protection Act of 1973 and the Rice Production Act of 1975 established disaster payment programs that covered wheat, upland cotton, and feedgrains
- 1977 Farm Bill renewed mandatory disaster payments
- 1975-1981, CCC disaster outlays exceeded $3.57 billion

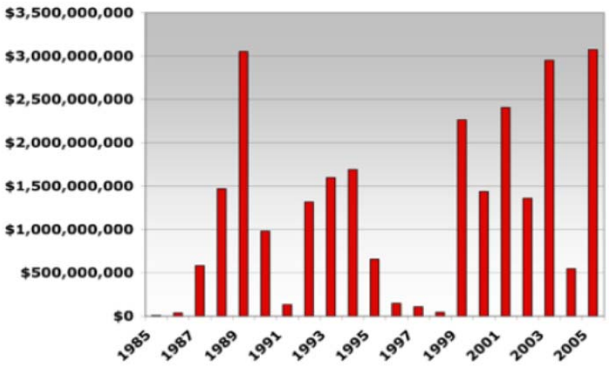
Disaster Aid Since 1985

- Every year realized disaster aid
- $26 billion in total
- 11 of 21 years, payments $>$ $1 billion
- Recent EWG study notes 1% of producers received payments in 11 or more years and that their payments accounted for almost 10% of total

Disaster Aid Since 1985

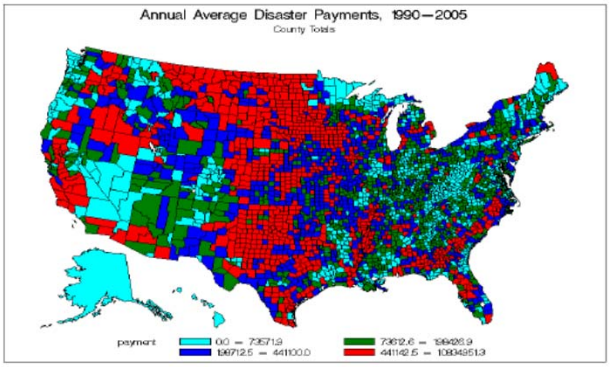
- Payments tend to be spatially concentrated—lower to upper Great Plains
- Other ad hoc support—$20+ billion Market Loss Assistance—was very important at end of 1990s (no longer ad hoc—now CCP)
- Raises a number of interesting questions regarding expectations for disaster relief (are production decisions conditional on there being relief in a bad year?)
- Do regional distortions or changes in crop-mix arise as a result?

Recent Disaster Relief Outlays (EWG)

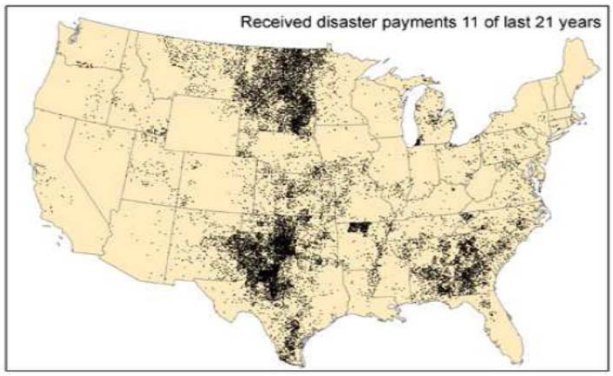


Source: Environmental Working Group

Real Disaster Payments Made through FSA (1990-2005)



Frequent (11 of 21 years) Disaster Relief Recipients (EWG)



Source: Environmental Working Group

Other Forms of Subsidized Disaster Assistance

- Flood Control Act 1936
- National Flood Insurance Program (1968–)
- FEMA
- Estimates of Katrina-related assistance top $200 billion

Premium Subsidy Factors by Coverage Level

Coverage Level	Premium Subsidy Factor	GRP/GRIP Premium Subsidy
50	.67	
55	.64	
60	.64	
65	.59	
70	.59	.64
75	.55	.64
80	.48	.59
85	.38	.59
90	NA	.55

Economic Justification for Subsidies?

- Is there a real or perceived failure of market-based instruments to provide disaster/risk protection?
- Theory predicts risk-averse agents will fully insure at actuarially-fair rates
- The fact that large subsidies have been needed to achieve even modest levels of participation raises questions
- Worldwide experience with all-risk insurance has realized low rates of participation
- Prior to 1994 CIRA, participation around 10-30%
- Many point to systemic risks as a rationale for government—reinsurance markets cannot cover catastrophic risks of the magnitude involved in U.S. agriculture
- Counter argument notes these markets are wide and deep and often address systemic risks

Externalities

- Over much of its history, disaster relief targeted public buildings and infrastructure
- In many cases, transactions costs may preclude private market solutions
- A good example involves plant and animal diseases and deliberate threats to food supplies
  - Agents may be unwilling to report disease or take preventative measures without government involvement (through coercion or persuasion–i.e., fines or subsidies)
  - Private contracts to address disease risks too costly to develop, monitor, and enforce
- Public projects (flood control) represent another case where transactions costs prohibit private market instruments

Mistakes in Pricing? Adverse Selection

- Suppose I price against the risk of average farmer, but in county there is heterogeneity in risk– some more risky, some less risky.
- I then overcharge low risk farmers and undercharge high risk farmers.
- So what if I'm off a little. Errors will average out. On average, I'll be OK. Right?
- Who has greater incentive to buy insurance?

Adverse Selection and Demand

- Research confirms low risk individuals are more responsive to premium increases.
- Thus, errors in pricing will distort risk of pool– skew it toward high risk as low risk individuals are less likely to buy– indemnities rise and program loses money.
- How can I fix this? Raise all rates? (GAO).
- Raising rates drives out low risk end of pool—pool become smaller and riskier– losses increase.
- Eventually, the plan fails.
- Called the “death spiral” of adverse selection.

Adverse Selection

- The greatest problem facing any insurer.
- Inaccurate prices lead to pulling in riskier part of the insurance pool.
- This is an information problem.
- In public policy sense, there may be problems with adequately discriminating against higher risks– after all, some say the program is meant to help these individuals.

Catastrophic Risks

- Insurers typically price above fair rate to build reserves and cover operating costs
- Another issue– crops are special as risks are "systemic"– they cannot be diversified over policies– not true of many private lines (fire, life, etc.)
- For a private insurer, reserves and reinsurance may not be enough to allow for the "big hit"
- This is an issue related to spatial correlation, due to weather– bad years involve widespread losses
- How do we price/handle this?
  - Reinsurance (is the market deep enough?)
  - Loading to build reserves
  - Government reinsurance (deeper pockets)

Moral Hazard

- Occurs if insurance buyer changes behavior after buying insurance.
- The term "moral hazard" makes us think of fraud and abuse, but to an economist, it may just be rational behavior.
- Would you drive your car differently if you did not have any insurance?
- Less fertilizer, less chemicals, less "worry" about what-ifs and thus less self-protection.
- Certainly relevant in insurance, and adjusting for losses plays key role.
- Really is a monitoring problem– can the insurer observe behavior and price accordingly?

Pricing Revenue Insurance

- Since 1997, tremendous growth in revenue insurance products (CRC, RA, IP)
- Indemnities can be triggered by low yields and/or low prices
- CRC and RA-HPO will reimburse lost bushels directly (useful for forward contracts) by paying at harvest time prices
- RA and CRC are being merged to a single "combo" product

Issues in Pricing Revenue Insurance

- Now, one needs to worry about the joint pdf for price and yield and the implied revenue distribution.
- How does one measure price uncertainty? Options?
- What is the proper correlation between price and an individual's yield?
  - Is it time variant (stronger in bad years?).
  - Does it vary by area (say, MD vs. IA)?
  - Again, a question of spatial correlation.
- Measuring joint distribution may be difficult, even if marginals are easy (copulas).
- Most literature on options pricing (Black-Scholes) assumes log normality for prices.