Production Distortions and Implications for the Design and Delivery of Crop Insurance Subsidies

Barry K. Goodwin

North Carolina State University

December 11, 2012

IATRC Winter Meeting, San Diego

The Nature of Subsidies

- Programs often termed a "Public–Private Partnership" (Taxpayer Beware!)
- Many market–failure arguments used to argue for subsidies
- Most arguments appeal to systemic nature of risk and limited reinsurance
- In almost every case, evidence of market failure is absent
- In US, 2010 saw $1.3 billion in A&O subsidy along with $4.6 billion in premium subsidy
- Paid as percentage (about 65%) of premium
- This naturally means that
    - Riskier areas get more total subsidies
    - Higher prices (and yields) mean greater taxpayer outlays

About Crop Insurance Subsidies

- No ceiling on subsidies in many cases—*directly coupled* to production and market prices
- Much recent discussion over support that can increase as market conditions strengthen—but revenue insurance has been doing this for a long time
- Why has this not been a bigger issue in WTO?
- Reported as non-commodity-specific *de minimis* amber box support
- Subsidies are commodity-specific, coupled support
- RP replicates (and replaces) similar (unsubsidized) protection
- Financial markets have realized significant innovation—but this cannot occur for agriculture as no private insurer can compete against such subsidies
- ARPA (2000) and subsequent legislation established rent–seeking incentives to development new programs
- In 2011, 15 crops $<$ \$1 million; 31 $<$ \$10 million in liability

The Harm of Subsidies

- Obvious fact—subsidizing risk leads to more risk
- Distortions may occur at intensive and extensive margins
  - Quantity and allocation of acreage to specific crops
  - Production practices (i.e., moral hazard)
- Variations in returns to insurance may aggravate distortions
- Subsidies and risk sharing with private insurers may encourage moral hazard

Market Failure Arguments

- Lack of reinsurance capacity— not persuasive (consider CDG markets—$trillions in capacity)
- The government is more efficient
- The government has advantages in addressing adverse selection and moral hazard (coercive powers)
- Infrastructure and social objectives
- Contagious but manageable risks (disease or fire)
- Lack of reinsurance argument

The Crop Insurance Paradox

- Theory suggests risk averse farmers will fully insure at actuarially–fair rates
- Available evidence universally rejects this
- Subsidies always needed to generate participation
- Hazell et al. (1986) ...*the fact is that, with few exceptions, farmers in both developed and developing countries have been unwilling to pay the full cost of all-risk crop insurance ...most all-risk programs remain public sector schemes ...their management is often subject to political pressure regarding premiums and coverage and the programs are often used as a mechanism to transfer income to farmers.*
- Subsidies and the lack of private insurance—cause or effect?

The Design of Subsidies and Distortions

- On the front end
    - Premium subsidies
    - Subsidies on administrative and operating costs
    - Subsidized reinsurance
- On the back end
    - Excess indemnity coverage (less certain support)
- Proportional, variable, or fixed?
- Capped or unlimited?
- Means tested?
- Important fiscal budget issues

Sources of Risk

Source of Risk	Degree to Which Risk is Systemic
Yield Risks	
Rainfall and Temperature	Strong
Pests	Moderate
Fire	Minimal to Moderate
Hurricanes	Moderate to Strong
Hail	Minimal
Price Risks	
Output Price	Strong
Input Prices	Strong
Other Risks	
Liability	None
Policy Change	Strong
Input Availability	Moderate to Strong
Weak Governance	Moderate to Strong

The US Program

- $114 billion in liability in 2011
- Total premium in 2011 was $12 billion
- Premium subsidy $7.42 billion
- Implies 62% subsidy
- Subsidy paid as a percentage of premium such that rising prices (which we have seen in recent years) imply much larger costs to taxpayers
- Latest CBO score $91 billion over 10 years
- Governed by complex (and favorable to companies) reinsurance agreement
- Recent calls for Congress to raise guarantee to 90-95% ("shallow losses") of expected revenue

Ag. Prices and Premium Subsidies
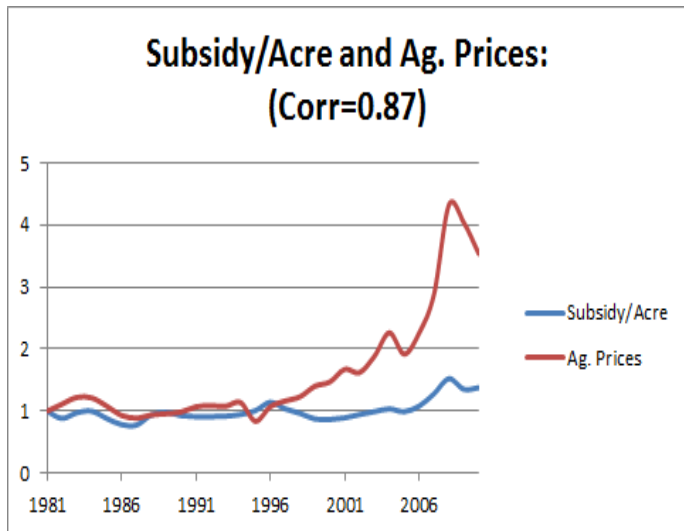
US Crop Insurance Statistics

Year	Million Acres	Liability	Premium	Subsidy	Indemnities	Subsidy Rate	Loss Ratio	Subsidy Adjusted Loss Ratio
1981	45.00	5,981.19	376.82	46.99	407.29	0.12	1.08	1.23
1982	42.28	6,092.36	393.58	90.65	527.12	0.23	1.34	1.74
1983	27.94	4,369.88	285.77	63.67	583.74	0.22	2.04	2.63
1984	42.67	6,618.60	433.82	98.28	638.35	0.23	1.47	1.90
1985	48.55	7,159.15	439.80	100.10	683.17	0.23	1.55	2.01
1986	48.67	6,229.85	379.74	88.10	615.73	0.23	1.62	2.11
1987	49.14	6,094.70	365.11	87.62	369.84	0.24	1.01	1.33
1988	55.58	6,964.56	436.39	107.99	1,067.56	0.25	2.45	3.25
1989	101.63	13,535.72	814.29	204.96	1,212.22	0.25	1.49	1.99
1990	101.36	12,828.36	836.47	215.31	973.03	0.26	1.16	1.57
1991	82.35	11,215.75	737.04	190.06	955.25	0.26	1.30	1.75
1992	83.10	11,333.94	758.79	196.72	918.17	0.26	1.21	1.63
1993	83.71	11,351.47	755.68	199.99	1,654.64	0.26	2.19	2.98
1994	99.64	13,608.33	949.39	254.88	601.12	0.27	0.63	0.87
1995	220.51	23,728.45	1,543.35	889.37	1,567.73	0.58	1.02	2.40
1996	204.86	26,876.81	1,838.56	982.06	1,492.66	0.53	0.81	1.74
1997	182.19	25,458.85	1,775.37	902.79	993.55	0.51	0.56	1.14
1998	181.83	27,921.44	1,875.93	946.31	1,677.54	0.50	0.89	1.80
1999	196.92	30,939.45	2,310.13	1,391.89	2,434.72	0.60	1.05	2.65
2000	206.47	34,443.75	2,540.16	1,347.89	2,594.83	0.53	1.02	2.18
2001	211.33	36,728.59	2,961.85	1,774.06	2,960.12	0.60	1.00	2.49
2002	214.86	37,299.30	2,915.94	1,741.41	4,066.73	0.60	1.39	3.46
2003	217.41	40,620.51	3,431.36	2,042.03	3,260.81	0.60	0.95	2.35
2004	221.02	46,602.28	4,186.13	2,477.42	3,209.72	0.59	0.77	1.88
2005	245.86	44,258.92	3,949.23	2,343.83	2,367.32	0.59	0.60	1.47
2006	242.07	49,919.76	4,579.28	2,681.85	3,503.66	0.59	0.77	1.85
2007	271.64	67,348.98	6,562.25	3,823.43	3,546.40	0.58	0.54	1.29
2008	272.27	89,897.34	9,851.16	5,690.84	8,680.38	0.58	0.88	2.09
2009	264.77	79,572.93	8,950.60	5,426.79	5,225.68	0.61	0.58	1.48
2010	256.26	78,102.83	7,593.96	4,710.99	4,248.39	0.62	0.56	1.47

US Crop Insurance Statistics: Liability and Premium
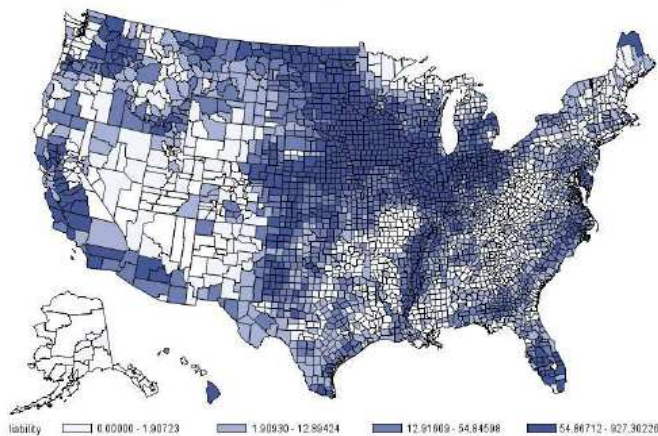

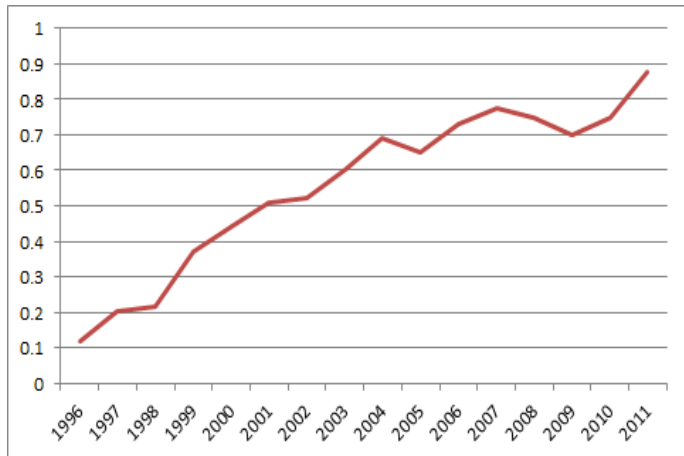SOURCE: USDA RMA.

Source: Smith (2012)

US Crop Insurance Statistics: Liability

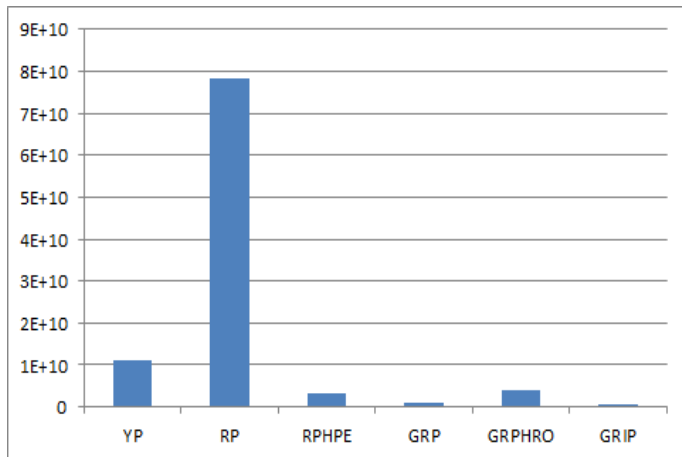2011 Liability ($million)
All Federal Crop Insurance Plans

(a) 2010 Total Liability

Liability Share of Revenue Coverage:

Share of Total Liability by Plan:

2008 Farm Bill CBO Score

Table 3: CBO 2008 Farm Bill Baseline Budget Score (Source: CBO and Monke 2012)

Fiscal Year	2013	2014	2015	2016	2017	2013-2017	2013-2022
Title I CommodityPrograms	**5,750**	**6,005**	**6,636**	**6,467**	**6,285**	**31,143**	**62,944**
Directpayments	4,957	4,958	4,958	4,958	4,958	24,789	49,580
Counter-cyclical,ACRE,Marketingloans	140	426	1,038	840	669	3,113	6,881
Interestandoperatingexpenses	26	61	96	131	138	452	1,139
Economicassistancetocottonmills	57	55	55	55	55	277	548
MILCandotherdairyassistance	54	48	50	50	46	248	432
Other	515	456	439	433	419	2,262	4,365
Title II Conservation	**6,093**	**5,992**	**6,113**	**6,320**	**6,438**	**30,956**	**65,275**
Title III Trade	**346**	**344**	**344**	**344**	**344**	**1,722**	**3,442**
Title IV Nutrition(SNAP)	**82,022**	**79,799**	**80,059**	**79,664**	**78,024**	**399,567**	**771,773**
Title VI RuralDevelopment	**3**	**0**	**0**	**0**	**0**	**3**	**3**
Title IX Energy	**131**	**0**	**0**	**19**	**23**	**173**	**324**
Title X HorticultureandOrganicAgriculture	**105**	**105**	**105**	**105**	**105**	**525**	**1,050**
Title XII CropInsurance	**8,412**	**8,528**	**8,702**	**8,788**	**8,903**	**43,333**	**89,817**
PremiumSubsidy	5,924	6,007	6,138	6,210	6,305	30,585	63,750
DeliveryExpenses	1,352	1,368	1,385	1,386	1,387	6,878	13,831
UnderwritingGains	1,137	1,154	1,179	1,193	1,212	5,876	12,247
TotalFarmBillBaseline	**102,862**	**100,773**	**101,959**	**101,707**	**100,122**	**507,422**	**994,628**

International Crop Insurance: Premium Subsidies

Country	Type of Subsidy	Average Subsidy	Country	Type of Subsidy	Average Subsidy
Argentina	Capped	0%	Mauritius	Fixed	1%
Austria	Fixed	50%	Mexico	Variable	45%
Brazil	Variable	50%	Moldova	Fixed	80%
Canada	Fixed	50%	Morocco	Fixed	50%
Chile	Fixed	50%	Nepal	Fixed	NA
China	Fixed	NA	Peru	Capped	US$ 25/Ha
Colombia	Variable	45%	Philippines	Capped	6%
Costa Rica	Variable	49%	Poland	Fixed and Variable	50%
Cyprus	Capped and Fixed	50%	Portugal	Variable	67%
Czech Republic	Variable	43%	Russia	Fixed	50%
Dominican Republic	Variable	42%	Slovenia	Fixed	50%
El Salvador	Fixed	50%	South Korea	Fixed	50%
France	Fixed and Variable	35%	Spain	Variable	50%
Guatemala	Fixed	50%	Sudan	Fixed	50%
Honduras	Fixed	50%	Switzerland	Fixed	0.47%
India	Capped	30%	Thailand	Capped	US$ 3.16/Rai
Iran	Variable	45%	Turkey	Fixed	50%
Israel	Fixed and Variable	35%	Ukraine	Fixed	50%
Italy	Fixed and Variable	66%	United States	Variable	NA
Japan	Capped and Fixed	50%	Uruguay	Variable	60%

International Crop Insurance: A&O Subsidies

	Admin. & Operational Subsidies	Loss Assessment Subsidies
Canada	✓	
Cyprus	✓	✓
Dominican Republic	✓	
India	✓	✓
Japan	✓	✓
Nicaragua	✓	
Portugal	✓	
South Korea	✓	
Thailand	✓	
Turkey	✓	
United States	✓	✓
Morocco		✓

International Crop Insurance: Reinsurance Subsidies

Brazil
Cyprus
India
Israel
Italy
Japan
Kazakhstan
Netherlands
Poland
Slovenia
South Korea
Turkey
United States

US Crop Insurance Statistics: Subsidy-Adjusted Loss Ratios
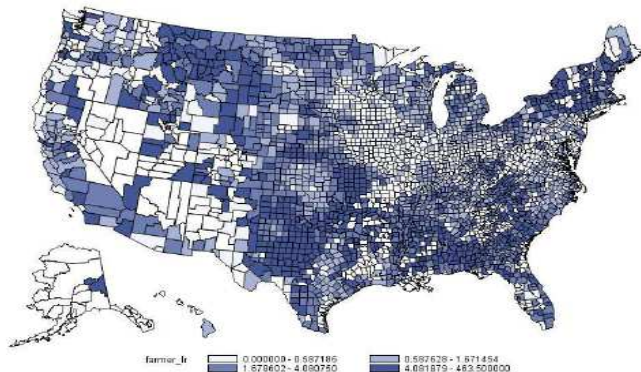
(b) 2000-2011 Subsidy-Adjusted Loss Ratios

A Simple Empirical Consideration of Distortions

- NASS County–level acreage response, conditioned on prices, lagged acreage, lagged insurance participation
- Also includes 5–year average subsidy rates and subsidy–adjusted loss-ratios
- BLS REIS data on input costs
- More acreage associated with
  - Higher subsidy rates
  - Higher insurance participation
- Less fertilizer and chemical use from higher subsidies (farmer returns)
- Implication is that acreage and production distortions may indeed arise
- Data are preliminary and research is needed to examine the effects of the greatly–expanded crop insurance program on acreage and production practices

US Crop Insurance Statistics: Subsidy-Adjusted Loss Ratios

Table 4. OLS Estimates of Acreage Response Equations

Parameter	Corn	Soybeans	Cotton	Wheat
Intercept	1.5079	−18.4388	10.3819	−7.0729
	(0.7201)*	(0.6952)*	(1.8702)*	(0.8186)*
Corn Price	14.1935	−8.1787	−20.1589	
	(0.3761)*	(0.3647)*	(0.9405)*	
Soybean Price	−9.9437	12.5597	8.2951	
	(0.4368)*	(0.4254)*	(1.1115)*	
Cotton Price			9.5996	
			(0.6546)*	
Wheat Price				3.5002
				(0.4068)*
Mean Loss Ratio	−0.0002	−0.0159	−0.0745	−0.0058
	(0.0016)	(0.0046)*	(0.0269)*	(0.0120)
$(\text{Liability}/\text{Acres})_{t-1}$	7.0818	8.3529	1.1242	37.8846
	(0.4812)*	(0.6338)*	(1.3245)	(2.4592)*
Mean Subsidy Rate	2.0868	3.8916	1.8610	1.2955
	(0.2926)*	(0.2875)*	(0.7473)*	(0.3825)*
$\text{Planted Acres}_{t-1}$	0.9839	0.9905	0.9638	0.9753
	(0.0008)*	(0.0008)*	(0.0019)*	(0.0009)*
R^2	0.9731	0.9769	0.9618	0.9733

Numbers in parentheses are standard errors. An asterisk indicates statistical significance at the $\alpha = .10$ or smaller level.

Analysis of Subsidy Distortions

Variable	Parameter Estimate	Standard Error	t Ratio
Total Expenses			
Output Price / Input Price	0.06590	0.00345	19.08
Average Subsidy Adjusted Loss Ratio	-0.00013	0.00004	-3.16
Average Premium Subsidy Rate	0.09136	0.00238	38.37
Relative Expenses$_{t-1}$	0.97201	0.00229	425.16
Fertilizer and Chemical Expenses			
Output Price / Input Price	0.03099	0.00064	48.34
Average Subsidy Adjusted Loss Ratio	-0.00005	0.00001	-6.42
Average Premium Subsidy Rate	0.02926	0.00044	65.76
Relative Expenses$_{t-1}$	0.93583	0.00213	439.27
Seed Expenses			
Output Price / Input Price	0.00694	0.00028	25.19
Average Subsidy Adjusted Loss Ratio	0.00000	0.00000	-0.52
Average Premium Subsidy Rate	0.00854	0.00020	43.5
Relative Expenses$_{t-1}$	1.03531	0.00153	675.33
Hired Labor Expenses			
Output Price / Input Price	0.00366	0.00061	5.97
Average Subsidy Adjusted Loss Ratio	0.00004	0.00001	5.77
Average Premium Subsidy Rate	0.00142	0.00042	3.35
Relative Expenses$_{t-1}$	0.93043	0.00206	451.49

Concluding Remarks

- The harm of subsidized crop insurance comes from
  - Significant taxpayer transfers (which have their own distortions) to farmers, AIPs, and a community of those involved in developing new programs
  - Distortions in production (acreage, crop choice, and practices)
  - Distortions in market prices (WTO—where are you?)
  - Crowding–out of private market risk management innovation
- No persuasive evidence exists of market failure
- The costs and losses are tied to increasing prices and yields—the program continues to grow and is primary commodity program
- Discussion of "shallow–loss" coverage and decreasing deductibles raise concerns of distortions continuing to grow
- Subsidizing risk may have negative consequences for long–run productivity growth and global competitiveness