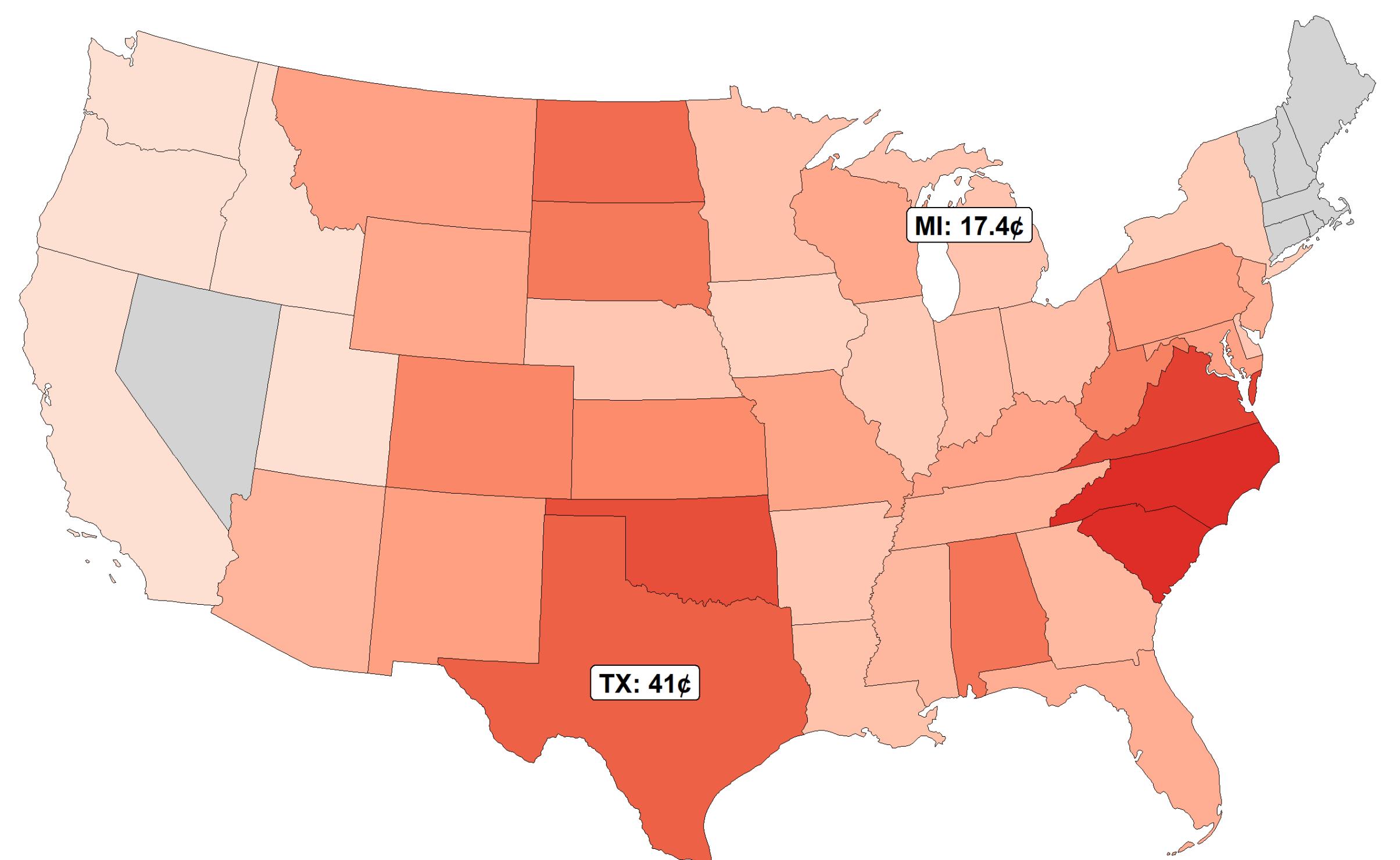


Motivation

Corn Subsidies per Bushel by State

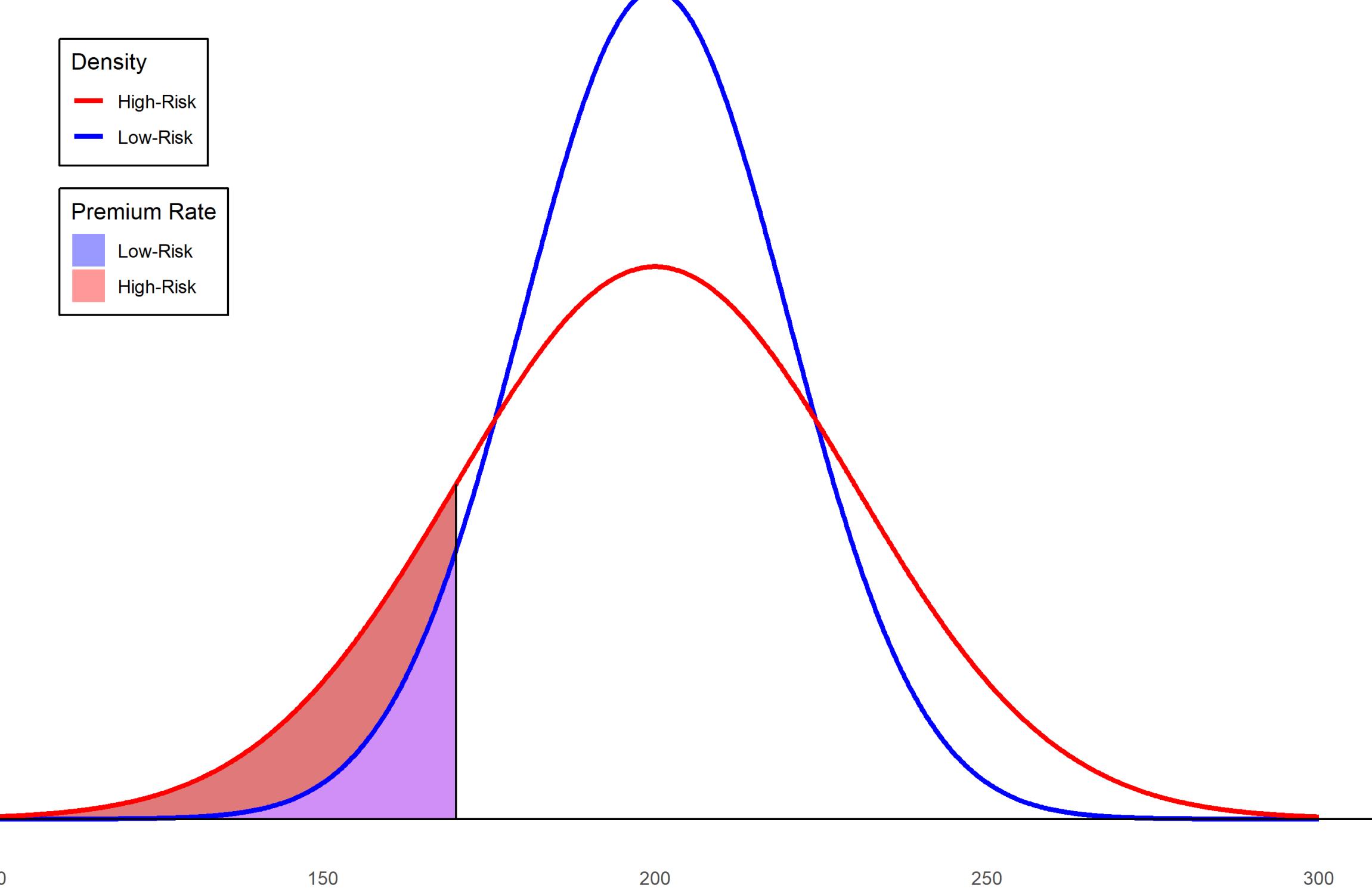


Regionally Inequitable Distribution of Premium Subsidies

- Riskier regions of the U.S. receive higher crop insurance subsidies per acre
- The inequity is even greater on a per bushel basis

Penalty for Adopting Risk-Reducing Technology

- Consider a producer deciding whether to adopt a new technology (e.g. irrigation, drought resistant genetics)
- The only effect of the new technology is a reduction in variance- no mean effect
- Under Current Policy- Distance Based Guarantee (DG) – The producer would be penalized by receiving fewer crop insurance premium subsidies



	Low-Risk DG	High-Risk DG
Expected Yield in Bushels per Acre	200	200
Yield Guarantee	170	170
Premium Rate per Acre	\$13.19	\$55.49
Subsidy per Acre	\$7.91	\$33.30
Producer Premium per Acre	\$5.27	\$22.20
Expected Subsidy per Bushel	\$0.04	\$0.17
Expected Rate of Return from Insurance	2.5	2.5
Expected Profit per Acre from Insurance	\$7.91	\$33.30
Expected Profit for 2500 acres from Insurance	\$19,775	\$83,250

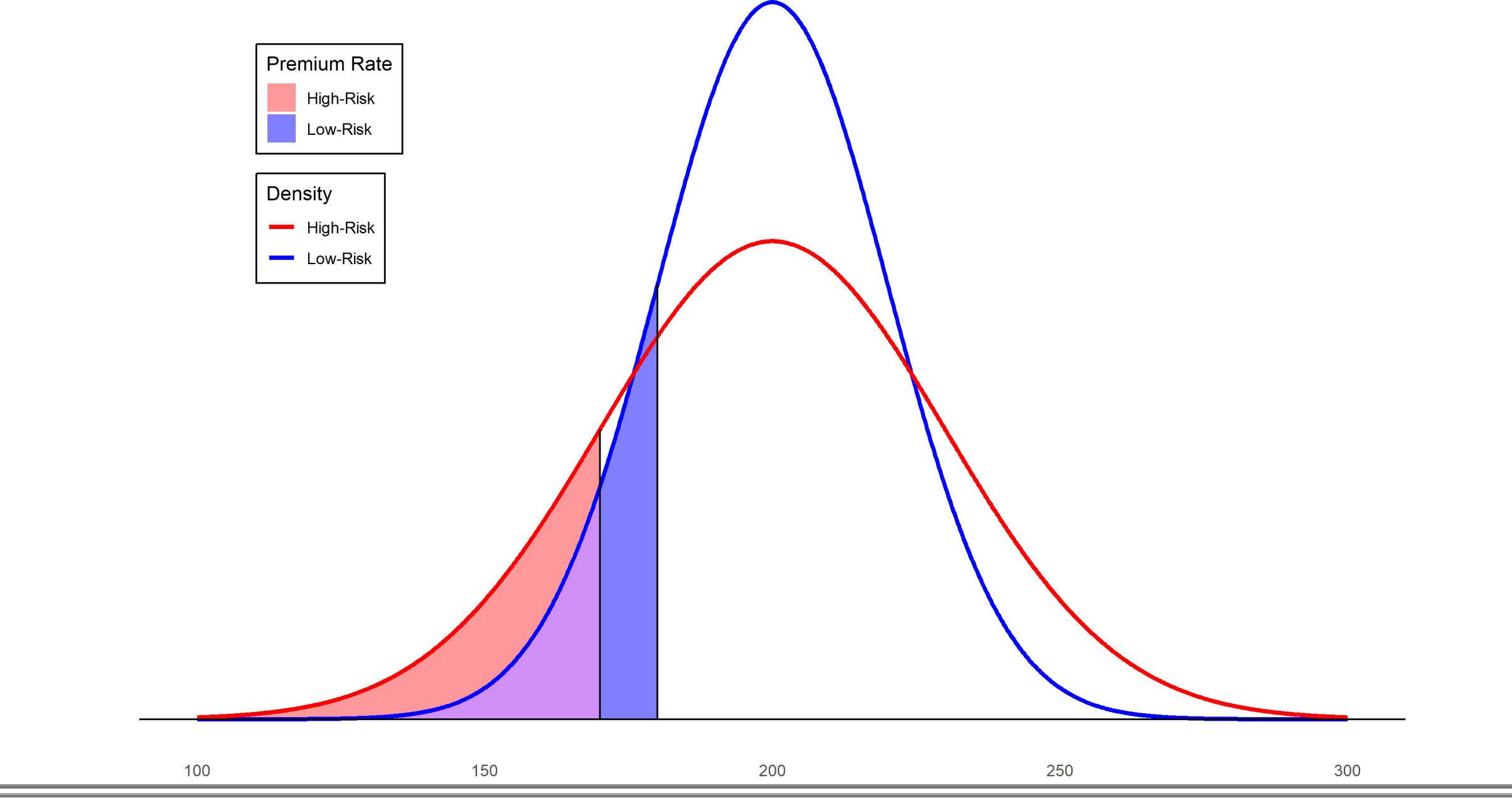
Solution

Define Coverage Level Based on Probability of Loss

- Current design is distance-based yield guarantees (e.g., 70% coverage level)
- Probability-based yield guarantees (PGs) adjust to the riskiness of the underlying distribution
- PGs provide coverage based on a probability of loss (e.g., 1 in 4 year probability of loss)

Example Continued

- Under a 1 in 6.3 year probability of loss yield guarantee the low-risk producer would have a 180 bu. coverage level, while the high-risk producers' yield guarantee remains at 170 bu.
- Under the 1 in 6.8 PG, the low-risk producer receives 2/3 of the subsidies that the high-risk producer receives, compared to just 1/4 of the subsidies under the current design (DGs)



	Low-Risk PG	High-Risk PG
Expected Yield in Bushels per Acre	200	200
Yield Guarantee	180	170
Premium Rate per Acre	\$37.49	\$55.49
Subsidy per Acre	\$22.49	\$33.30
Producer Premium per Acre	\$15.00	\$22.20
Expected Subsidy per Bushel	\$0.11	\$0.17
Expected Rate of Return from Insurance	2.5	2.5
Expected Profit per Acre from Insurance	\$22.49	\$33.30
Expected Profit for 2500 acres from Insurance	\$56,225	\$83,250

Objectives

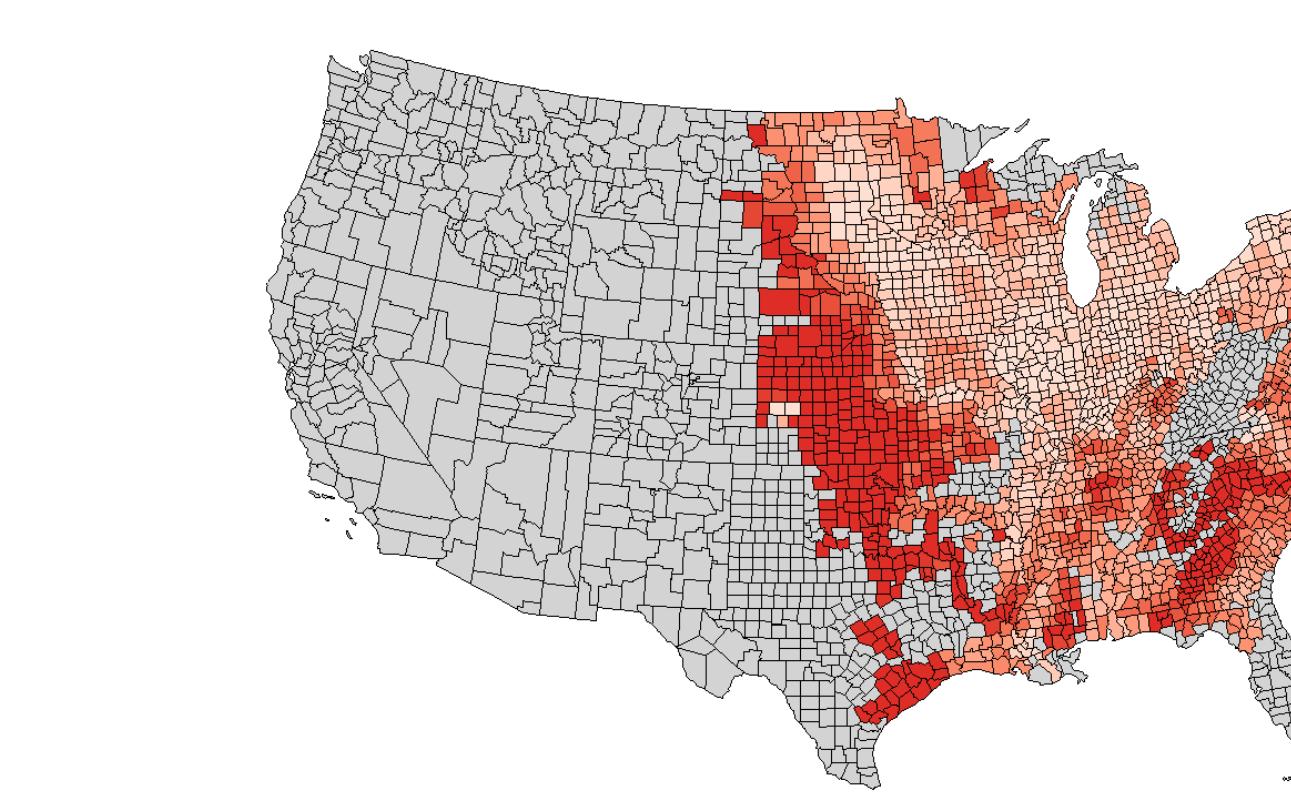
- Simulate the changes in premium subsidies by county/crop from a change from DGs to PGs for Corn, Soybeans, and Wheat
- Estimate different effects for Yield Protection, Whole Farm, and SCO
- Estimate the land use changes caused by the subsidy effects of the change to PGs

Methodology

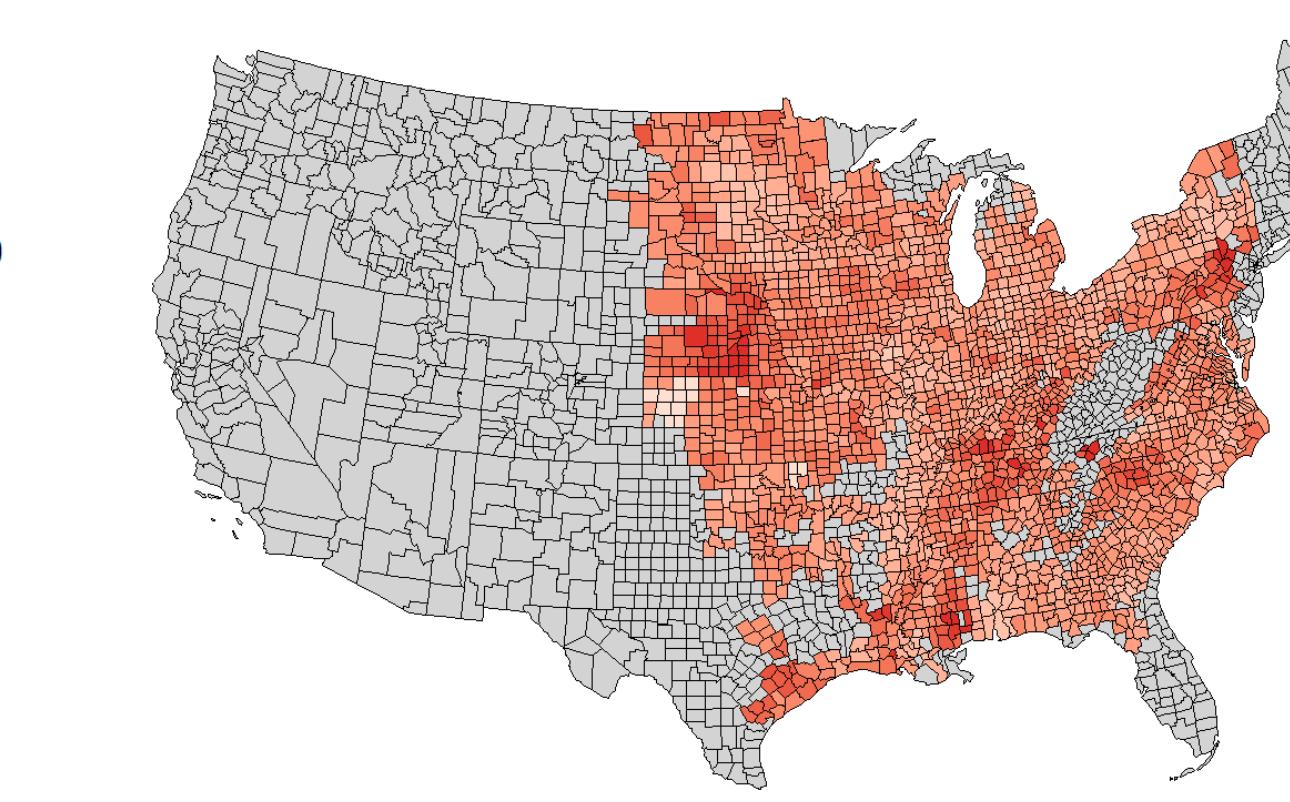
- County-level yield data from RMA- what they use to rate area based policies
- Follow the RMA's detrending process and apply a kernel density estimate (KDE) on residuals
- Estimate premiums by numerical integration on KDEs
- YP- Estimate effect of change from 60, 70, 80, and 90% DGs to PGs
- Whole Farm- Estimate effect of change from 70, 80, and 90% DGs to PGs
- SCO- Estimate effect of change from the 75-86% sleeve to a PG sleeve

Results

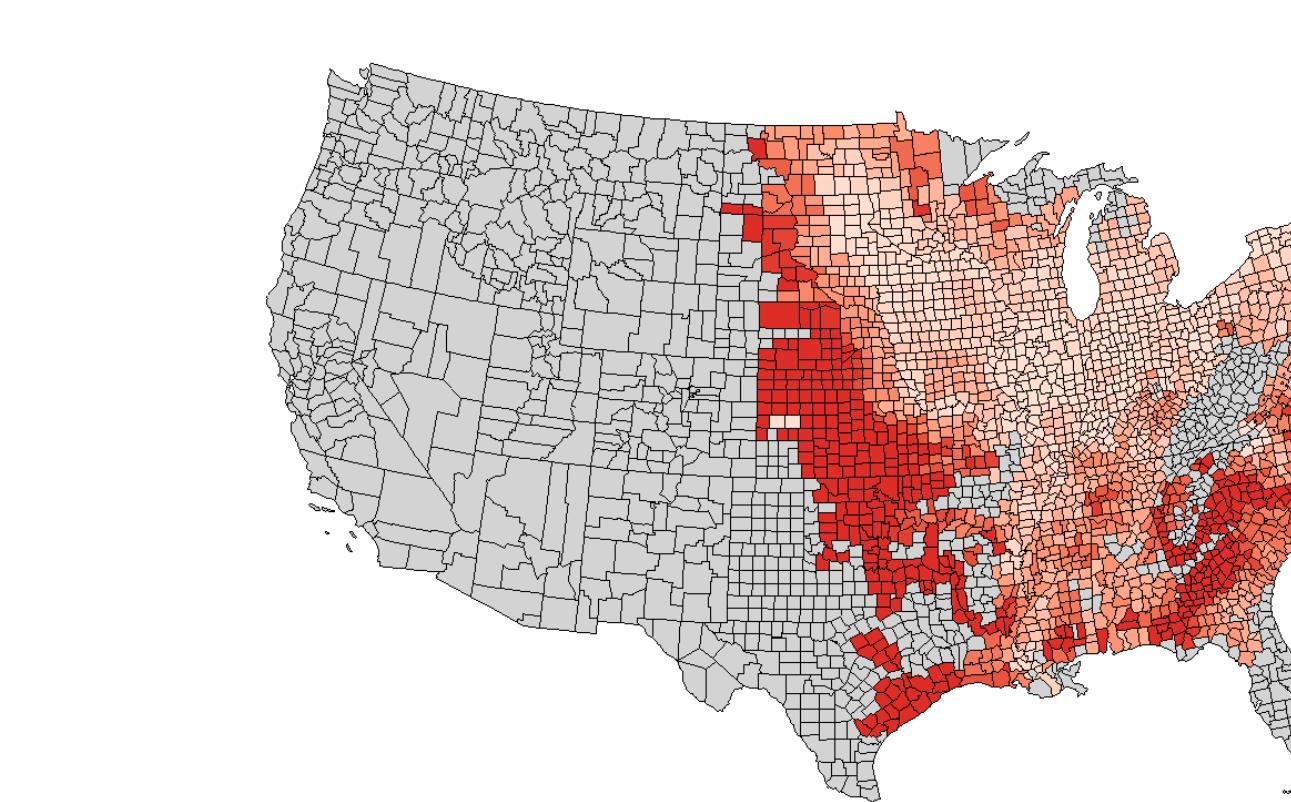
Non-Irrigated Soybean 80% Subsidy Per Acre



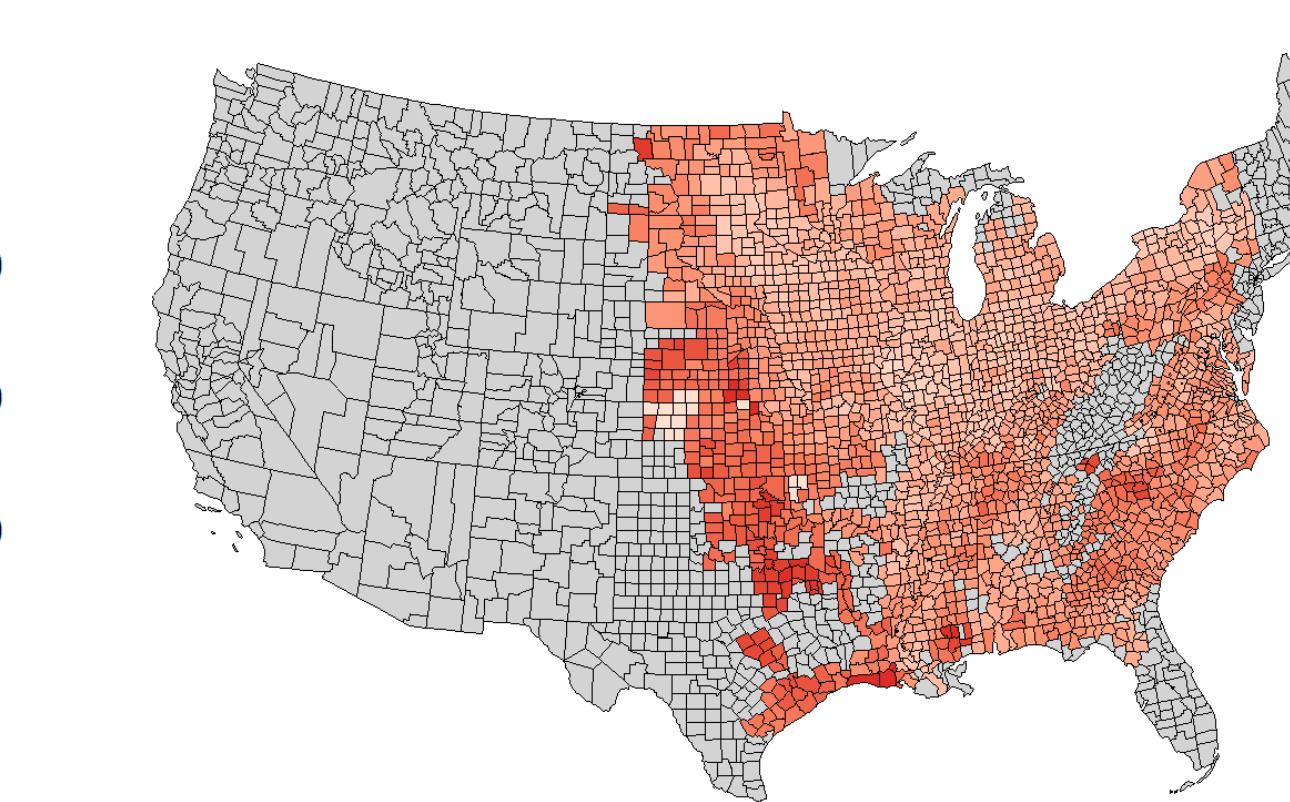
Non-Irrigated Soybean 1 in 6 PG Subsidy Per Acre



Non-Irrigated Soybean 80% Subsidy Per Bushel

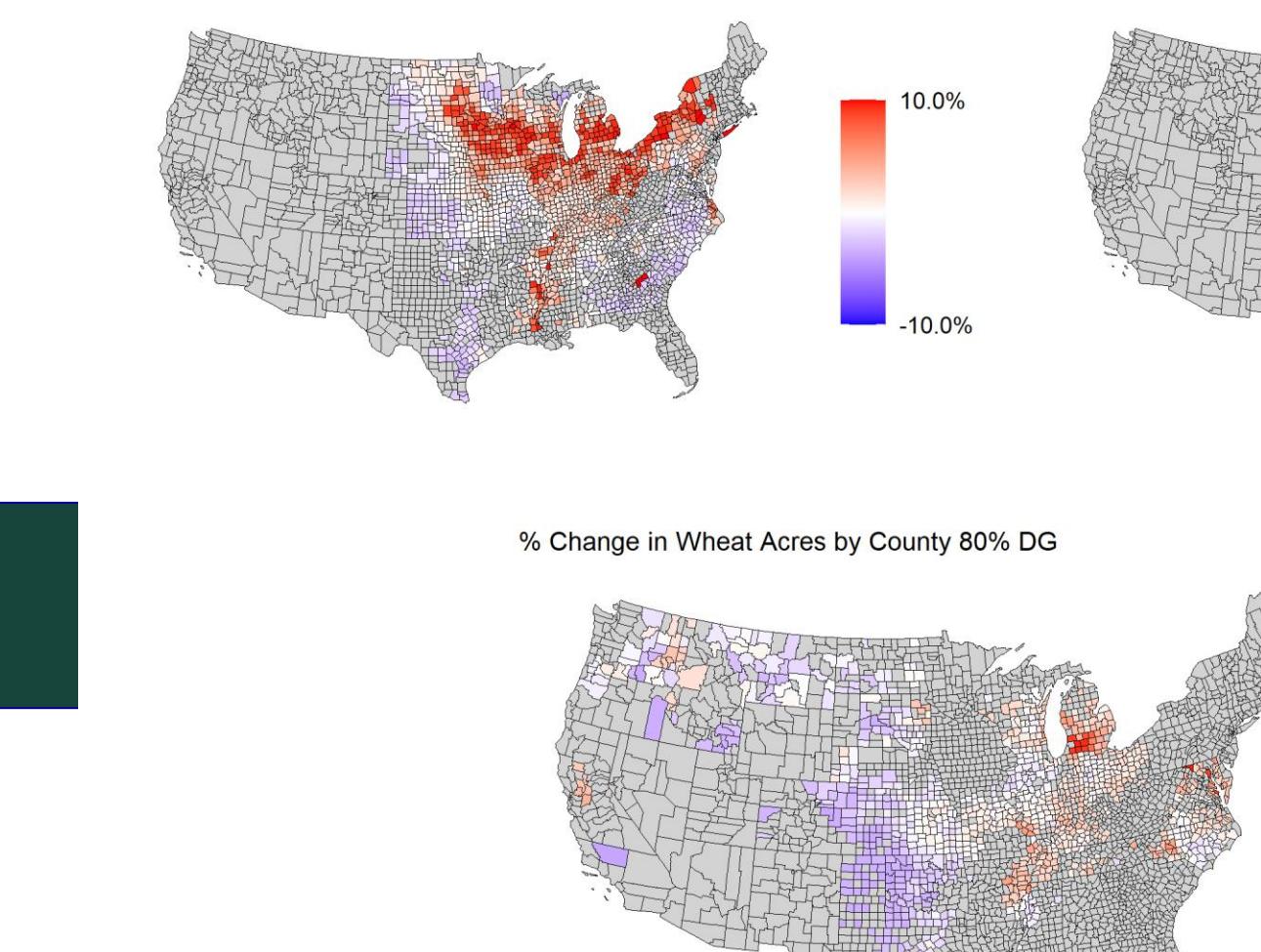


Non-Irrigated Soybean 1 in 6 PG Subsidy Per Bushel

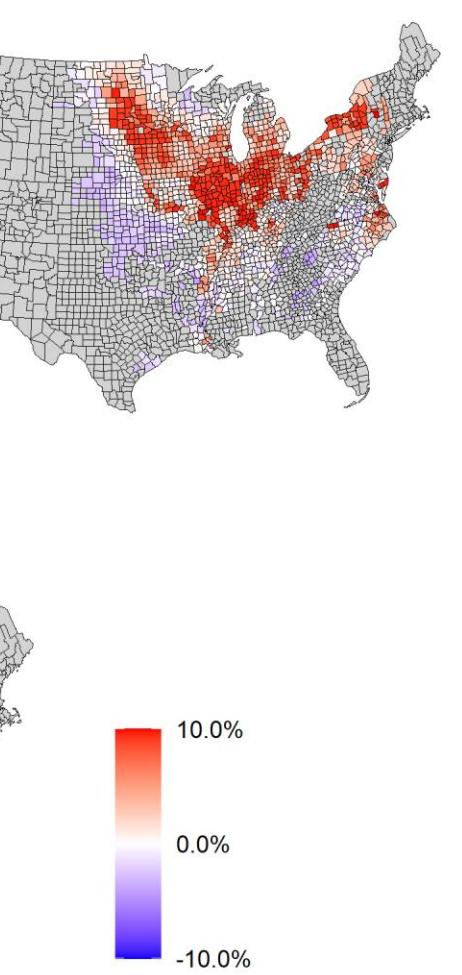


DG	PG	Unit	Mean	DG Var	CoV	PG Mean	PG Var	CoV	Ratio
60%	1/13	\$ per Ac	3.56	16.46	4.62	3.46	3.27	0.95	0.20
		¢ per Bu	3.53	26.84	7.60	2.40	1.15	0.48	0.06
70%	1/8	\$ per Ac	6.29	34.67	5.51	6.34	6.79	1.07	0.19
		¢ per Bu	5.91	52.96	8.95	4.52	3.44	0.76	0.08
80%	1/5	\$ per Ac	10.77	64.54	5.99	11.49	17.21	1.50	0.25
		¢ per Bu	9.59	95.27	9.94	8.41	13.16	1.56	0.16
90%	1/3.5	\$ per Ac	18.43	97.79	5.31	17.97	37.10	2.06	0.39
		¢ per Bu	15.43	151.30	9.81	13.44	38.98	2.90	0.30

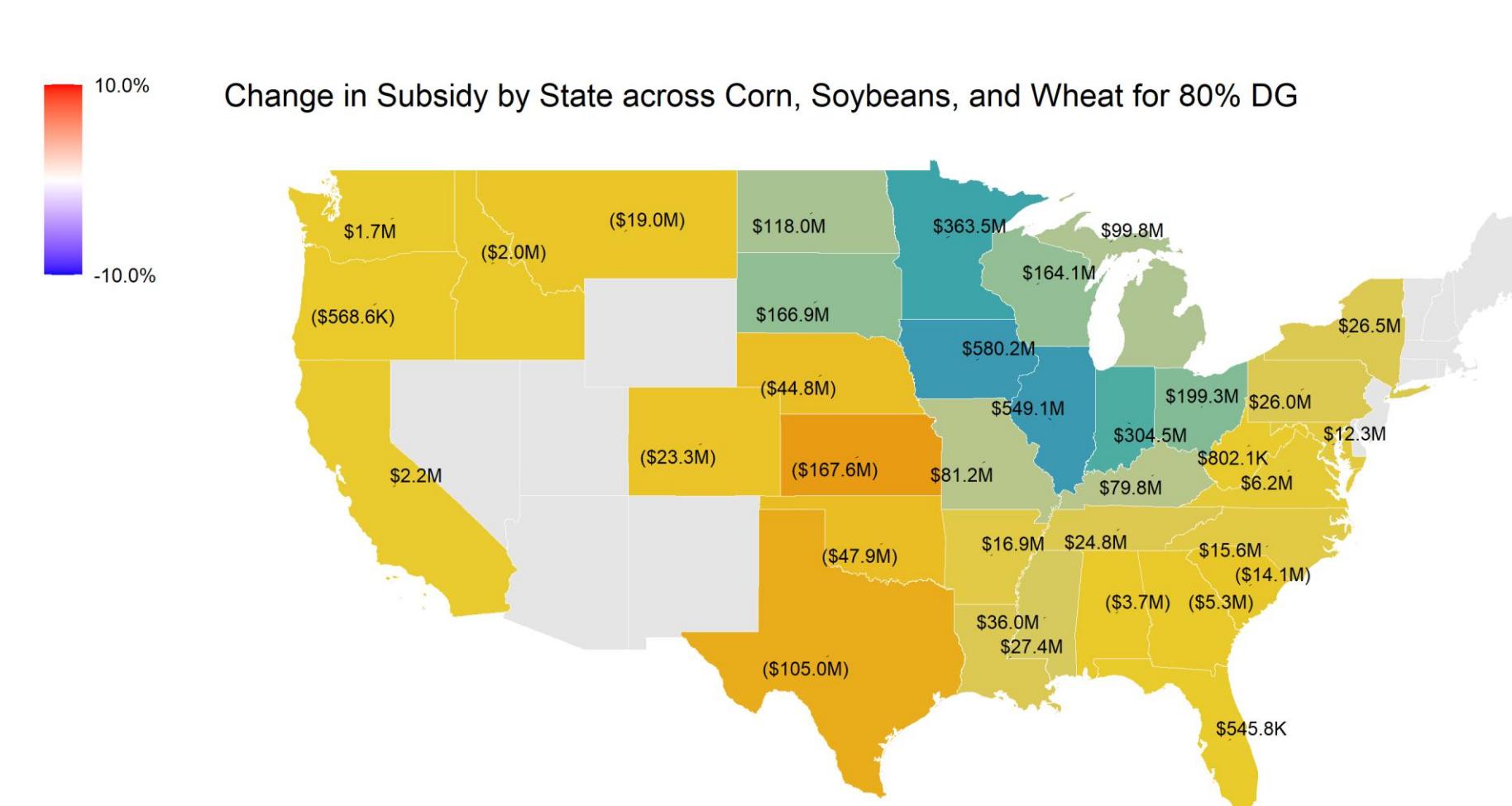
% Change in Corn Acres by County 80% DG



% Change in Soybean Acres by County 80% DG



Change in Subsidy by State across Corn, Soybeans, and Wheat for 80% DG



Policy Implications

- Moving to PGs dramatically decreases the variance of premium subsidies across counties on a per bushel and per acre basis across all three crops for all three types of crop insurance- YP, Whole Farm, and SCO
- Would result in premium subsidy redistribution of \$3.36 billion annually and around 3% average absolute change in acres by county
- Results are directly applicable to the Canadian context. Canada also uses DGs and between the federal and provincial governments subsidizes 60% of crop insurance premiums