The Impacts of Pasture Insurance on Farmland Values

Jennifer Ifft*
USDA, Economic Research Service
355 E St.SW, Washington, D.C. 20024
jifft@ers.usda.gov

Shang Wu
University of Delaware, Applied Economics and Statistics
213 Townsend Hall, Newark, DE 19716
swu@udel.edu

Todd Kuethe
USDA, Economic Research Service
355 E St.SW, Washington, D.C. 20024
tkuethe@ers.usda.gov

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Research Question

***What is the impact of the Pasture, Rangeland and Forage Pilot Program on Land Values*?**

Objective: To determine the value that farmland owners place on availability of insurance through the Pasture, Rangeland, Forage (PRF) Pilot Program

Background

- Federal crop insurance has expanded rapidly over the past two decades and is currently delivered through private insurance agents/companies.
- Crop insurance premium subsides increased from $950 million in 1999 to $7.4 billion in 2011. Acres insured increased from 197 million to 265 million.
- PRF insurance was started on a pilot basis in 2007, and gradually expanded to new counties and states. In 2011 PRF insurance was available in 24 states. PRF insurance premium subsides increased from $41 million in 2007 to $60 million in 2011. Acres insured increased from 28 million to 34 million.
- Given increases in enrollment over time, producers clearly value crop insurance as a risk management tool. Land values should therefore reflect the value that the market assigns to the availability of crop insurance, specifically the value of risk reduction as well as the premium subsidy.

The Issue

- Very little is known about the impact of any type of insurance on farmland values, and no available studies investigate the impacts of the availability of insurance or insurance premium subsidies.
- Crop insurance is an increasingly important component of US farm policy, and the impact of farm policies on land values is a key determinant of the ultimate beneficiaries those policies.
- Most crop insurance programs, as well as most farm programs, are implemented at the same time at the national level, making identification of the impacts of specific policies indistinguishable from other policy and market changes affecting the agricultural sector at that time.

Methods and data

- Our model is based on the standard capitalization formula frequently used to measure subsidy incidence.
    - We utilize an unbalanced panel that includes data on per pasture land values, where once sampled, fields remain in the survey for five years, after which new fields are sampled.
- The gradual rollout of PRF at the county level since 2007 provides a unique opportunity to measure the impact of agricultural insurance on land values.

- We use the rollout as a natural experiment, where farms receive "treatment" when PRF insurance becomes available in their county.

- We use two econometric approaches that are common for policy or program evaluation, including when policies are implemented gradually over time and space:
  1. A Differences-in-differences model:
     a. A basic Diff-in-Diff model controls for time trends and examines average land values before and after the policy intervention.
     b. We use tract-level observations from 2005 and 2010, so the same field is not observed in both 2005 and 2010.
  2. A field-level fixed effects model:
     a. Field (tract) level fixed effects control for unobserved heterogeneity, which may be correlated with the selection of counties for the PRF pilot program.
     b. We control for time effects as well as a region-time trends.
- Pasture land values are modeled as a function of revenue (including livestock revenue), government payments, and development and recreation potential.

1. $L = \beta_0 + \beta_1 PRF + \delta_0 I_{2010} + \delta_1 I_{2010} \cdot PRF + \beta_2 X + \mu$

2. $L_{ijt} = \boldsymbol{X_{it}}\beta + \delta_1 PRF + \delta_2 PRF_{\geq 3} + f_i + \tau + R_{jt} + \varepsilon_{ijt}$

- Data sources
  - USDA/NASS June Area Survey
  - Risk Management Agency (RMA) PRF coverage data
  - RMA Summary of Business
  - Bureau of Economic Analysis Database
  - NASS Quick Stats – Agricultural Census and Survey Data
  - Farm Service Agency (FSA) 1099 data

Variables

<u>Land Values</u>(L) Land used for pasture, $ per acre <u>Pasture Insurance</u> PRF insurance available for at least 1 year (PRF) PRF insurance available for at least 3 years ($PRF_{\geq 3}$) Rainfall or Vegetative Index PRF Insurance (X) <u>Revenue and land use variables</u> (X) Livestock income per acre pasture – county average Livestock expenses per acre pasture – county average Feed expenses per acre pasture – county average Government payments per acre pasture – county average

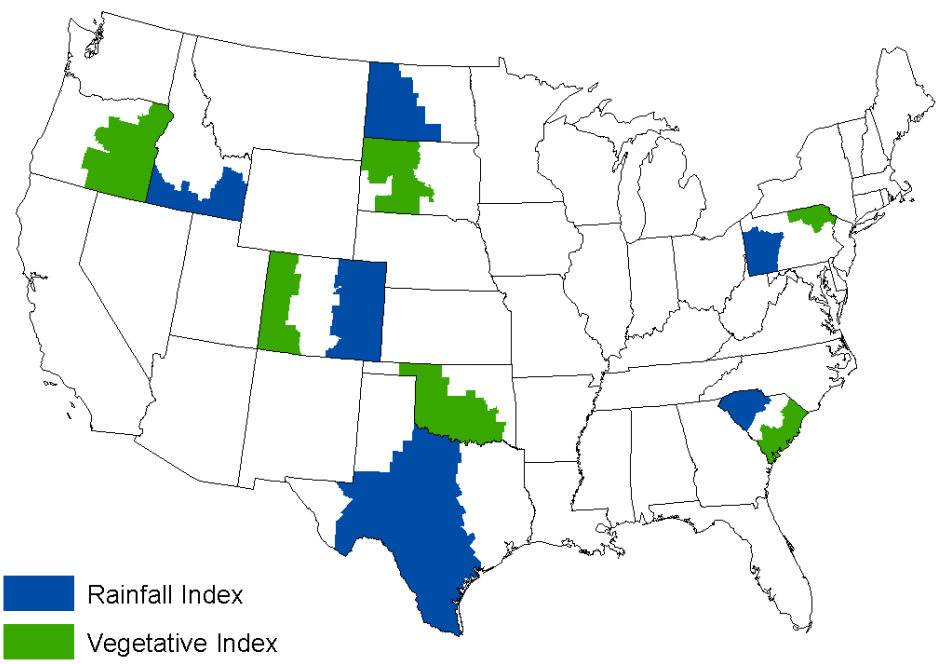
Percent acres in tract irrigated
Population – county level
Natural Amenities Index*
Median Soil Quality – county level*
State-Time Control (Time trend for states with PRF available in at least some counties)*

<u>Fixed Effects Model</u>
Tract (f_i)
Time (τ)
Region-time: NASS and ERS regions(R_{jt})

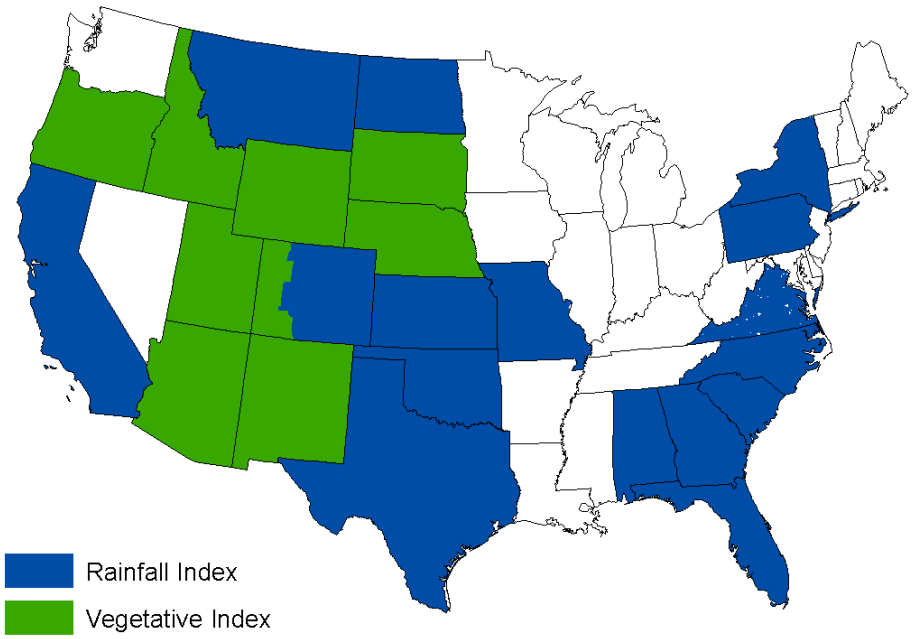
*Diff-in-Diff model only

Maps

PRF Coverage – 2007



PRF Coverage – 2011



Results

Diff-in-Diff and Fixed Effects Regression Results

	D-in-D	**D-in-D**	**FE**	**FE**	**FE**	**FE**
PRF	-451.1***	-535.2***	91.3*	86.8	88.0	72.4
	(111.3)	(140.9)	(54.8)	(54.7)	(56.9)	(62.9)
PRF-3yrs				242.8***	141.5**	154.9**
				(59.8)	(65.4)	(76.8)
PRFx2010	240.2*	394.9**				
	(130.8)	(178.5)				
2010	352.0***	474.6***				
	(94.1)	(84.8)				
State-time Control		X				
NASS Region-time effects					X	

ERS Region-time effects						X
R^2	0.33	0.33	0.02	0.02	0.03	0.04
Obs (weighted)	1,504,393	1,504,393	5,080,309	4,898,789	5,984,082	5,984,082
Groups			20,332	19,520	22,929	22,929

* significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level. Controls include: Population intensity index, natural amenity index, median soil quality (for D-in-D); past 3 year average of: government payments to pasture, livestock returns, feed expenses, livestock expenses (stock, etc.), population growth (FE only); a handful for counties from Wyoming and Montana that had Rangeland GRP Insurance prior to 2007 are excluded from our analysis. Our coefficients of interest are highlighted in yellow.

- The diff-in-diff model suggests:
  - Average pasture land values increased from 2005-2010
  - Average pasture land values in counties where PRF has been implemented are lower
  - Pasture land in counties where PRF was implemented experienced an increase in values over counties where PRF was not implemented
- The fixed effects model suggests:
  - PRF insurance is likely not immediately capitalized into pasture value
  - After at least 3 years of pasture insurance availability, land values increase by about $150. This is 7-8 percent of average pasture values from 2005-2010 in our sample.

Conclusions

- Results suggest PRF insurance is significantly valued by farm operations using pasture.
- Having PRF insurance over time can increase pasture values by approximately 7-8%.
- Capitalization of the PRF (about $150/acre) insurance is higher than the capitalized premium subsidy (about $123, with a $6.13 per acre premium subsidy in 2011 and discount rate of 5%), which suggests that producers value the risk reduction aspects of PRF insurance availability in addition to the premium subsidy.