Crop Insurance Participation Rate and its Asymmetric Effects on Yield Risk for US Corn and Soybeans

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Selected Poster prepared for presentation at the

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INTRODUCTION

- Farm incomes are highly variable and subject to sudden shocks
- Government programs such as crop insurance help to protect farmers from such risks
- Subsidies in the crop insurance market can raise the certainty equivalence of returns to farming above the cost of risk protection
- The disequilibrium may allow risk averse farmers to increase risk exposure to expand production or yields
- An increase in yield risk and drought sensitivity in farming is a potential outcome, affecting price stability
- Major studies have found increases in drought sensitivity in the Midwest where crop insurance use rates tend to be highest
- A relationship between crop insurance use and yield risk means that policy intervention can also help to address the issue.

RESULTS

- We perform a partial moment analysis
- We define our partial moment as deviations above or below a flexible polynomial trend of yield:
  \[ \mu_T^p(\tau) \equiv \int \tau^p \phi(\tau) \]
- The partial moment allows for the detection of asymmetric risk
- We extend the estimation to include instrumental variables
- Two instruments are used:
  - National trends in crop insurance participation growth rates as a result of policy changes
  - Changes to the national crop insurance premium subsidy rates
- Both instruments are correlated with national crop insurance demand
- Uncorrelated with county level factors that influence crop insurance demand
- All equations and instruments are combined into a single estimation equation as below:
  \[ e^p = \delta(\bar{I} + \alpha X_{i,t-1}) + (1 - \delta)(\bar{y}_t + \lambda X_{i,t-1}) + \delta \nu_p + (1 - \delta) \nu_p \]
- Fractional regression is used to generate instrument and Angrist and Pischke methods are used to produce instrument interactions

Methods

- To determine the response of yield risk to crop insurance participation rates
- To investigate the sensitivity of yields to droughts
- To determine asymmetric effects of crop insurance on yields to determine changes in downside risk exposure
- Use instrumental variables analysis to extract causal effects

Objective

- To determine the response of yield risk to crop insurance participation rates
- To investigate the sensitivity of yields to droughts
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RESULTS

- We find that crop insurance use is associated with an increase in downside risk for corn and soybeans.
- We also find increased sensitivity to drought as crop insurance participation rates increase.
- A few factors likely play a role
  - Expansion into lower quality acres
  - Changes in input use
  - Increased planting density to increase yields
  - Increased sensitivity to drought could imply greater price and farm income instability in the future
- Recommended policies will depend on the extent to which each factor contributes.

BIBLIOGRAPHY

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