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SURE Impact? An Empirical Investigation of Moral Hazard and Adverse Selection  
Behavior.

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## OVERVIEW

What is SURE?

- SURE is the Supplemental Agricultural Disaster Assistance program (2008 Farm Bill, section 12033).
- Producers must purchase a federally subsidized crop insurance on all planted crops to be eligible for SURE.
- SURE provides disaster relief payments for:
  - Farms within or bordering counties qualified for natural disaster coverage.
  - Farms experiencing weather related losses that reduce farm wide output by more than 50% of the annual production history (APH).
- Farms experiencing production losses that exceed 50% do not need to be within a natural disaster area to receive SURE indemnities.**

Relevant Research Questions

- Can SURE exacerbate adverse selection and moral hazard behavior in multiple peril crop insurance (MPCI)?
- How can SURE's impact on producer behavior be measured?
- Has SURE affected producer behavior?**

## THE SURE PROGRAM

Intent: provide disaster relief payments to U.S. agricultural producers in cases of unexpected, rare, and catastrophic production losses.

Participation requirements: purchase federally subsidized MPCI coverage for all planted crops.

Stipulations for SURE Payments

- Be within or border a declared natural disaster area **OR** have farm wide production losses that exceed 50% of the annual production history.
- The *revenue guarantee* (115% of expected farm revenue) must be greater than the farm wide *revenue-to-count* (sum of estimated market revenue, 15% of direct payments, countercyclical payments, and all MPCI indemnities).

SURE payment: 60% of the differenced between revenue guarantee and revenue-to-count.

## CAN SURE AFFECT BEHAVIOR?

Producer's incentives to participate in MPCI

- Minimize revenue risk from unexpected yield losses and market price variability.
 

**Moral hazard incentive: Low**
- Increase revenues from subsidized indemnity payments (such as SURE).
 

**Moral hazard incentive: High**

An increase in MPCI indemnities reduces SURE payments. Why would producers want to trigger SURE?

\$1 of SURE payment is offset by \$0.60 of MPCI payments → **Net Revenue from SURE : \$0.40**

CAN SURE CAUSE MORAL HAZARD INCENTIVES?  
**YES**

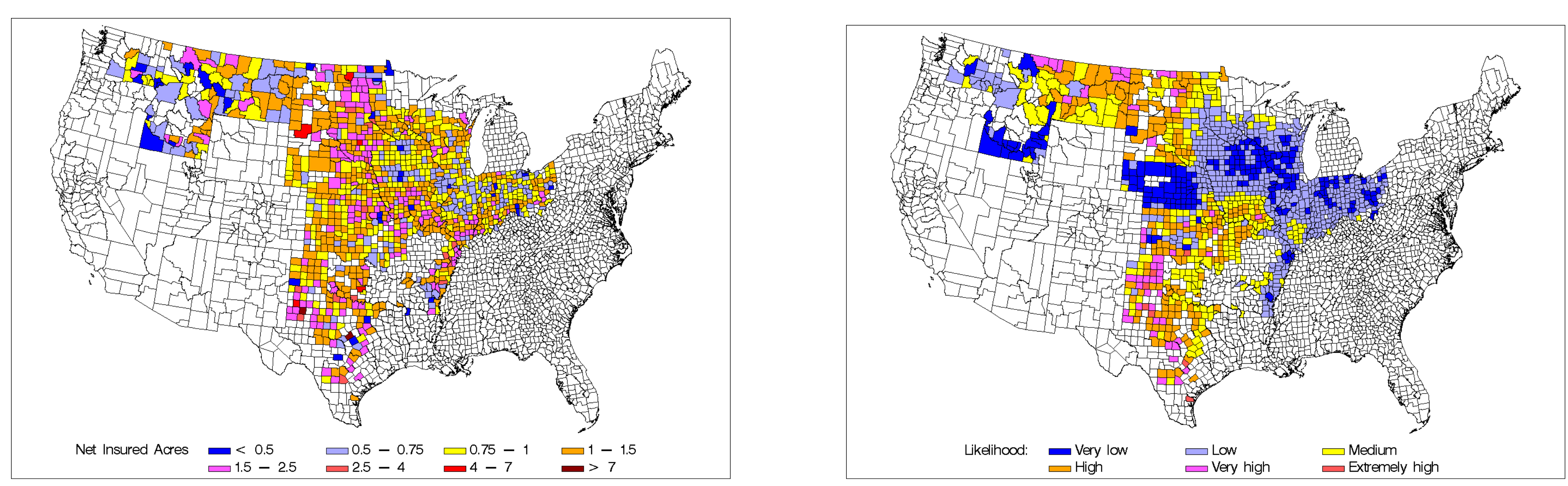
## MEASURING A SURE IMPACT

Tracking SURE effects

Because SURE eligibility requires farm wide MPCI coverage, impacts of SURE may be deduced from changes in net insured acreage.

**If producers who are more likely to trigger SURE (experience yield losses above 50%) increase net insured acreage, then the policy may be creating moral hazard incentives.**

### Impacts of SURE



(a) Net insured acres (Ratio of net insured acres in 2009 to net insured acres in 2007)

(b) Likelihood of Moral Hazard Behavior (Recent deviation from APH × historical yield volatility)

## THE EMPIRICAL MODEL

Conceptualization: measure changes in net insured acres before and after SURE, controlling for:

- Behavior that can trigger SURE indemnities.
- Other factors that affect MPCI demand.

Modeling Details – Explanatory Variables

### Factors that can trigger SURE payments

Yield deviations from APH Recent deviations from APH may signal attempts to temporarily increase efforts and inflate historical yields. After APH is inflated, producers return to original or lower effort level. Because APH is inflated triggering the 50% loss threshold is easier.

Yield deviations at risky farms Yield deviations that occur on farms that historically experience highly volatile yields may be the primary indicators of moral hazard behavior.

### Other factors altering MPCI demand

- |                                |                              |
|--------------------------------|------------------------------|
| MPCI premium rates             | MPCI loss ratios             |
| Farmer age                     | Farm size                    |
| Number of planted crops        | Land value                   |
| Proportion of full farm owners | Proportion of irrigated land |

## ESTIMATION DETAILS

- Corn, soybeans, and wheat were analyzed. Only the top ten producing states for each crop were chosen.
- All variables that rely on yields are constructed using time “detrended” yields.
- Yields are “detrended” using penalized B-spline functions with a single knot at the 50<sup>th</sup> of the data. Cross-validation is used to not overfit the data.
- Historical yield volatility (farm riskiness) is the coefficient of variation measure from the yield trend curve.
- Farm characteristics were extrapolated from 2002 and 2007 Census of Agriculture using natural splines.
- Ordinary least squares are used. Heteroskedasticity robust standard errors are reported for all estimations.
- County-level estimation was performed for two aggregation levels:
  - All insurance policies for each crop.
  - Individual insurance policies for each crop.

## ESTIMATION RESULTS

**The variable of interest is “Yield deviations at risky farms”: producers who are more likely to trigger the 50% loss threshold and acting to inflate the APH.**

**Finding statistically significant parameter estimates of “Yield deviations at risky farms” may indicate moral hazard behavior in response to the 2008 SURE policy.**

### IS “YIELD DEVIATIONS AT RISKY FARMS” STATISTICALLY SIGNIFICANT?

#### Aggregation across all insurance policies

Corn	Soybeans	Wheat
<b>YES</b> (1% level)	<b>YES</b> (1% level)	<b>YES</b> (1% level)

#### By insurance policy

Policy	Corn	Soybeans	Wheat
APH	<b>YES</b> (1% level)	<b>YES</b> (1% level)	<b>YES</b> (1% level)
CRC	<b>NO</b> (1% level)	<b>NO</b> (1% level)	<b>NO</b> (1% level)
GRIP	<b>NO</b> (1% level)	<b>NO</b> (1% level)	– (1% level)
GRP	<b>NO</b> (1% level)	<b>NO</b> (1% level)	– (1% level)
IP	<b>NO</b> (1% level)	<b>NO</b> (1% level)	– (1% level)
RA	<b>YES</b> (1% level)	<b>YES</b> (1% level)	<b>NO</b> (1% level)

**Note:** Parameter estimates for GRIP, GRP, and IP wheat policies were not estimated due to insufficient observations.

## IMPLICATIONS

- Smith and Watts (2010) simulate and show SURE effects on moral hazard incentives.
  - This study examines MPCI demand before and after SURE to empirically test for moral hazard behavior. Potential moral hazard behavior exist in the production of three major U.S. crops.
  - Farm level data may be able to provide a more effective indicator of moral hazard and adverse selection behavior in response to SURE.
- Empirical evidence suggests the 2008 SURE policy may exacerbate moral hazard and adverse selection behavior in U.S. corn, soybeans, and wheat producers.**