# The Effect of Crop Insurance on Agricultural Loan Delinquencies

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- **Contributions:**
  - This study provides new empirical evidence about the impact of crop insurance participation on farm loan delinquency rates;
  - Given that our unique longitudinal data set separates out these two types of loans—production and real estate loans, we offer novel empirical insights as to whether the impact of crop insurance on loan delinquency differs depending on the type of loan taken by the farmer.

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  - Ratio of 'total actual liability' in the county (for each year) over 'total possible liability';
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- **Weather variables, unemployment rate, and farm net income.**

# Empirical Strategy

- We estimate the effect of crop insurance participation on agricultural loan delinquencies at the county-level based on the following specification:

$$Delinq_{it} = \beta_1 Ins_{it} + \beta_2 W_{it} + \beta_3 X_{it} + \lambda t + \gamma_i + \epsilon_{it}$$

where:

- $Delinq_{it}$: agricultural loan delinquency rates (%) in county $i$ in year $t$
- $Ins_{it}$: liability-based crop insurance participation rate (%) for county $i$ in year $t$
- $W_{it}$: weather variables (GDD, HDD, precipitation, precipitation squared)
- $X_{it}$: unemployment rate and farm net income
- $t$: a linear time trend
- $\gamma_i$: county fixed effects
- $\varepsilon_{it}$ is the error term

- **Estimation Strategies:**
  - Linear panel FE
  - IV-FE: using total insurance premium subsidy rate as an instrument variable

# Empirical Results

Table: Effects of Crop Insurance Participation on Agricultural Loan Delinquency

| | Production Loan | | Real Estate Loan | | Overall Ag Loan | |
|---|---|---|---|---|---|---|
| | FE | IV-FE | FE | IV-FE | FE | IV-FE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Ins | -0.0030*** | -0.0298*** | -0.0048*** | -0.0182** | -0.0045*** | -0.0274*** |
| | (0.0011) | (0.0056) | (0.0015) | (0.0074) | (0.0011) | (0.0088) |
| Unemployment Rate | 11.6859*** | 12.1088*** | 16.7637*** | 16.9756*** | 14.3228*** | 14.6867*** |
| | (0.7324) | (1.3518) | (0.9512) | (1.5128) | (0.6971) | (2.0078) |
| Income | -1.0836** | -0.8465 | -2.3101*** | -2.1919*** | -2.1455*** | -1.9426 |
| | (0.5460) | (0.6167) | (0.7093) | (0.7459) | (0.5198) | (1.2781) |
| GDD | 0.2706** | 0.4252*** | 0.3318** | 0.4090*** | 0.2279** | 0.3604* |
| | (0.1196) | (0.1093) | (0.1554) | (0.1380) | (0.1139) | (0.1921) |
| HDD | -0.9242 | -0.5349 | -0.5276 | -0.3324 | -0.5908 | -0.2557 |
| | (0.8807) | (0.6894) | (1.1438) | (0.9610) | (0.8382) | (1.3116) |
| Precipitation | 0.1601 | 0.0499 | 1.6845*** | 1.6296*** | 0.8602* | 0.7659 |
| | (0.4839) | (0.5021) | (0.6286) | (0.5837) | (0.4607) | (0.5921) |
| Precipitation squared | 0.0565 | 0.0153 | -1.0416** | -1.0624** | -0.4835 | -0.5191 |
| | (0.3694) | (0.3701) | (0.4798) | (0.4321) | (0.3516) | (0.4764) |
| Time Trend | -0.0574*** | 0.0128 | -0.0241*** | 0.0110 | -0.0328*** | 0.0274 |
| | (0.0037) | (0.0146) | (0.0048) | (0.0213) | (0.0035) | (0.0286) |
| County FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 19813 | 19813 | 19815 | 19815 | 19815 | 19815 |
| F-statistic | | 513.70*** | | 513.56*** | | 36.34*** |
| Kleibergen-Paap rk LM statistic | | 341.09*** | | 341.03*** | | 10.76*** |

- We find a negative and statistically significant impact of crop insurance on county-level agricultural loan delinquency rates.

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| HDD | -0.9242 | -0.5349 | -0.5276 | -0.3324 | -0.5908 | -0.2557 |
| | (0.8807) | (0.6894) | (1.1438) | (0.9610) | (0.8382) | (1.3116) |
| Precipitation | 0.1601 | 0.0499 | 1.6845*** | 1.6296*** | 0.8602* | 0.7659 |
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- We find a negative and statistically significant impact of crop insurance on county-level agricultural loan delinquency rates.
- Results are robust when using alternative crop insurance participation measures and different estimation strategies (i.e., alternative IVs and "external-IV-free" Kinky regression approach).

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- **Limitations:**
  - First, our study uses more aggregate county-level data rather than individual farm-level data;
  - Second, the geographic scope of the current study is mainly focused on the US Midwest and we specifically conduce the empirics largely for corn operations.

Questions or Comments?
Thank you!!