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What Kinds of Rural Irrigation Infrastructure Have Played Role on Dealing with Drought ?

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What Kinds of Rural Irrigation Infrastructure have Played Role on Dealing with Drought?

Huang Chen^{1*}, Jinxia Wang¹, Jikun Huang¹

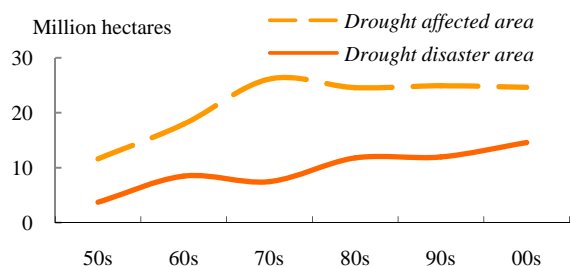
1) Center for Chinese Agricultural Policy, Chinese Academy of Sciences

Institute of Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences



Motivation

- Drought became increasingly frequent in China.



- The Chinese government will invest 4 trillion Yuan on irrigation infrastructure for enhance resistance to the drought in next ten years.

Research Questions

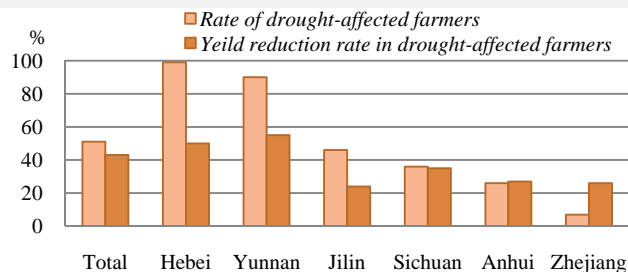
- How did the drought occur and its influence on crop production during the past few years?
- What about the current situation of irrigation infrastructure?
- Which kinds of irrigation infrastructure have played significant roles?

Methods and Data

- Econometric model analysis.
- Data come from a face to face field survey conducted in 2010, covered 1,118 farmers, 107 villages and 18 counties in 6 provinces in China.

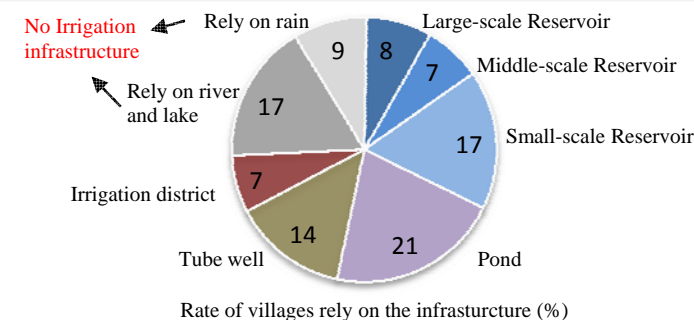


Drought Influence in 2006-2010



- Half of farmers have been affected by drought in past 5 years.
- The most severest drought cause 40% yield reduction

Utilization Status of Irrigation Infrastructure



Descriptive Analysis

| | No reduction | 1%-33% reduction | 34%-66% reduction | 67%-100% reduction |
|-------------------------|--------------|------------------|-------------------|--------------------|
| Larger scale reservoirs | 12 | 7 | 3 | 6 |
| Middle scale reservoirs | 9 | 9 | 4 | 2 |
| Small scale reservoirs | 12 | 17 | 14 | 38 |
| Pond | 25 | 18 | 18 | 7 |
| Tube well | 3 | 22 | 31 | 17 |
| Irrigation District | 9 | 6 | 4 | 0 |
| Rely on river and lake | 19 | 15 | 15 | 19 |
| Rely on rain | 12 | 6 | 11 | 12 |

Econometric Analysis

- Econometric model (OLS):

$$y_{ij} = \alpha + \beta W_{ij} + \gamma V_{ij} + \delta H_{ij} + \lambda D_{ij} + \varepsilon_{ij}$$

where y_{ij} is yield reduction rate of farmer i in village j ; W_{ij} is a vector of irrigation infrastructure dummy variables (set “rely on rain” as control group); V_{ij} , H_{ij} and D_{ij} are (village, household and regional) control variables.

- Estimation results of key variables:

| | Coefficient | T Value |
|-------------------------|-------------|-----------|
| Larger scale reservoirs | -0.106 | (2.64)*** |
| Middle scale reservoirs | -0.068 | (1.73)* |
| Small scale reservoirs | -0.051 | (1.35) |
| Pond | -0.047 | (2.41)** |
| Tube well | -0.061 | (1.80)* |
| Irrigation District | -0.05 | (1.12) |
| Rely on river and lake | -0.12 | (3.55)*** |
| Adjusted R ² | 0.55 | |

Note: “*”, “**” and “***” respectively means P<0.1, P<0.05 and P<0.01.

Conclusions and Political Implication

- Nearly half of farmers suffered drought in 2006-2010, and the drought caused 40% yield reduction on them.
- 26% villages have not been covered by irrigation infrastructure yet, which need more investment in future.
- Large-scale and middle-scale reservoirs, pond and tube well play significant role in dealing with drought, comparing with the type of “rely on rain”.
- Expanding investment on irrigation infrastructure is a wise choice under the increasing threat of drought. It should not only focus on larger scale facilities, e.g. reservoirs, but also consider small one, such as pond and tube well.