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**Willingness to Pay for Tomato Price Insurance in Beijing-Tianjin-Hebei**

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***Selected Paper prepared for presentation at the 2017 Agricultural & Applied Economics Association  
Annual Meeting, Chicago, Illinois, July 30-August 1***

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## Introduction

- ❖ **Local fresh vegetables** are in high demand in China, especially in large cities such as Beijing and Shanghai
- ❖ **Green leafy vegetable price index insurance (VPI)** was successfully implemented in Shanghai with a 50% subsidy by government
- ❖ People in Beijing-Tianjin-Hebei (BTH) region consume more **fruit-type vegetables** like tomato and no VPI is available in the BTH region

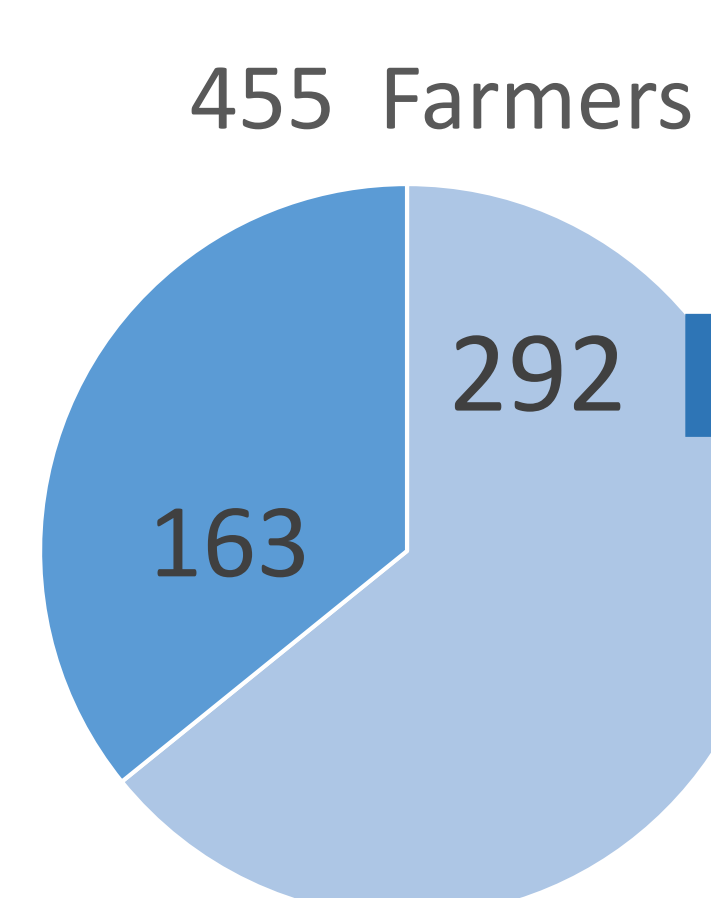
## Objective

- ❖ Identify factors associated with a BTH farmer's willingness to pay (WTP) for tomato price insurance if it was introduced in the BTH region and if the farmer is willing to insure (Guan, Ahrendsen, and Liu, 2017).

## Insurance premium and payout

- ❖ **Insured revenue:** estimated production in kg per area \* estimated production cost per kg \* 0.70
- ❖ **Premium** = 0.10 \* Insured revenue
- ❖ **Payout** per area is the insured revenue multiplied by the percentage of price difference between 1.05 times the estimated average market price for the previous 3 marketing years and the market price for the current marketing year.

## Willingness to insure and to pay



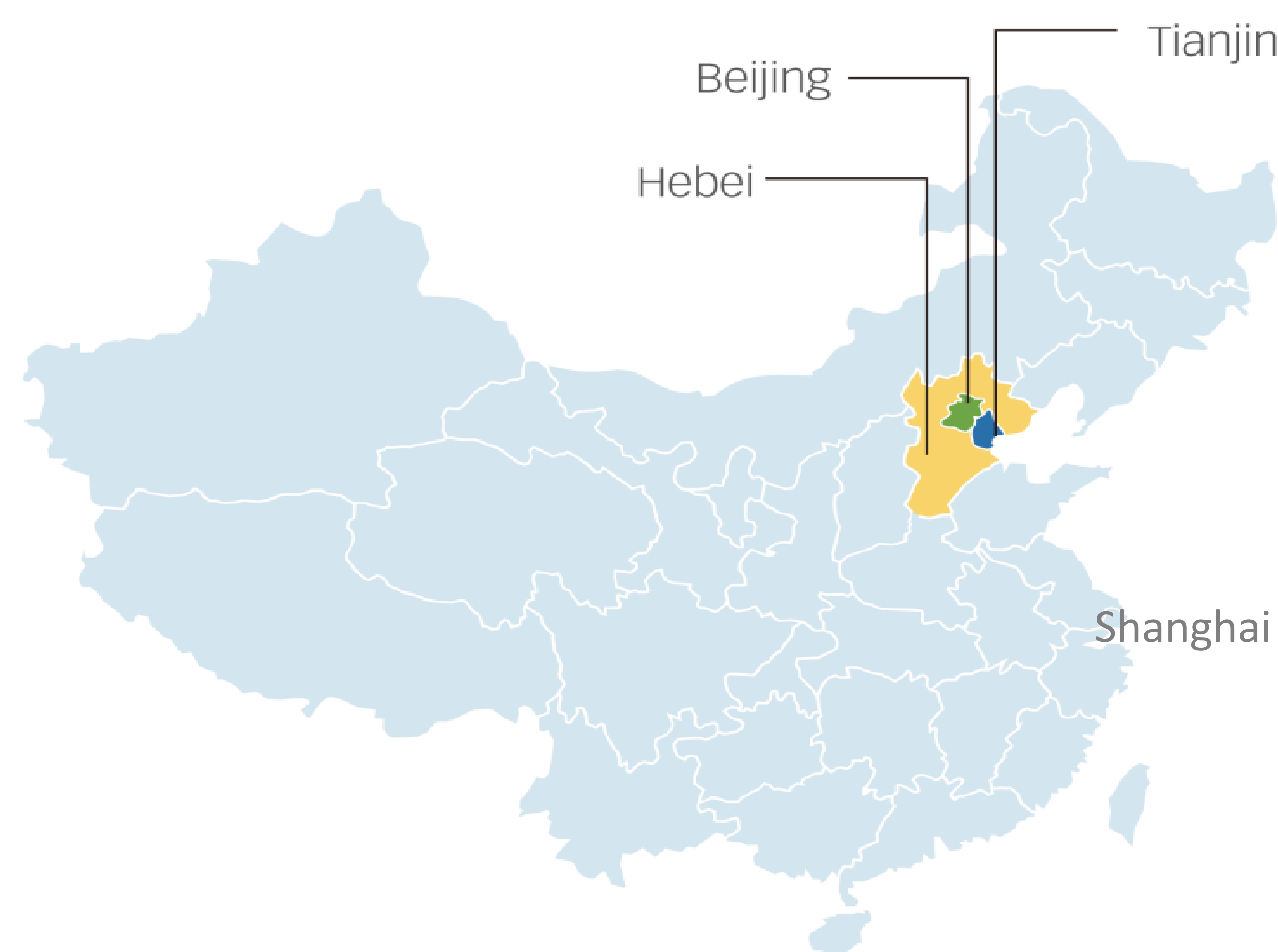
- ❖ WTP is for the 292 farmers who are willing to insure vegetable prices
- ❖ Use popular tomato as example to estimate the WTP for price insurance

■ willing to insure ■ not willing to insure

**Acknowledgements:** This work is part of a project (05162130111242003) "The Collaborative Supply of Fresh Production in Beijing-Tianjin-Hebei Region" sponsored by the Chinese Ministry of Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the Chinese Ministry of Agriculture, University of Arkansas, or China Agricultural University.

## Data and Method

- ❖ Survey sponsored by China Ministry of Agriculture
- ❖ Farmers randomly selected from 28 villages and 7 counties in BTH region, July-August 2016



- ❖ Two sets of tomato price insurance premiums (RMB/mu) are considered since two methods of tomato production are common<sup>2</sup>
  - **Outdoor:** 250, 200, 150, 100, 50 till they accept, which corresponds to  $WTP \geq 250$ ,  $200 \leq WTP < 250$ ,  $150 \leq WTP < 200$ ,  $100 \leq WTP < 150$ ,  $50 \leq WTP < 100$ , if 50 was not accepted, then  $WTP < 50$
  - **Greenhouse:**  $WTP \geq 510$ ,  $408 \leq WTP < 510$ ,  $306 \leq WTP < 408$ ,  $204 \leq WTP < 306$ ,  $102 \leq WTP < 204$ , if 102 was not accepted, then  $WTP < 102$
- ❖ **Interval regression**
  - Dependent variable  $y_i^*$  is unobserved and modeled as  $y_i^* = x_i \beta + e_i$ .
  - with four categories of independent variables ( $x_i$ ) (**location, demographic, farm characteristic, risk cognition**) with unknown weights  $\beta$  and  $e_i \sim N(0, \sigma^2)$ .

$$y_i = j \text{ if } A_{j-1} \leq y_i^* < A_j,$$

$$\text{for } j = 1, \dots, J, A_0 = -\infty, A_J = +\infty$$

where  $A_j$  are the observed threshold values for the intervals (Greene, 2002).

## Interval Regression WTP Results

for outdoor and greenhouse tomato production

N=292	Outdoor		Greenhouse	
	Marginal effect	P_Value	Marginal effect	P_Value
TIANJIN	297.9***	0.000	19.55	0.626
HEBEI	280.1***	0.000	12.20	0.745
MALE	15.61	0.443	51.46*	0.068
AGE	1.445	0.205	-3.456**	0.029
EDUMED	-0.109	0.997	-88.14**	0.028
EDUHIGH	35.65	0.271	-99.30**	0.032
EXPERIENCE	-1.614	0.219	1.903	0.295
DECMAKER	-61.33**	0.035	67.84	0.104
ORG	-56.39**	0.019	8.993	0.769
WHETMT	-12.31	0.520	37.00	0.165
FARMSIZE	-0.016	0.973	0.198	0.787
OFF-FARM	-1.690	0.929	57.28**	0.030
YIELD	0.268	0.645	-0.026	0.975
NETINCOME	0.553	0.246	0.362	0.491
OTHER_INS	-2.693	0.894	13.58	0.647
EFF_INS	11.56	0.306	30.07*	0.068
ATTENTION	69.84	0.294	-276.1***	0.006

## Conclusions

- ❖ **Outdoor tomato production**
  - Demand in Beijing is weak relative to Tianjin and Hebei; Government might consider to increase subsidy to farmers who plant outdoor tomatoes in Beijing relative to Tianjin and Hebei.
  - Farmers who belong to a marketing organization, but still need to protect revenue, may need more subsidy (56 RMB/mu)
- ❖ **Greenhouse tomato production**
  - Government may need to subsidize older and more educated farmers more relative to younger and less educated farmers
  - Farms with an additional household member working off-farm may need less subsidy (57 RMB/mu)
  - Farmers who pay close attention to market prices are much less willing to pay for price insurance and may need a larger subsidy

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<sup>2</sup> RMB is the Chinese currency unit, where 1 RMB=0.14 USD, and mu is Chinese area unit, where 1 mu = 666.67 meter<sup>2</sup> = 0.066667 hectare = 0.16474 acre