Three Essays on Agricultural Policy and Food Demand

Jing Zhao

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Three Essays on Agricultural Policy and Food Demand

Presented by Jing Zhao
University of Missouri

Wyatt Thompson (advisor) and Willi Meyers (committee member)

Presentation at the Annual Meeting of the IATRC
Clearwater, Florida, Dec 14, 2015

Achievements

- *Essay 1 : The Influence of Wheat Price Support Policy in China: A Counterfactual Analysis*

Test the effects of recent China wheat price support and stock policies on the domestic market, considering both levels and variability.

- Essay 2 : Using Income Growth to Extrapolate Future Wheat Producer Support

Estimate the relationship between wheat support and income, and use this relationship to project future support.

- Essay 3 : The effect of Refrigerator Ownership on Food Consumption in Rural China

Estimate the impact of refrigerator ownership on food consumption in rural China, with implications for demand estimation and food waste.

Essay 1

Question: How did China's wheat price support and stock holding policies affect the domestic market?

Wheat Market Characterization

- Describe policy environment
- Data show (a) the role of support price and (b) not integrated with world market

Simulation Model Development and Counterfactual Analysis

- Build and estimate partial equilibrium model of the China wheat market
- Calibrate to historical data
- Counterfactual case of no public stock holding

Sensitivity Analysis

- Private stocks (a) crowding out and (b) price response
- Interaction with corn price
- Speed of domestic supply response

Essay 1-results

Removing government stocks and price support on the wheat market in China →

Lower price initially, higher price later

Lower domestic production and slightly higher average domestic use

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
	(percent change from historical values)							
Price	-9.0	-5.1	-9.2	-9.3	-4.4	-0.1	3.8	9.7
Production	0.0	-1.0	-1.4	-2.1	-2.8	-2.8	-2.2	-1.2
Food use	1.4	0.4	1.5	1.6	0.6	0.0	-0.6	-2.0

Standard deviation of wheat market price under different scenarios →

Government stocks reduced price volatility by this measure

	Historical	Base scenario*	Alternative degrees of displacement		Alternative percentage of corn price change		Alternative price elasticity	
			0.7	0.9	0.05	0.1	-0.44	-1.22
Standard Deviation	343	468	522	411	472	474	543	426

* The base scenario column shows the results using the parameters of baseline, but without government stocks.

Essay 2

- Questions: Is there any historical pattern for wheat support?
  - Builds on work of Anderson (1995), Anderson et al. (2008), Anderson et al. (2010), and others
  - Goal: can we use the pattern to project support into the future?

- Method: Fixed Effect Model

$$Y_{it} = \alpha_0 + \alpha_1 Inc_{it} + \alpha_2 Inc_{it}^2 + \alpha_3 Inc_{it}^3 + \sum \beta_k D_k + \gamma TS_{it} + \delta APR_{it} + \varphi PALA_{it} + \sum_1^{n-1} \alpha_i + \varepsilon_{it}$$

Essay 2

Nominal rate of assistance (total or component)

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Income per capita

Trade status

Arable land per capita

$$Y_{it} = \alpha_0 + \alpha_1 Inc_{it} + \alpha_2 Inc_{it}^2 + \alpha_3 Inc_{it}^3 + \sum \beta_k D_k + \gamma TS_{it} + \delta APR_{it} + \varphi PALA_{it} + \sum_1^{n-1} \alpha_i + \varepsilon_{it}$$

Fixed effects

Dummies for unusual world prices and a shift in 1998 or 2002 (proxy WTO)

Agriculture population share

Essay 2– Main Results

Dependent Variables	NRA total	NRA_o output	NRA_bms border measures	NRA_dms domestic support	NRA_i input support
Lagged Dependent Variable	0.61 (0.02)***	0.61 (0.02)***	0.59 (0.02)***	0.56 (0.02)***	0.74 (0.02)***
Ln(Inc_lag)	-1.58 (0.80)**	-1.60 (0.80)**	-1.36 (0.79)*	-0.26 (0.32)	-0.01 (0.05)
Ln(Inc_lag)^2	0.23 (0.10)**	0.24 (0.10)**	0.20 (0.10)**	0.04 (0.04)	0.00 (0.01)
Ln(Inc_lag)^3	-0.01 (0.00)**	-0.01 (0.00)**	-0.01 (0.00)**	-0.00 (0.00)	-0.00 (0.00)
Dummy 1	-0.29 (0.04)***	-0.30 (0.04)***	-0.28 (0.04)***	-0.03 (0.02)	0.00 (0.00)
Dummy 2	0.23 (0.03)***	0.23 (0.03)***	0.25 (0.03)***	-0.01 (0.02)	0.00 (0.00)
Dummy 3	-0.08 (0.03)***	-0.07 (0.03)**	-0.08 (0.03)***	0.01 (0.02)	-0.00 (0.00)
Trade	0.09 (0.03)***	0.09 (0.03)***	0.07 (0.03)***	0.02 (0.02)	0.00 (0.00)
Shift	-0.07 (0.02)***	-0.07 (0.02)***	-0.04 (0.02)*	-0.03 (0.01)**	-0.00 (0.00)**
Adjusted R^2	0.65	0.65	0.62	0.41	0.71

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Evidence suggests

1. Nonlinear income effect
2. Middle income → rising NRA, NRA_o, NRA_bms
   Support falls and flattens for high income countries
3. Less income impact on NRA_dms, NRA_i

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Shift	**-0.07 (0.02)*** **	**-0.07 (0.02)*** **	**-0.04 (0.02)* **	**-0.03 (0.01)** **	**-0.00 (0.00)** **
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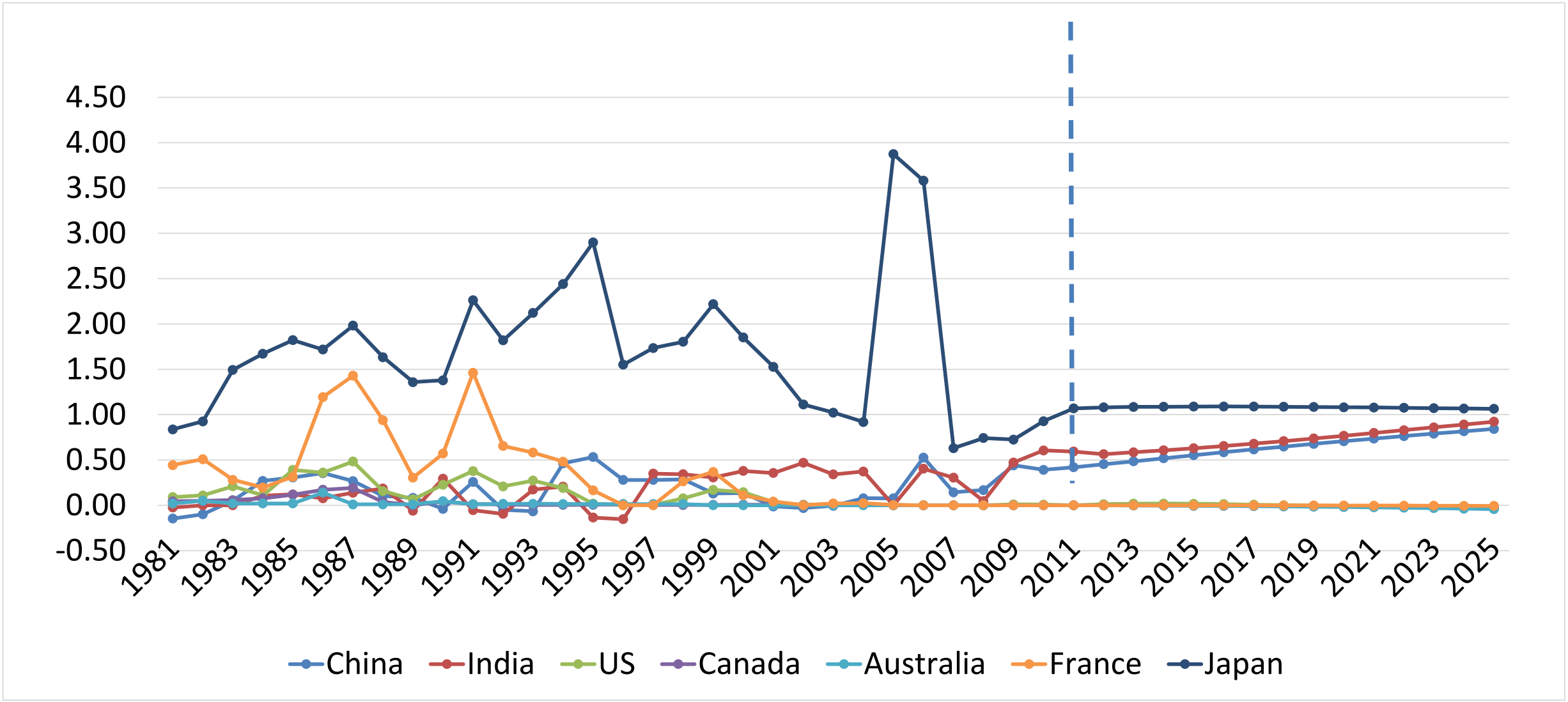
Proxy for WTO (implementation or accession) has negative effect on NRA, NRA_o, NRA_bms, NRA_dms, NRA_i

Essay 2--Projecting wheat support in selected Countries



Essay 3

- Did the refrigerator ownership affect food consumption in rural China?
- Data: rural household survey
  - Measures actual consumption at home
- Methods:
  - Fixed effect model
    (few constraints based on economic theory, more statistical)
  - Quadratic AIDS model with group expenditure
    (theoretical constraints imposed)

Essay 3– refrigerator ownership effect on shares and on expenditures

Explanatory variables	Effect on expenditures by food group						Effect on overall food expenditure
	grain	fat&oil	meat	egg	seafood	vegetable	
Refrigerator ownership	-0.0002 (0.0003)	0.0003 (0.0002)*	0.0004 (0.0004)	0.0001 (0.0001)	0.0002 (0.0001)*	-0.0009 (0.0002)***	-0.0067 (0.003)**

(Note: only QUAIDS results shown to conserve time. FE and RE model results similar.)

Essay 3– Elasticity with and without refrigerator ownership

Meat elasticity

	With refrigerator	Without refrigerator
Marshallian Elasticity	-0.52	-0.55
Hicksian Elasticity	-0.16	-0.17

Expenditure Elasticity

	Grain	Fat&oil	Meat	Egg	Seafood	Vege	Fruit
With	0.66	0.98	1.07	2.12	1.16	1.37	0.51
Without	0.60	1.06	1.15	2.11	1.23	1.24	0.64
Comparison	-0.06	0.08	0.08	-0.01	0.07	-0.13	0.13

Essay 1 : The Influence of Wheat Price Support Policy in China

Main instrument has been government stocks and trade restrictions

No government stocks but same trade policy→

lower and more variable price, lower production, more consumption

Essay 2 : Using Income Growth to Extrapolate Future Wheat Producer Support

Nonlinear income effect on support and support instruments

Project support: e.g. rising wheat NRA in China and India to 2025

Not safe to assume constant support for future analysis (climate change, food security)

Essay 3 : The effect of Refrigerator Ownership on Food Consumption in Rural China

Causes lower total food expenditure

Omitting refrigerator ownership can bias elasticity estimates

Questions?