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Dynamic Impacts of Grain Policy Changes on Chinese Soybean Price

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Dynamic Impacts of Grain Policy Changes on Chinese Soybean Price

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Introduction

- Soybean is one of the most important grain in China and its consumption has steadily increased every year.
- Soybean consumption increased from 27.11 million tons in 2000 to 79.5 million tons in 2014. However, soybean acreage and production have decreased continuously.
- As a result, Chinese soybean production could not be able to meet domestic demand. Soybean import has increased continuously; therefore, more than 80% of soybean consumption has been imported since 2011.

Objectives

- The objective of this study is to analyze long-run equilibrium, asymmetric and dynamic responses between Chinese soybean prices and global soybean prices after China's grain policy changes.
- We attempt to estimate whether grain policies altered Chinese soybean price structure effectively, and how Chinese soybean market structure changed over the three periods.
- Considering grain policy changes
Period I (2003/9/22–2006/6/30)
Period II (2006/7/3–2008/2/29)
Period III (2008/3/3–2015/12/31)

Methods

Asymmetric ECM

$$\Delta LSC_t = \alpha + \sum_{p=1}^m (\beta_p^+ \Delta LSC_{t-p}^+ + \beta_p^- \Delta LSC_{t-p}^-) + \sum_{q=0}^n (\gamma_q^+ \Delta LSG_{t-q}^+ + \gamma_q^- \Delta LSG_{t-q}^-) + \lambda^+ ECM_{t-1}^+ + \lambda^- ECM_{t-1}^- + \omega_t$$

Asymmetric ECM with Exponential GARCH

$$\log(\sigma_t^2) = \pi + \sum_{j=1}^a \theta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^b [\varphi_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \tau_i \frac{\varepsilon_{t-i}}{\sigma_{t-i}}]$$

Methods

Asymmetric ECM with GJR-GARCH

$$\sigma^2 = \pi + \sum_{j=1}^a \theta_j \sigma_{t-j}^2 + \sum_{i=1}^b \varphi_i \varepsilon_{t-i}^2 + \sum_{r=1}^c \delta_r \varepsilon_{t-r}^2 \cdot D_r$$

Asymmetric ARDL

$$\Delta LSC_t = \alpha + \sum_{x=1}^a (\beta_x^+ \Delta LSC_{t-x}^+ + \beta_x^- \Delta LSC_{t-x}^-) + \sum_{y=0}^b (\gamma_y^+ \Delta LSG_{t-y}^+ + \gamma_y^- \Delta LSG_{t-y}^-) + \epsilon_t$$

Results

Period I

We found an asymmetric long-run relationship between Chinese and global soybean market because China did not implement any agriculture subsidy policy.

Asymmetry test (Asymmetric ECM)

		ECM
ΔLG_t	F-statistic	0.536
	p-value	0.464
ΔLG_{t-1}	F-statistic	0.694
	p-value	0.405
ΔLC_{t-1}	F-statistic	1.559
	p-value	0.212
ECM	F-statistic	0.202
	p-value	0.653
Joint test	F-statistic	0.663
	p-value	0.416

Period II

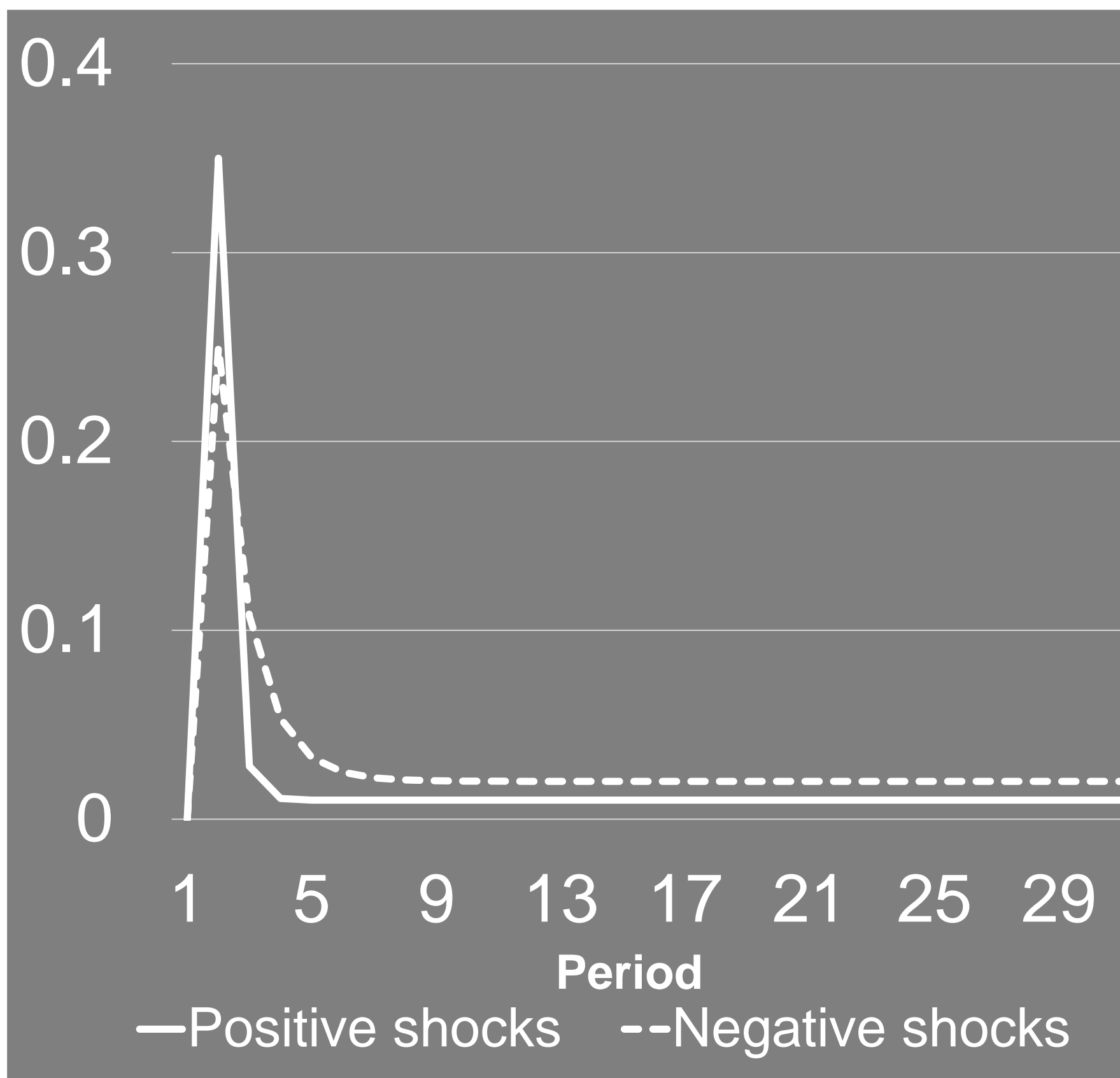
An asymmetric long-run relationship between Chinese and global soybean prices was found, since agricultural subsidy policies in Period II had affected Chinese soybean prices.

In particular, positive shocks of global soybean prices to Chinese soybean prices were much greater than negative shocks. It means that Chinese soybean prices increased sensitively when global prices increased, but it did not decrease in the period that global soybean prices decreased.

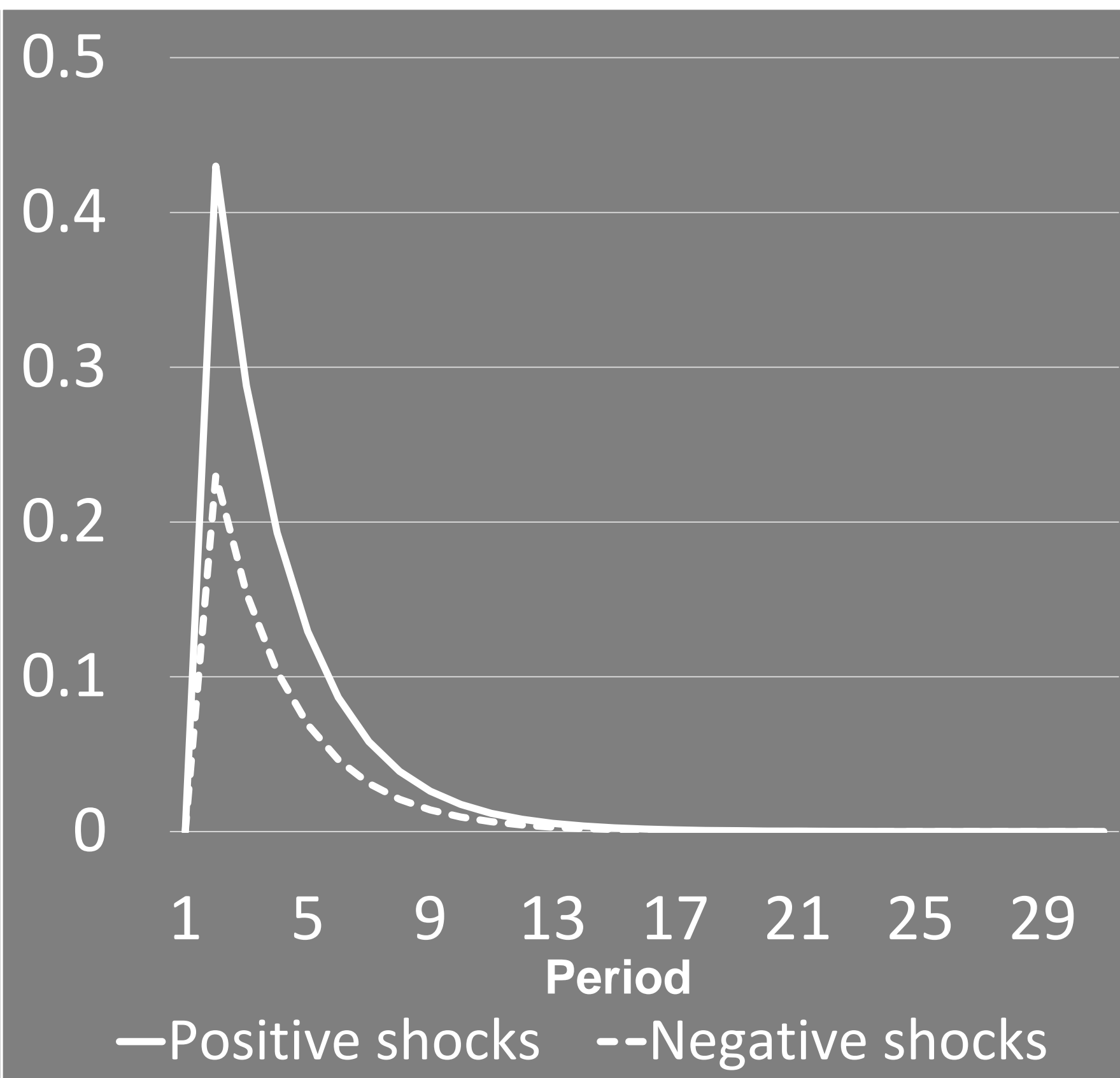
Results

Asymmetry impulse response functions(Period II)

Conditional mean equation



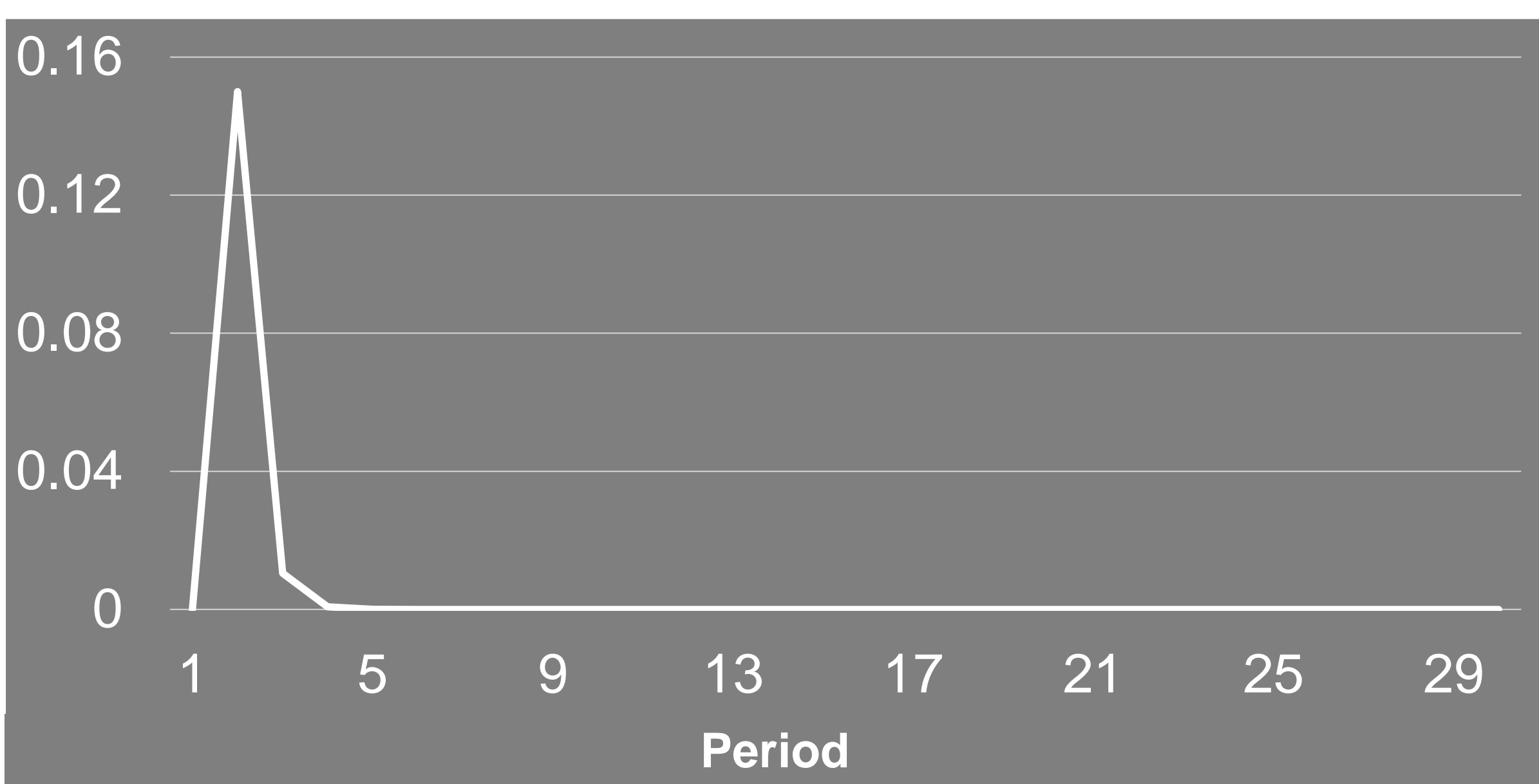
Conditional variance equation



Period III

The long-run relationship between Chinese soybean prices and global soybean prices was disappeared. And also, one-way causal relationship from global soybean prices to Chinese soybean prices was found.

Impulse response functions(Period III)



Conclusions

- A series of Chinese policy interventions broke the stable long-run relationship between Chinese and global soybean market.
- The Chinese government interventions may stabilize domestic soybean prices for a while, but would not maintain government subsidies and discretionary boarder protection continuously because these interventions definitely reduce consumer welfare and violate the WTO rules.
- Therefore, instead of direct government interventions, it is recommended for Chinese government to strive for structural adjustment policies to increase productivity and food security.