Structural Price Fluctuation Caused by Oil Price Variation in China's Mutton and Beef Market

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PREFACE

Beef and mutton to be as the essential daily consumption, their prices have been given much attention by the government, researchers, and households. And some of researchers thinks that the instability of their prices is the result of the market gaming. However, the aim of my study is to employ and develop the VAR model of order p (price) and relative impulse response functions to account for the role that endogenous variables and oil price effect to the price fluctuation.

Introduction

Agricultural economic performance plays an important role in the general well-being of the population, which is involved in food security, employment and livelihoods for almost 1/3 of the world’s population.

Variations in agricultural market prices have a detrimental effect on the stability and growth of the economy of nations. The negative consequences can lead to inadequate storage facilities, disjointed agricultural supply chains, and restricted access to risk-sharing markets farmers.

Hypotheses debate about price based on the rational expectations model of storage and livestock, and laboratory studies show that people behave in a rationally constrained manner and rely on simple heuristics to predict prices in complex situations.

Method and Data

1

Theoretical model

The VAR model of order *p*, denoted as *VAR*(*p*), can be expressed (Wooldridge 2015):

$$y_t = \alpha + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + BX_t + \mu_t$$

Subject to $\mathrm{E}(\mu_t) = 0, \mathrm{E}(\mu_t \mu_t') = \Omega, \mathrm{E}(\mu_t \mu_t') = 0$

2

Proposition

a). There is a statistically significant long-term equilibrium between beef and mutton products in such a way that they are alternatives to each other.

b). The rise of upstream costs and transportation costs can significantly increase the price of beef and mutton, and so does the international market in the long run.

3

Data

To employ monthly data from January 2003 to December 2022. Endogenous Variables are involved in retail beef price, retail mutton price, beef producer price, mutton producer price, corn price, international beef price, international mutton price, and exogenous variable is focus on oil price.

Empirical Analysis

- **Analysis**

a) To determine the lag order (p) by some standard criteria, e.g. SC, HQ, AIC selection methods.

b) To perform Johansen co-integration test exploring the long-run equilibrium within the beef and mutton market.

c) To analyse its short-term shock effect by the adoption of the impulse response function.

- **Model specification and estimation**

Apart from the impulse response functions, we also conduct variance decomposition analysis, decomposing the forecast error variance and showing the impact's contribution to variables due to various shocks.

Results and Discussion

Whatever "Oil Prices and Beef" and "Oil Prices and Mutton", we employ several statistical techniques, including Lag, Log-Likelihood (LL), Likelihood Ratio (LR), degrees of freedom (df), p-value (p), Final Prediction Error (FPE), Akaike's Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC), to map out the dynamics of oil prices and beef, oil prices and mutton.

All in-depth statistical analysis showcasing the relationship between oil prices to beef and mutton reflect the impact of oil prices on these two meat commodities, revealing potential vulnerabilities and opportunities in the global meat market due to fluctuating oil prices. For instance, as for "Oil Prices and Beef", At a lag of zero, the LL is -1959.33, indicating a high level of volatility. As the lag increases, the LL displays a substantial decrease, reflecting an improvement in the model's fit. This downward trend continues until the lag reaches 16, where the model seems to reach an optimal point, with LL at -838.48 and the LR at 14.108.

Results and Discussion

The optimal lag order examination between oil prices and beef

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-1959.33				189942	17.8302	17.8427	17.8611
1	-913.604	2091.4	4	0	14.6478	8.36004	8.39741	8.45259
2	-871.254	84.7	4	0	10.3363*	8.0114*	8.07369*	8.16566*
3	-869.325	3.8578	4	0.426	10.533	8.03023	8.11744	8.24619
4	-866.875	4.8997	4	0.298	10.683	8.04432	8.15645	8.32198
5	-864.836	4.0779	4	0.396	10.876	8.06215	8.19919	8.40151
6	-863.91	1.8531	4	0.763	11.1854	8.09009	8.25205	8.49115
7	-861.917	3.9848	4	0.408	11.3931	8.10834	8.29522	8.57111
8	-861.521	0.79205	4	0.94	11.7748	8.1411	8.3529	8.66557
9	-858.202	6.6386	4	0.156	11.8508	8.14729	8.384	8.73346
10	-856.201	4.0029	4	0.406	12.0718	8.16546	8.42709	8.81333
11	-854.857	2.6867	4	0.612	12.3714	8.18961	8.47616	8.89919
12	-850.451	8.8124	4	0.066	12.3312	8.18592	8.49738	8.9572
13	-849.488	1.9254	4	0.749	12.683	8.21353	8.54991	9.04651
14	-846.674	5.629	4	0.229	12.8281	8.22431	8.5856	9.11899
15	-845.535	2.2768	4	0.685	13.1753	8.25032	8.63654	9.20671
16	-838.482	14.108*	4	0.007	12.8246	8.22256	8.63369	9.24065
17	-836.943	3.0769	4	0.545	13.1265	8.24494	8.68099	9.32473
18	-836.567	0.75286	4	0.945	13.5797	8.27788	8.73884	9.41937
19	-832.141	8.8509	4	0.065	13.5424	8.27401	8.75989	9.47721
20	-829.757	4.7687	4	0.312	13.7599	8.2887	8.7995	9.5536

Results and Discussion

The significance of this study goes beyond the immediate scope of beef and mutton pricing; it highlights the interconnections between different sectors of the economy, emphasizing how changes in commodity markets can affect consumer prices through a chain reaction. This interplay between upstream costs and final product pricing is a phenomenon that exists across all sectors, making the insights of this study broadly relevant.

Future research in this area could build on the foundation laid in this study and examine the impact of additional factors on meat prices. Potential areas of investigation might include the role of technological advances in feed production, the impact of alternative energy sources on transportation costs, or the impact of international trade agreements on commodity prices. In addition, researchers could explore the complicated interactions between these factors and how they work together to shape pricing mechanisms in the meat industry.

Conclusion

- To investigate the price trend of China’s beef and mutton product market by constructing a theoretical model including the impact of transportation costs (oil price) with VAR(p) model.
- To comprehend the current situation and prospects in China as well as the price responses to various scenarios with different endogenous variables in a short time.
- To deliver a valuable reference for the sustainable development of China’s beef and mutton product market and present empirical evidence for the government to guide production and stabilize prices by forwarding market regulation in advance by this study.

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Thank you for your attention.

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