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Research Article

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Research on the impact of agricultural products logistics on cold meat price : An analysis based on economic benefit

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ABSTRACT

Along with the development of economic globalization and informatization, modern logistics has receives increasing attention from the society. As Transportation Cost is a significant factor that will influence the price of farm and sideline products, then we make a statistical analysis of the impact of transportation cost (TRC) on cold meat price index (MPI) .The result shows that: First, LnTRC at lag 1 period increased one percentage points can drive LnMPI increased by 0.91 percentage points, so the effect of transportation cost to cold meat price is obvious. Second, LnTRC is the Granger reason to LnMPI, which means transportation cost growth is the reason of cold meat price increase.Third, the result of variance decomposition shows that LnTRC has a high contribution degree to LnMPI, and prove that transportation cost can explain the rising of cold meat price. On this basis, we put forward the related policy suggestion.

Keywords: Livestock Transport, Transportation Cost ,Agricultural Logistics, Cold Meat Price, Customer Satisfaction

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INTRODUCTION

Along with the development of economic globalization and informatization, modern logistics has receives increasing attention from the society. By using advanced information technology and logistics equipment, logistics links the traditional storage, loading and unloading, handling, transportation, distribution processing, distribution, packaging and information processing as integration, and has become an important means to make efficient operation [1]. Agricultural products is different from industrial products, it has the fresh characteristic, such as perishable easily rotten. An agricultural product was regarded as a special commodity, the Agricultural logistics and supply chain management will naturally put forward higher request [2]. Seasonal characteristics, regional characteristics of the agricultural production, in the process of logistics requirements do not pollution, not bad; this puts forward higher requirements on agricultural products logistics management[3]. However, with the rapid development of economy and transformations in consumption patterns of residents, the consumer demand for agricultural products showing the new features of diversification, personalization and harmless, and so on. The customers' requirement of efficient logistic mode of agricultural products and timely supply of abundant and safe agricultural products will certainly put forward higher requirements for the supply chain management of agricultural products[4]. Therefore, it is particularly urgent and important to improve the existing logistics level of agriculture in China, so as to structure the agricultural products logistic mode adapted to the current economic and social development.

Omar(2009) pointed out two aspects of fresh agricultural products and non fresh agricultural products, summarizes the application of the agricultural products supply chain model[5]. Lama(2009)research on the effect of the logistic chain on meat quality[6].Meuwissen (2008) research the liability risk in the agricultural products supply chain[7]. Li and Fan (2006) analyzed the efficiency of the agricultural product logistics system in China [8].Golan (2003)

analyze the development stage of the logistics of agricultural products, dividing the agricultural products supply chain at different stages [9]. Wang (2012) studies the factors affect the price of Chinese livestock products [10].Liu (2006) research of agricultural products logistics based on agricultural production and consumption characteristics [11]. This article combined theoretical with empirical method, analyzed the influence of cold meat price to breeding benefit and supplies, the change rule of cold meat price, focused on the formation and transmission mechanism of cold meat price from horizontal and vertical dimensions, so as to provide theoretical analysis framework and empirical analysis foundations for slowing down cold meat price fluctuation, promoting sustainable development of industry chain. Finally some targeted countermeasures and suggestions were put forward.

EXPERIMENTAL SECTION

In this paper, we use STATA 12.0 software and make a statistical analysis of transportation cost (TRC) and cold meat price index (MPI) .The monthly data is from Jan.2008 to Dec.2013, and we undertook log processing to data, noted as LnTRC and LnMPI. All data was collected form China statistical yearbook and China livestock information website.

ADF unit root test

In order to analyze each variable's stationary, we use ADF unit root test to inspect LnTRC and LnMPI, the result as is shown in table 1. Through the test results we can see that LnTRC and LnMPI are non-stationary. Then I calculate the difference of LnTRC and LnMPI, and denoted as d.LnTRC and d.LnMPI, results show that the two variable d.LnTRC and d.LnMPI are stable, and then we can use granger test and cointegration test.

Table 1. ADF test

variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	result
LnTRC	-2.512	-3.750	-3.000	-2.630	unstable
LnMPI	-1.581	-3.709	-2.983	-2.623	unstable
D.LnTRC	-3.029	-3.709	-2.983	-2.623	stable
D.LnMPI	-3.865	-3.709	-2.983	-2.623	stable

VAR model

Vector auto regression (VAR) model is the simultaneous form of autoregressive model, A VAR (p) model of a time series y (t) has the form:

$$A_0 y_{(t)} = A_1 y_{(t-1)} + \cdots + A_p y_{(t-p)} + \varepsilon_{(t)}$$

Lag length selection have great influence for VAR model, if we establish two models, it is unable to determine the relationship between variables without the lag length. Therefore, the structure of VAR model is determined by the variables and lag length. I use Stata to measure the lag length; the result is shown in table 2:

Table 2. Related data of VAR model order

lag	LR	df	p	FPE	AIC	HQIC	SBIC
0				.000015	-4.61458	-5.79145	-5.59638
1	194.18	4	0	1.7e-04	-11.4251	-11.0236	-12.123
2	11.56*	4	0.022	9.0e-05*	-12.8196*	-12.5012*	-12.3126
3	23.01	4	0	1.2e-06	-12.1681	-12.4824	-12.1056*
4	8.35	4	0.145	8.4e-09	-12.0121	-12.2453	-11.4254

In this paper, I use AIC, SC criterion to identify the lag length. From table 2, we can get that the minimum AIC is -12.8196 in lag 2, so we choose 2 lag as the lag length. According to the analysis above, we construct the VAR regression model of LnTRC and LnMPI, and choose lag length as 3. Through the STATA 12.0, we get the formula of LnMPI as:

$$LnMPI = 0.152 + 0.17LnMPI_{t-1} + 0.83LnMPI_{t-2} + 0.91LnLAV_{t-1} + 0.03LnLAV_{t-2}$$

According to this formula, we can get that the transportation cost growth will promote cold meat price increase. LnTRC at lag 1 period increased one percentage points can drive LnMPI increased by 0.91 percentage points, so the effect of transportation cost to cold meat price is obvious.

Granger causality test and Co-integration test

Granger test is put forward by Granger (1969) and Sims (1972), Grainger test can be used to analyze the direct causal relation of a variable with another variable in VAR model. We assume a VAR model as:

$$y_t = \sum_{i=1}^{k} a_i y_{t-i} + \sum_{i=1}^{k} \beta_i x_{t-i} + u_t$$

So the null hypothesis will be:

$$H_0 : \beta_1 = \beta_2 = \cdots = \beta_k = 0$$

If all the parameter estimates of x are not significant, then the null hypothesis will not be rejected. In other words, if there is any parameter estimate of x significant, that means x is the granger reason to y. This test can be shown by F statistics:

$$F = \frac{(SSE_r - SSE_u)/k}{SSE_u/(T - kN)}$$

In this formula, SSE_r represents the residual sum of squares when null hypotheses was passed, and SSE_u represents the residual sum of squares when null hypotheses was not passed, k represents the lag length, N represents the number of variables. To analyze the relations between transportation cost and cold meat price. I use granger causality test to analyze this VAR model, the result is shown in table 3.

Table 3. Granger causality test

Equation	Excluded	chi2	df	Prob > chi2
LnMPI	LnTRC	19.294	2	0.000
LnTRC	LnMPI	10.988	2	0.485

From Table 3, we can get that LnTRC is the Granger reason to LnMPI, which means transportation cost growth is the reason of cold meat price increase. However, LnMPI is not the reason for LnTRC, so that cold meat price is not the reason of transportation cost change; this is also same to the conclusion above. At the same time, we take Johnson co-integration test to analyze the long-term relations between LnTRC and LnMPI, the results is shown in table 4:

Table 4. Johnson Co-integration test

Rank	Parms	LL	Characteristic Value	Statistic	5% Significant level
0	6	203.12471		5.8641*	15.41
1	9	204.46236	0.13028	3.0157	3.76

According to the results, there exist at least one direct co-integration relationship between LnTRC and LnMPI, which means that there exist a long-term equilibrium relationship between transportation cost and cold meat price.

Impulse-response function and Cholesky variance decomposition

According to the results above, we can get that there exist a long-term equilibrium relationship between transportation cost and cold meat price, and transportation cost is the reason to cold meat price, also the VAR model is stable. There are two methods to analyze the VAR model: impulse-response function and cholesky variance decomposition. Impulse-response function describes the response of endogenous variable to random error, and we can get the endogenous variable's change trend from the graph.In order to analyze the VAR model, I use Impulse-response function and cholesky variance decomposition, the results is shown in figure 1 and figure 2.

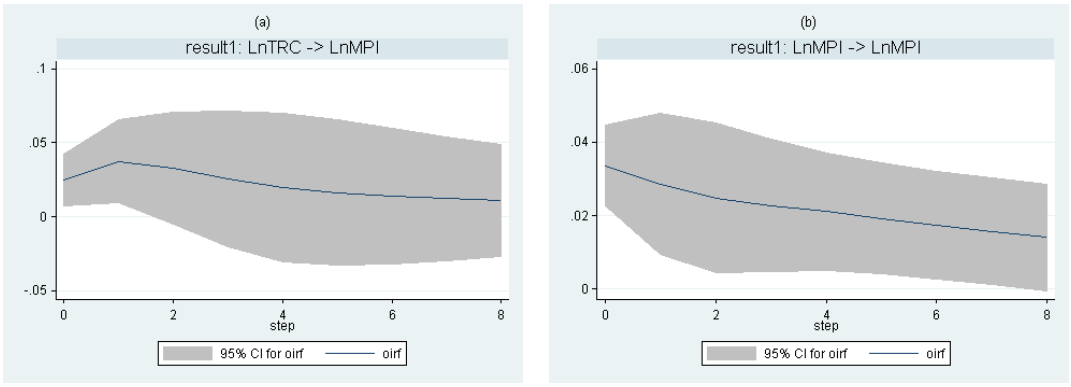

Figure 1. Impulse-response analysis:(a)The impact of LnTRC to LnMPI; (b)The impact of LnMPI to LnMPI

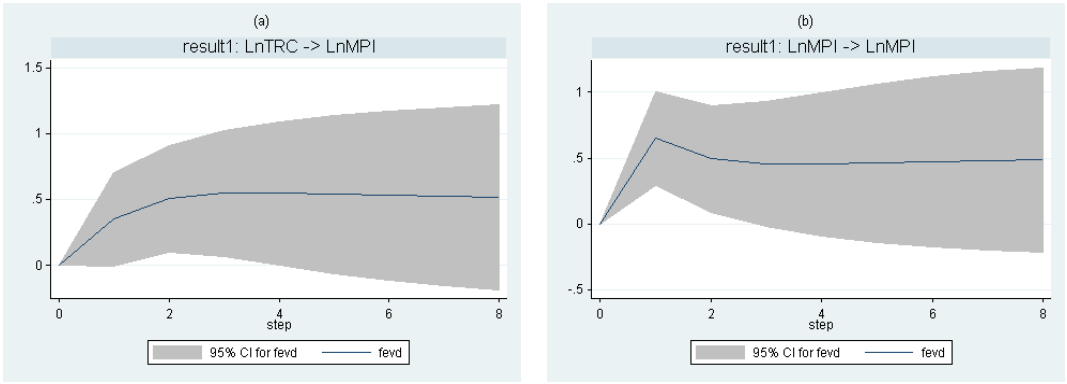

Figure 2. Cholesky variance decomposition:(a)The contribute degree of LnTRC to LnMPI; (b)Thecontribute degree of LnMPI to LnMPI

From figure 1(a), we can get that when LnTRC received one unit impact,it will lead LnMPI increase currently, LnMPI will reach the max at t=1 period as 0.037,then LnMPI begin to stable and about 0.013 at t=6 period. It illustrates there is long-term effect between transportation cost and cold meat price increase. From figure 1(b), if give LnMPI one unit impact, LnMPI will continue increasing and reach the maximum at t=0 period, this means that when meat prices inflation is appear, it will promote prices level continually rise. According to the impulse analysis results, we can get that transportation cost growth will significant influence meat prices increase, and once inflation happened, it will continue to promote price increasing, so that it is important to deal with the inflation. The cholesky variance decomposition also shows the same result, the contribution degree of LnMPI to LnMPI is gradually reduced while the contribution degree of LnMPI to LnTRC is gradually increased.

CONCLUSION

To sum up, according to the test results we can get that transportation cost growth will promote cold meat price increase, and there exist a long-term equilibrium relationship between transportation cost and cold meat price. LnTRC at lag 1 period increased one percentage points can drive LnMPI increased by 0.91 percentage points, so the effect of transportation cost to cold meat price is obvious. From the result of impulse-response analysis, we find that the transportation cost will lead the price level sustained growth in the later several months. While once inflation happened, it will push prices continually rise, so it is much more difficult to control the inflation after it begin. With the rapid development of economy and transformations in consumption patterns of residents, the consumer demand for agricultural products showing the new features of diversification, personalization and harmless, and so on. The customers' requirement of efficient logistic mode of agricultural products and timely supply of abundant and safe agricultural products will certainly put forward higher requirements for the supply chain management of agricultural products

Therefore, in order to stabilizing cold meat price and promoting sustained development of livestock industry in china, we need to improve the work in the following aspects: first, strengthen the construction and improve the logistics system, especially rural logistics and transport industry; second, develop industrialization leading enterprises of slaughter and process industry to raise the level of industrial organization; third, advance the scientific and technological innovation of Livestock industry and standardized scale breeding so as to improve industrial quality; finally, improve circulating efficiency of livestock industry chain and operation mode of livestock to raise the level of market integration of industry chain. In addition, we should also

enhance the informationization construction of livestock industry to increase the rationality degree of cold meat price expectation.

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