Comparative Analysis of Discovery Function of Cotton Future Price among Different Regions

——A Case Study of Xinjiang

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Abstract Through comparative analysis, We research the relationship between cotton future price and cotton spot price in different regions, in order to formulate corresponding strategies in different regions under the new situation. We use ADF unit root test, E-G two-step co-integration test, Granger causality test, and other research methods in Eviews 5.0 statistical software, to empirically study the relationship between the cotton future price and cotton spot price in Xinjiang, the relationship between the cotton future price and cotton spot price in China. The results show that there is a long-term relationship between the cotton future price and cotton spot price in Xinjiang, between the cotton future price and cotton spot price in China; the cotton future price plays unidirectional role in guiding cotton spot price in Xinjiang and cotton spot price in China. The discovery function of cotton future price plays much greater role in the cotton market of China than in the cotton market of Xinjiang.

Key words Cotton, Future price, Spot price, Empirical test, China

The State Council and the Party Central Committee attach great importance to playing the role of futures market in addressing issues concerning agriculture, countryside and farmers. Since 2004, No. 1 Document of the central government for seven consecutive years has touched upon the problem of development of China's futures market. Cotton is regarded as the staple agricultural product related to the national economy and people's livelihood, and the cotton futures go public providing strong guarantee for the healthy development of China's cotton industry. However, due to the impact of a variety of factors, the price fluctuations of cotton futures are frequent, and thus the uncertainty or risk to cotton growers and cotton-related enterprises mounts.

1 Data source, index selection and research method

1.1 Data source

1.1.1 Futures price. Cotton futures price is from China Cotton Information Network. In order to get continuous sequence of cotton futures contract, we select the settlement price of the contract in the month nearest to business-transaction month as representative. After the business-transaction month, we select the next settlement price of the contract in the month nearest to business-transaction month as representative, to get continuous price sequence of cotton futures contract.

1.1.2 Spot price. The cotton spot price in China and Xinjiang is mainly from the China Cotton Association. The cotton spot price in China adopts the average price data of 328-level cotton every day (the greatest variety of transaction in the spot market), and the cotton spot price in Xinjiang adopts the average price data of taking delivery of goods of 328B-level cotton every day in Xinjiang.

1.2 Index selection We select the data from January 4, 2007 to April 20, 2011, eliminating the inconsistent dates between cotton futures price and spot price, to get three sequences, each sequence with 1034 data. Wherein, the cotton futures price sequence is kept as {*ZF*}, China's cotton spot price as {*Q*328}, and Xinjiang's cotton spot price sequence as {*X*328}.

1.3 Research method We use Eview5.0 statistical software to conduct empirical analysis on the data.

2 Results and analysis

2.1 Basic statistics description The basic statistical analysis on the figure is the basis and prerequisite for statistical metering, which helps to better know the basic statistical characteristics of research object. By Eviews 5.0 statistical software, we get Table 1[1] as follows.

Table 1 The descriptive statistical analysis of cotton future price and spot price

Index	*ZF*	*Q*328	*X*328
Mean	16 193.39	15 727.53	15 643.3
Median	14 117.5	13 750.5	13 500
Maximum	33 545	31 302	32 200
Minimum	10 310	10 035	11 800
Standard deviation	5 379.9	5 171.065	5 301.165
Skewness	1.885 851	1.859 363	1.976 119
Kurtosis	5.375 911	5.242 905	5.568 597
Jarque-Bera test	856.095 6	812.531 8	957.220 2
Probability	0	0	0
Total	16 743 965	16 262 261	16 175 170
Sum Sq. Dev.	2.99E+10	2.76E+10	2.90E+10
Observations	1 034	1 034	1 034

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From Table 1, we can find that the mean value and standard deviation of cotton futures price sequence *ZF* are biggest, followed by China's cotton spot price sequence {*Q*328} and Xinjiang's cotton spot price sequence {*X*328}. The kurtosis of sequence {*ZF*}, {*Q*328} and {*X*328} is greater than 0, skewness of sequence {*ZF*}, {*Q*328} and {*X*328} is bigger than 3, and the distribution is with the characteristic of "right skewness and peaked kurtosis"; p value of Jarque-Berastatistic is smaller than 0, indicating that sequence {*ZF*}, {*Q*328} and {*X*328} are all not in line with normal distribution.

2.2 Test of correlation coefficient From Fig. 1, we can find that sequence {*ZF*}, {*Q*328} and {*X*328} have the basic identical trend of price in the sample interval. In the process of rise or fall of cotton price, the change of futures price is more rapid than that of spot price.

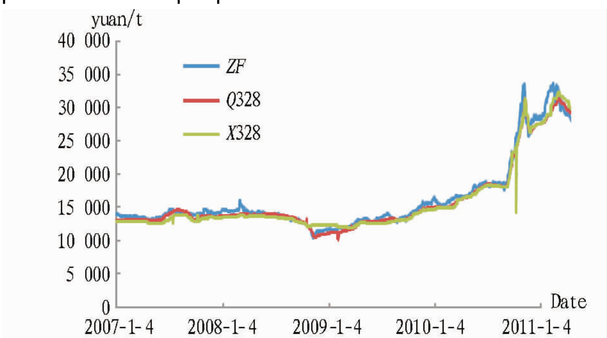

Fig.1 The trend of cotton price sequence

In order to further understand the correlation between variables, we conduct correlation coefficient test on variables, to get that the correlation coefficient of cotton futures price sequence {*ZF*} and China's cotton spot price sequence {*Q*328} is 0.992 662; the correlation coefficient of cotton futures price sequence {*ZF*} and Xinjiang's cotton spot price sequence {*X*328} is 0.987 444. The former excels the latter, and they both pass test of significance, indicating that the correlation between cotton futures price and China's spot price is higher than the correlation between cotton futures price and Xinjiang's spot price.

2.3 ADF unit root test Prior to conducting ADF test, we need to determine the form of test regression model[2]. From Fig. 1, we can find that sequence {*ZF*}, {*Q*328}, {*X*328} all tend to rise, therefore, we use the test regression model including not only term of intercept, but also term of trend, to conduct ADF test on sequence {*ZF*}, {*Q*328}, {*X*328} respectively. In order to overcome the heteroscedasticity problem existing in the time sequence data, we take logarithm of sequence {*ZF*}, {*Q*328}, and {*X*328} respectively, kept as {LN*ZF*}, {LN*Q*328} and {LN*X*328}.

From Table 2, we can find that t statistic of ADF test of logarithmic sequence {LN*ZF*}, {LN*Q*328} and {LN*X*328} is −1.003 335, −0.689 944 and −0.236 156 respectively; all greater than the critical value at significance level of 0.01, significance level of 0.05 and significance level of 0.10 respectively, as is shown in Table 2. Hence, it can not reject the null hypothesis, namely the test hypothesis of "sequence having unit root", that is to say, there are unit roots in sequence {LN*ZF*}, {LN*Q*328} and {LN*X*328}, and the former sequence is non-stationary sequence[3].

In order to get the integration order of logarithmic sequence {LN*ZF*}, {LN*Q*328} and {LN*X*328}, we need to test the stationarity of their respective first-order difference. In the light of the test results, t statistic of ADF test of first-order difference logarithmic sequence {△LN*ZF*}, {△LN*Q*328} and {△LN*X*328} is −26.103 31, −10.346 97 and −26.254 16; all smaller than the critical value at significance level of 0.01, significance level of 0.05 and significance level of 0.10 respectively. Therefore, it rejects the null hypothesis, namely test hypothesis of "sequence having unit root. There is no unit root in first-order difference sequence {LN*ZF*}, {LN*Q*328} and {LN*X*328}, and they are all stationary sequences, as is shown in Table 3.

Table 2 ADF unit root test data output of the logarithmic sequence

Name of sequence	ADF test value	The critical value at the level of 0.01	The critical value at the level of 0.05	The critical value at the level of 0.10
LN*ZF*	−1.003 335	−3.966 965	−3.414 173	−3.129 195
LN*Q*328	−0.689 944	−3.966 991	−3.414 186	−3.129 202
LN*X*328	−0.236 156	−3.966 983	−3.414 182	−3.129 200

Table 3 Order difference sequence ADF unit root test data output of

Name of sequence	ADF test value	The critical value at the level of 0.01	The critical value at the level of 0.05	The critical value at the level of 0.10
△LN*ZF*	−26.103 31	−3.966 965	−3.414 173	−3.129 195
△LN*Q*328	−10.346 97	−3.966 991	−3.414 186	−3.129 202
△LN*X*328	−26.254 16	−3.966 983	−3.414 182	−3.129 200

2.4 E-G two-step co-integration test In order to analyse whether there is co-integration between logarithmic sequence {LN*ZF*} and {LN*Q*328}, between logarithmic sequence {LN*ZF*} and {LN*X*328}, firstly, we should conduct the regression on logarithmic sequence {LN*ZF*} and {LN*Q*328}, logarithmic sequence {LN*ZF*} and {LN*X*328}, then test the stationarity of respective regression residual, and finally judge whether there is co-integration relationship between logarithmic sequence {LN*ZF*} and {LN*Q*328}, between logarithmic sequence {LN*ZF*} and {LN*X*328}.

We conduct test on whether is co-integration relationship between logarithmic sequence {LN*ZF*} and {LN*Q*328}. Taking LN*Q*328 as the variable to be explained, LN*ZF* as explanatory variable, we adopt *OLS* method to estimate regression equation, to get statistics of estimation results of regression equation, as is shown in Table 4.

Table 4 Statistics of estimation results of regression equation

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.095 368	0.034 573	2.7584 86	0.005 9
LN*ZF*	0.987 158	0.003 581	275.657 8	0
R-squared	0.986 601		Mean dependent var	9.621 855
Adjusted R-squared	0.986 588		S. D. dependent var	0.269 460
S. E. of regression	0.031 207		Akaike info criterion	−4.094 447
Sum squared resid	1.005 010		Schwarz criterion	−4.084 890
Log likelihood	2 118.829		*F*-statistic	75 987.22
Durbin – Watson stat	0.157 104		Prob(*F*-statistic)	0

The estimated regression equation is as follows:

$$LNQ328 = 0.095\ 368 + 0.987\ 158\ LNZF \quad (1)$$

We use model estimation result to generate residual sequence, and conduct unit root test on the residual sequence of regression equation. As the mean value of residual sequence is 0, so we choose ADF test without term of intercept and term of trend (Fig. 2).

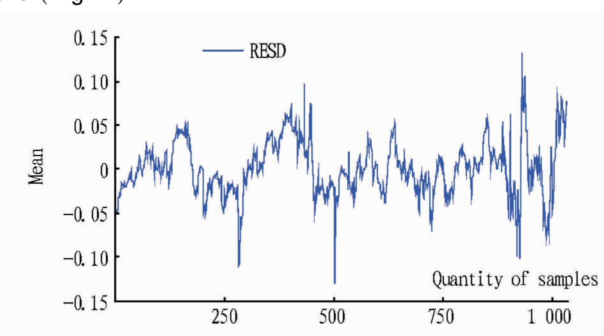

Fig.2 The trend of residual sequence

According to test results, the *t* statistic of ADF test of residual sequence is −6.392 341, smaller than the critical value of −3.436 462, −2.864 127 and −2.568 199 at the significance level of 0.01, 0.05 and 0.10 respectively. Therefore, it rejects the null hypothesis, namely the test hypothesis of "residual sequence having unit root", and the residual sequence is stationary.

In a similar way, we can also use LN*ZF* as the variable to be explained, and LN*Q*328 as explanatory variable. The conclusion we get is the same as the foregoing result.

In the mean time, we conduct test on the co-integration relationship between logarithmic sequence {LN*ZF*} and {LN*X*328}. We use LN*X*328 and LN*ZF* as variables to be explained, LN*ZF* and LN*X*328 as explanatory variable, to get that their respective residual sequence is stationary.

According to the theory of co-integration, it indicates that there is co-integration between logarithmic sequence {LN*ZF*} and {LN*Q*328}, between logarithmic sequence {LN*ZF*} and {LN*X*328}, that is, there is long-term equilibrium relationship between cotton futures price and China's cotton spot price, between cotton futures price and Xinjiang's cotton spot price.

2.5 Granger causality test Through Granger causality test, we can judge the causality relationship between cotton futures price and spot price[4]. First, we test the causality relationship between cotton futures price and China's spot price. On the basis of AIC information criterion, we increase lag order from the first-order lag, to get Table 5. We can find that in the Granger causality test, it gives two null hypotheses, namely "LN*ZF* is not the Granger cause of LN*Q*328 change", and "LN*Q*328 is not the Granger cause of LN*ZF* change".

When *P* value of *F* statistic is smaller than the significance test level of 0.01, it rejects the corresponding null hypothesis; when *P* value of *F* statistic is bigger than the significance test level of 0.01, it accepts the corresponding null hypothesis. We get that cotton futures price plays the role in guiding China's cotton spot price, while China's cotton spot price does not play the role in guiding cotton futures price. This indicates that the discovery role of cotton futures price is prominent, while the impact of cotton spot price on futures price is limited.

Table 5 Granger causality test results of lag periods

Null hypothesis	Lag period	*F* value	*P* value	Judgement
LN*ZF* does not Granger Cause LN*Q*328	1	201.886	5.7E-42	Reject
LN*Q*328 does not Granger Cause LN*ZF*	1	2.903 51	0.088 69	Accept
LN*ZF* does not Granger Cause LN*Q*328	2	134.556	1.3E-52	Reject
LN*Q*328 does not Granger Cause LN*ZF*	2	0.724 34	0.484 89	Accept
LN*ZF* does not Granger Cause LN*Q*328	3	79.863 7	2.0E-46	Reject
LN*Q*328 does not Granger Cause LN*ZF*	3	0.892 82	0.444 28	Accept
LN*ZF* does not Granger Cause LN*Q*328	4	63.057 8	1.2E-47	Reject
LN*Q*328 does not Granger Cause LN*ZF*	4	0.614 53	0.652 25	Accept
LN*ZF* does not Granger Cause LN*Q*328	5	52.885 7	7.4E-49	Reject
LN*Q*328 does not Granger Cause LN*ZF*	5	1.822 50	0.105 71	Accept

In a similar way, we conduct test on the causality relationship between cotton futures price and Xinjiang's cotton spot price, to get that cotton futures price plays the role in guiding Xinjiang's cotton spot price, while Xinjiang's cotton spot price does not play the role in guiding cotton futures price.

2.6 Error correction model (*ECM*) According to the conclusions by using E-G two-step co-integration test method, and Granger causality test method, we further establish short-term dynamic relationship between cotton futures price and China's cotton spot price, between cotton futures price and Xinjiang's cotton spot price. By using Eviews 5.0 software, we get Table 6.

Table 6 Statistics of estimation results of regression equation of Error Correction Model (ECM)

Variable	Coefficient	Std. Error	*t*-statistic	Prob.
C	0.000 745	0.000 214	3.479 403	0.000 5
D(LN*ZF*)	0.086 682	0.019 265	4.499 379	0
D(LN*ZF*(−1))	0.116 733	0.020 788	5.615 346	0
D(LN*Q*328(−1))	−0.120 822	0.028 490	−4.240 834	0
ECM(−1)	−0.085 726	0.007 442	−11.519 62	0
R-squared	0.212 384	Mean dependent var		0.000 789
Adjusted R-squared	0.209 316	S.D. dependent var		0.007 672
S.E. of regression	0.006 822	Akaike info criterion		−7.132 445
Sum squared resid	0.047 799	Schwarz criterion		−7.108 514
Log likelihood	3 685.341	F-statistic		69.233 78
Durbin-Watson stat	2.000 765	Prob(F-statistic)		0

ECM model estimation regression equation is as follows:

$$\triangle LNQ328_t = 0.000\ 745 + 0.086\ 682 \triangle LNZF_t + 0.116\ 733 \triangle LNZF_{t-1} - 0.120\ 822 \triangle LNQ328_{t-1} - 0.085\ 726\ ECM(-1) \quad (2)$$

We can find that the above regression equation passes *F* test, and DW test. The regression coefficient of $\triangle LNZF_t$, $\triangle LNZF_t - 1$ and $\triangle LNQ328_{t-1}$ passes t test at the significance level of 1% respectively, wherein the sign of $\triangle LNZF_t$ variable is consistent with the sign of long-term equilibrium relationship in the above E-G two-step co-integration test and the error correction coefficient is negative.

The regression result shows that the short-term adjustment coefficient of *ECM*(−1) is significant, indicating that when the short-term fluctuation of China's cotton spot price deviates from the long-term equilibrium, it will use 8.572 6% of adjustment force to put the imbalance state back to equilibrium.

As China's cotton spot price does not play the role in guiding and cotton futures price, so here we do not conduct ECM model estimation regression which takes $\triangle LNZF_t$ as variable to be explained, $\triangle LNQ328_t$ as explanatory variable. But it must be noted that R-squared in the above estimation regression equation *ECM* model after adjustment is only 0.209 316, indicating that the explanatory variable in the equation can only explain 20.931 6% of the variable to be explained, and the other 79.068 4% needs to be explained by other factors.

In a similar way, we conduct ECM model estimation regression on cotton futures price and Xinjiang's cotton spot price, and get the following equation:

$$\triangle LNX328_t = 0.000\ 981 + 0.144\ 261 \triangle LNZF_t - 0.404\ 709 \triangle LNX328_{t-1} + 0.108\ 102 \triangle LNZF_{t-1} - 0.113\ 015\ ECM(-1) \quad (3)$$

After test, the equation passes *F* test, *t* test and *DW* test, and the short-term adjustment coefficient of *ECM*(−1) is also significant, indicating that when the short-term fluctuation of Xinjiang's cotton spot price deviates from the long-term equilibrium, it will use 11.301 5% of adjustment force to put the imbalance state back to equilibrium. The explanatory variable in the equation can only explain 25.544 5% of the variable to be explained, and the other 74.455 5% needs to be explained by other factors.

2.7 Analysis of impulse response On the basis of co-integration test and Granger test, we use impulse response function to conduct more specific analysis on the above conclusion. By using Eviews 5.0 software, we get Fig.3, 4.

From Fig.3, we can find that the innovation of one standard deviation of LN*ZF* and LN*Q*328 exerts big impact on LN*ZF*. Along with the increase of period, the disturbance response of LN*ZF* to LN*ZF* and LN*Q*328 also increases ceaselessly. In a similar way, the innovation of one standard deviation of LN*ZF* and LN*Q*328 shows a strong response to LN*Q*328. Along with the increase of period, the disturbance response of LN*Q*328 to LN*ZF* and LN*Q*328, on the whole, decreases ceaselessly.

In a similar way, from Fig. 4, we can find that the innovation of one standard deviation of LN*ZF* and LN*X*328 also exerts big impact on LN*ZF*. Along with the rise of period, the disturbance response of LN*ZF* to LN*ZF* and LN *X*328 also ceaselessly increases. Similarly, the innovation of one standard deviation of LN*ZF* and LN*X*328 has a strong response to LN*X*328. Along with the increase of period, the disturbance response of LN*X*328 to LN*ZF* and LN*X*328, on the whole, decreases ceaselessly.

2.8 Analysis of variance decomposition Through variance decomposition analysis, we get the contribution of the impact of each innovation to changes in the endogenous variables[5]. According to other research results and the actual situation, we stipulate the lag period of price sequence of LN*ZF* and LN*Q*328, price sequence of LN*ZF* and LN*X*328, as 100. Through Table 7, we can find that in the changes of LN*ZF* price prediction variance in cotton futures market, the contribution degree of the cotton futures price causing variance change accounts for about 99.5%, and the contribution degree of China's cotton spot price causing variance change only accounts for 0.5%; in the changes of LN*Q*328 price prediction variance in China's cotton spot market, the contribution degree of cotton futures price causing variance change increases along with ceaseless increase of lag period; the contribution degree of China's cotton spot price causing variance change decreases along with ceaseless increase of lag period.

In a similar way, we also get the variance decomposition of cotton futures price LN*ZF* and Xinjiang's cotton spot price LN*X*328 (Table 8), and obtain the aforesaid similar conclusion.

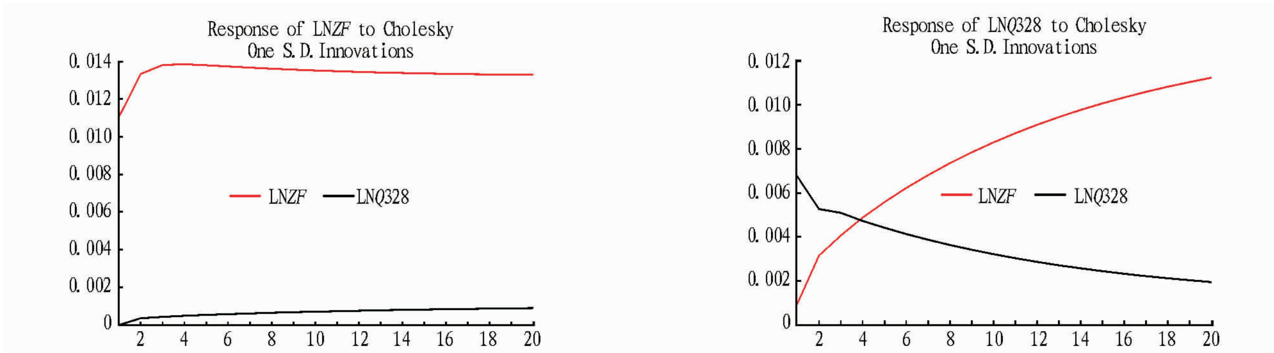

Fig. 3 Impulse response of cotton futures and China's cotton spot

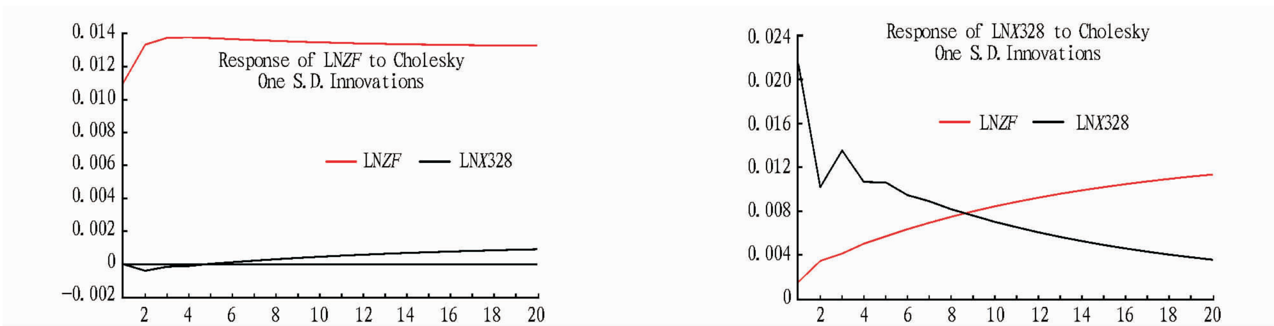

Fig. 4 Impulse response of cotton futures and Xinjiang's spot cotton

Table 7 The result of variance decomposition of LN*ZF* and LN*Q*328

Type lag period	Futures market of cotton		Spot market of China's cotton	
	Contribution of futures price	Contribution of spot price	Contribution of futures price	Contribution of spot price
1	100.000 0	0	1.919 938	98.080 06
2	99.957 27	0.042 735	12.826 38	87.173 62
…	…	…	…	…
49	99.563 40	0.436 595	94.988 90	5.011 104
50	99.560 14	0.439 860	95.109 19	4.890 810
51	99.556 98	0.443 020	95.223 62	4.776 382
…	…	…	…	…
99	99.474 85	0.525 146	97.648 70	2.351 297
100	99.473 94	0.526 056	97.670 94	2.329 064

Table 8 The result of variance decomposition of LN*ZF* and LN*X*328

Type lag period	Futures market of cotton		Spot market of Xinjiang's cotton	
	Contribution of futures price	Contribution of spot price	Contribution of futures price	Contribution of spot price
1	100.000 0	0	0.535 567	99.464 43
2	99.946 92	0.053 080	2.522 022	97.477 98
…	…	…	…	…
49	99.508 61	0.491 387	78.585 52	21.414 48
50	99.501 89	0.498 111	79.054 02	20.945 98
51	99.495 37	0.504 628	79.503 54	20.496 46
…	…	…	…	…
99	99.324 90	0.675 101	90.048 69	9.951 308
100	99.323 01	0.676 993	90.155 74	9.844 260

By comparing Table 7 and 8, it is not difficult for us to find that in the long-term change of China's cotton market price, the contribution of cotton futures price only accounts for 98.571 97%, and the contribution of spot market accounts for 1.428 03%; in the long-term change of Xinjiang's cotton market price, the contribution of cotton futures price accounts for 94.739 38%, and the contribution of spot price accounts for 5.260 62%, indicating that the discovery function of cotton future price plays much greater role in the cotton market of China than in the cotton market of Xinjiang. The cotton futures price gives play to the price discovery function on the spot price.

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Besides, due to various food crises, consumers are more dependent on a trusted brand. But there are many problems in agricultural brands at present. Firstly, most of the agricultural enterprises and regions lack the awareness of product brand, and even destroy the agricultural products at will. Secondly, the market offers something bogus, and the consumers do not trust in some of the agricultural brands. In general, due to the unique location, Qinling Area has the ecological conditions, climate factors and geographical endowments to develop ecological agriculture; these different factors should be combined with the demand characters of consumers, in order to create eco-agricultural brands, to exert the brand effects, to realize the all-win results of enterprises, regions and consumers, and to promote the industrialization and sustainable development of ecological agriculture in Qinling Area.

4 Conclusion

Eco-agricultural industrialization in Big Qinling Eco-city Cluster is a complex project, which needs the cooperation and collaboration of all links and subsystems. Starting from the agricultural development status of Big Qinling Eco-city Cluster, the necessity and feasibility of ecological agriculture development in Big Qinling Eco-city Cluster were discussed. Then, factors and endowment of developing eco-agriculture in Big Qinling Eco-city Cluster were analyzed. Finally, specific forms, functional orientation and concrete countermeasures for developing eco-agriculture in Big Qinling Eco-city Cluster were put forward. The major disadvantage associated with the key influencing factors of developing eco-agriculture in Big Qinling Eco-city Cluster was that the empirical research methods should be adopted in future research.

References

[1] LI BK. Accelerating the construction of modern agriculture industry system[J]. Issues in Agricultural Economy, 2007(12): 4 – 8. (in Chinese).
[2] QI RS. Modern agriculture industry system construction ideas and improve methods[J]. Henan Agriculture, 2008(21): 50. (in Chinese).
[3] ZHU QG. Consideration on enterprisation for China's agricultural economic organizations[J]. Journal of Shanghai Economic Management College, 2010(2): 41 –44. (in Chinese).
[4] LIU CL. Study on industry system of modern agriculture[J]. Research of Agricultural Modernization, 2007(4): 472 –475. (in Chinese).
[5] JIANG XP, ZHU QG. Research of non – listed enterprise shares non-fluent problem[J]. Special Zone Economy, 2010(3): 105 – 106. (in Chinese).
[6] GUAN JQ. Dynamic ecological footprint in Jiangxi Province of China [J]. Asian Agricultural Research, 2009, 1(3): 23 – 26.
[7] WEN Y. Construction of Qinling ecological demonstration area[J]. Journal of Anhui Agricultural Sciences, 2011, 39(23): 14278 – 14280, 14284. (in Chinese).
[8] LI YC. Stainability of cultivated land in Henan Province based on ecological footprint[J]. Asian Agricultural Research, 2009, 1(5):32 – 34, 46.
[9] WANG FU, WANG PY, SUN LN, *et al*. Research on ecological plan of greenbelt in waterfront based on polygon index method[J]. Journal of Anhui Agricultural Sciences, 2011, 39(23): 14314 –14316. (in Chinese).
[10] CHEN H. Difference analysis on the sustainable development of Eco – city ——a case of 14 cities in Gansu Province, China[J]. Asian Agricultural Research, 2009, 1(6):24 –28.
[11] JIANG F, ZHENG YN. Ecological greenway construction in Shunde district, Foshan City[J]. Journal of Anhui Agricultural Sciences, 2011, 39(23): 14331 –14333. (in Chinese).

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3 Conclusion

First, the cotton futures price, and China's cotton spot price as well as Xinjiang's cotton spot price, are in line with the characteristics of " peaked kurtosis and thick tail" of the most of the financial time sequence. The mean value and standard deviation of cotton futures price sequence {*ZF*} are the greatest; the mean value and standard deviation of Xinjiang's cotton spot price sequence {*X*328} are the smallest. 0.992 662 of correlation between cotton futures price and China's spot price is greater than 0.987 444 of correlation between cotton futures price and Xinjiang's spot price.

Second, through ADF unit root test and two-step co-integration test, we get that there is long-term equilibrium relationship between cotton futures price and China's cotton spot price, between cotton futures price and Xinjiang's cotton spot price. Through Granger causality test, we get that cotton futures price is the cause of changes of China's cotton spot price and Xinjiang' s cotton spot price.

Third, through error correction model, we get that 8.572 6% of adjustment force when China's cotton spot price deviates from long-term equilibrium is smaller than 11.3% of adjustment force when Xinjiang's cotton spot price deviates from long-term equilibrium. This indicates that the short-term adjustment ability of China's cotton spot price is lower than that of Xinjiang's cotton spot price. Fourth, through impulse response and variance decomposition analysis, we get that the discovery function of cotton future price plays much greater role in the cotton market of China than in the cotton market of Xinjiang. The cotton futures price gives play to the price discovery function on the spot price.

References

[1] FAN HH, ZHANG LY. Eviews statistical analysis and application [M]. Beijing: Mechanical Industry Press, 2010. (in Chinese).
[2] SUN JS. Econometrics[M]. Beijing: Tsinghua University Press, 2009. (in Chinese).
[3] PANG H. Econometrics[M]. Beijing: Science Press, 2007. (in Chinese).
[4] LI HR. A research of the relationship between cotton prices in futures market and in cash market[J]. Economic Survey, 2006(5): 149 –151. (in Chinese).
[5] SUN X, KANG HJ. The empirical research on China's cotton futures market price discovery function[J]. Journal of Financial Development Research, 2008(9): 53 –55. (in Chinese).