



The Effects of Investor Attention on Cornstarch Futures Markets

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Abstract. The futures market price of agricultural products is affected by many factors. We introduce the Baidu search index as a proxy variable for investor attention and examine the link between corn starch futures and the Baidu index. The Granger causality test is used to observe the direction of causality, which shows that the Baidu index causes cornstarch futures. The VAR model indicates that attention has significant positive effects on cornstarch futures return.

Keywords: VAR model · Granger causality test · Impulse response · Cornstarch futures return · Investor attention

1 Introduction

The corn starch futures contract has been listed and traded since December 19, 2014. It is necessary to study the corn futures market. As a downstream corn product, corn starch strongly correlates with corn price [1]. Listing cornstarch futures is conducive to the steady development of the deep corn processing and whole corn industries. It is known that the cornstarch industry is an important way to consume corn. It solves the problem of high stock of corn, but also leads to the fluctuation of corn price. The higher producer price level of corn and the further improvement of the comparative interests of corn will help mobilize the enthusiasm of farmers to expand corn planting.

Zhang et al. employ investor attention to explain and forecast carbon futures return in the European Union-Emission Trading Scheme [2]. The empirical results show that investor attention can be treated as the independent variable for carbon return. Most of the research works use the proxy variable of investor attention in the stock markets' prediction model. Recently, Ref [3] investigated the impact of attention-driven behavior on agricultural commodity prices. The results show a causal and permanent relationship between Google search queries and the prices of corn and wheat. This paper explores the potential linkages between investor attention and cornstarch futures return.

2 Data

In this section, we briefly describe the data sources and the variables selection. First, from the WIND database, we obtained weekly price data for corn starch futures from January 2, 2017, to August 29, 2021. To eliminate the instability of data, we adopted the logarithmic difference method, which converts the data into a growth rate. Second, we chose

Table 1. Descriptive statistic of cornstarch futures and investor attention.

	Mean	Std.dev	Max	Min	Skewness	Kurtosis
Cornstarch futures	0.0020	0.0228	0.1128	-0.1223	-0.1401	11.8756
Baidu Index	0.0019	0.0928	0.4498	-0.2790	0.7572	7.4803

“corn starch” as the keyword for further research and selected the search volume of the Baidu Index as the proxy variable for investor attention. Finally, we adopt the same data processing method to process the time series data of the Baidu Index as corn starch. The statistical results of the cornstarch future and Baidu index are shown in Table 1.

3 Empirical Results

In this part, empirical data are used to illustrate the relationship between investor attention and corn starch futures.

3.1 ADF Test

Data stationarity is the premise of time series model construction. The ADF unit root test was applied to the sequence to test the selected variable sequence’s stationarity. According to the results in Table 2, both of them are stationary time series, which satisfies the condition of the VAR modeling.

3.2 Granger Causality Analysis

The linear causality relationships between corn starch futures return and investor attention are tested by Granger causality test in this part. The results of the Granger causality test [4] in Table 3 are obtained with the lag order of 4.

As shown in Table 3, the probability that investor attention is not the Granger cause of cornstarch futures yield is 0.0018, which rejects the null hypothesis and admits that the change in investor attention will affect the shift in corn starch futures yield. At the same time, the probability that cornstarch futures return is not the granger cause of investor attention is 0.3816, which is to accept the null hypothesis, that is, cornstarch futures return will not reverse the change of investor attention.

Table 2. ADF unit root test results.

	Type	t-statistic
Cornstarch futures return	None	-12.6512***
	Intercept	-12.7860***
	Trend and Intercept	-12.7643***
Baidu index	None	-12.7528***
	Intercept	-12.7301***
	Trend and Intercept	-12.7038***

* ** represents the 1% level of significance.

Table 3. Granger causality test results.

Null Hypothesis	Prob
Baidu index does not Granger Cause cornstarch futures return	0.0018***
Cornstarch futures return does not Granger Cause Baidu index	0.3816

* ** represents the 1% level of significance.

3.3 Building VAR Model

We use the VAR model [5] to obtain the degree and timeliness of the cross-influence between investor attention and cornstarch futures return and then obtain the VAR estimation result and the corresponding impulse response function through Eq. (1),

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \dots + \alpha_p Y_{t-p} + \beta_1 ATT_{t-1} + \dots + \beta_p ATT_{t-p} + \lambda_t, \quad t = 1, 2, \dots, T, \tag{1}$$

where Y_t is the n-dimensional endogenous variable vector, ATT_t is the n-dimensional exogenous variable vector, p is the lag order, T is the number of samples, α_p and β_p are the matrices of coefficients to be estimated, and λ_t is the n-dimensional random disturbance term.

The results of the VAR analysis are reported in Table 4. The second column represents the coefficient of each independent variable when the cornstarch futures return is taken as the dependent variable, and the third column represents the results of Baidu index as the dependent variable. The standard error is shown in the bracket.

The following conclusions can be drawn from Table 4. First of all, the change of attention has a significant impact on the return of corn starch futures, but the impact is positive and negative, which means that the increase of attention may make investors have the desire to buy or sell, thus leading to the price change [6]. Second, the effect of the change in Baidu index may not immediately show up in the change in price because the first-order lag coefficient is not significant. Such influence may appear in three and four weeks later, as ATT_{t-3} and ATT_{t-4} are both significant.

In Table 5, we have tested the VAR model. The variance inflation factor test and correlation coefficient matrix show that the VAR model does not have multicollinearity. Then

Table 4. VAR analysis results.

	Y_t	ATT_t
Y_{t-1}	0.15927** (0.06381)	-0.17968 (0.27076)
Y_{t-2}	-0.20956*** (0.06245)	0.10085 (0.26499)
Y_{t-3}	-0.102395 (0.06254)	0.25537 (0.26537)
Y_{t-4}	-0.00731 (0.06240)	-0.43622* (0.26478)
ATT_{t-1}	-0.00540 (0.01497)	0.20257*** (0.06351)
ATT_{t-2}	-0.01672 (0.01521)	-0.00892 (0.06453)
ATT_{t-3}	-0.05050*** (0.01522)	0.06204 (0.06459)
ATT_{t-4}	0.03890** (0.01524)	-0.12604* (0.06468)
<i>intercept</i>	0.00245* (0.00139)	0.00279 (0.00590)
R^2	0.1508	0.0706

*, **, *** denote significance at 10%, 5% and 1% level, respectively.

the residual variance test proves that the VAR model does not have heteroscedasticity. The above results show that the VAR model adopted in this study is feasible.

In Figs. 1 and 2, the x-axis indicates the duration of impulse, and y-axis represents the degree of influence for the impulse. As can be seen from the impulse response Figs. 1–2, when a negative impact is brought to the attention of investors, the yield of corn starch futures makes a negative response, reaches a negative maximum in the fourth period, then gradually weakens, and then turns to a positive response. After getting a positive maximum in the sixth period, it gradually weakens and tends to be stable from the twelfth period. In addition, the impact of the yield of corn starch futures on attention can last about ten weeks.

Table 5. Test for VAR model.

	Y_{t-1}	Y_{t-2}	Y_{t-3}	Y_{t-4}	ATT_{t-1}	ATT_{t-2}	ATT_{t-3}	ATT_{t-4}
Panel A: 1/VIF								
	0.8759	0.9063	0.9038	0.9098	0.9505	0.9211	0.9200	0.9175
Panel B: Correlation matrix								
Y_{t-1}	1.0000							
Y_{t-2}	0.1379	1.0000						
Y_{t-3}	-0.2046	0.1347	1.0000					
Y_{t-4}	-0.1636	-0.2024	0.1329	1.0000				
ATT_{t-1}	-0.0047	-0.0333	0.0612	0.0799	1.0000			
ATT_{t-2}	-0.0357	-0.0085	-0.0308	0.0629	0.1929	1.0000		
ATT_{t-3}	-0.1075	-0.0321	-0.0110	-0.0325	0.0299	0.1935	1.0000	
ATT_{t-4}	-0.1977	-0.1054	-0.0333	-0.0119	0.0485	0.0303	0.1932	1.0000
Panel C: VAR residual heteroscedasticity test								
No cross terms	0.0253 (0.8737)					With cross terms	1.2468 (0.5361)	

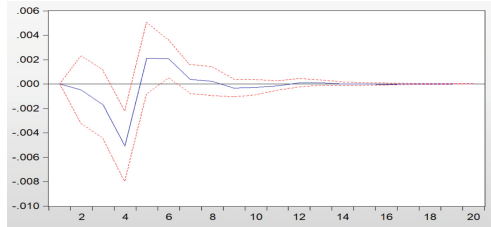


Fig. 1. Impulse response of cornstarch futures price concerned by Baidu Index.

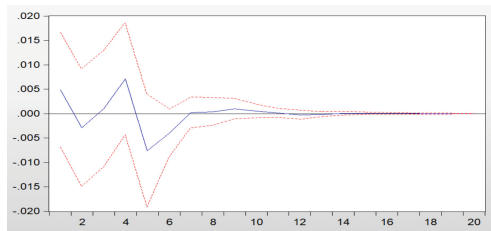


Fig. 2. Impulse response of Baidu Index concerned by cornstarch futures price.

4 Conclusion

This paper explores the potential linkages between investor attention and cornstarch futures return. The results of the Granger causality test, vector autoregressive model (VAR), and impulse response illustrate the influences of attention on cornstarch futures return.

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