

The Impact of the policies: Evidence from Chinese Ecological Agriculture Companies

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Abstract. Since 1982, affected by the national development direction and policies, companies in related agricultural industries have developed rapidly. One of the standards reflecting the company's development - stock price volatility - has specific industry characteristics. Overall, we found that in the event window, except for 2016 and 2017, the cumulative average abnormal returns showed an upward trend. Especially in 2015, 2018, 2019, 2020, and 2021, since the cumulative abnormal returns are insignificant and the test results are efficiency, it almost proves the policy effect not existing on China's stock market no matter the policy is positive or negative. Finally, through the FAMA five-factor robustness test, we found that the policy effect of ecological agricultural stocks is weak due to the impact of investment factors and profitability, and following previous research, we can conclude that the ecological agricultural stock price is estimated by the investor sentiment and stock valuation. To make a more targeted study on the effects of relevant preferential agricultural policies and national development policies on ecological agriculture, we selected the stock volatility data of 36 listed companies from 2015 to 2021, when the No. 1 central document was released. We used the event study method to use the market model and the FAMA five-factor model to make statistics on the abnormal returns of companies. Compared with the previous research, the heterogeneity of agricultural sub-sectors was obtained by narrowing the sample scope to the ecological agriculture sector in the agricultural sector, and the last policy-related research was further testified.

Keywords: Ecological agriculture, Stock market, Event study, No. 1 central document.

1. Introduction

Since 2010, China's central government has started to develop the three major agricultural industries, with significant progress each year. The National Agricultural Industrial Development Office promotes the development of the relevant industries with great force in the document that is the Agricultural Development Area Development Circulation Agricultural Item Guideline (2017-2020), which indicates that from 2017 to 2020, there will be the construction of 300 agricultural circulating industrial items, with a joint investment of 30 million agricultural products, the actual growth of more than 10%, and farmer income growth of more than 10% from Ministry of Agriculture of China in 2016. It also attaches great importance to the development of ecological agriculture worldwide. The US Ministry of Agriculture has announced that it will invest 1.46 billion dollars in supporting sustainable agricultural research projects and will support 15 new research projects in the future, including the improvement of animal and plant production and sustainability, as well as human and environmental health (USDA, 2021). The ecological agricultural industry has achieved effective development under the influence of US-related policies. Moreover, environmental protection and resource utilization is the problem of solving common social needs; As Pretty said in 2008, agricultural sustainability is the most basic concept of ecological agriculture: resource utilization and environmental protection. Through the adjustment and optimization of the agricultural industry model, the production capacity of the natural environment is maintained, and the overall effect of the agricultural production is increased simultaneously to ensure the sustainable health development of the agricultural industry [1].

For investors and market development, an accurate grasp of national policies and the basic information of relevant companies is an important means to avoid risks and predict returns, especially when China's relevant agricultural public funds are conducting adjustment for stock. Generally

speaking, favorable policies can drive the growth of stock prices of listed companies. However, relying only on policies and ignoring other factors is maybe helpful when facing changes in the company's stock prices. In other words, it is not reliable that the policy factor is the only to influence stock return. While by combining the influence of policy factors, market factors and company fundamentals, it is possible for us to get the maximum benefit with a larger probability as much as possible, especially in the face of ecological agriculture with stable growth value. This research can help investors and corporate decision-makers better use the "three rural" policy to promote the development of ecological agriculture, so as to build ecological agricultural economy. For investors, they can better grasp the economic development trend and the development volatility of the industry, so as to have a greater probability of obtaining positive returns. Finally, for agricultural developers and workers, the use of effective industry development information can help them participate in the ecological agricultural industry in the dividend stage of development, and better grasp the market dynamics, so as to promote the development of ecological agriculture and multi field cooperation.

2. Literature Review and Hypotheses Development

2.1 Current Operation Status of Chinese Agricultural Companies

The "export productivity paradox" of Chinese agricultural enterprises has been confirmed, they explain this phenomenon from the perspective of TFP (Total Factor Productivity) elements. Based on the data of leading national agricultural enterprises from 2016 to 2017, the SFA (Stochastic Frontier Approach) Malmquist method is used to decompose and compare the TFP of Chinese agricultural export enterprises and agricultural non-export enterprises. It concludes that China's agricultural total factor productivity shows a negative growth trend, the growth rate of agricultural export enterprises' total factor productivity is lower than that of agricultural non-export enterprises, and technological progress is an important reason for the change in China's agricultural enterprises' total factor productivity. However, compared with agricultural non-export enterprises, improving the technical efficiency of enterprises can promote the TFP of agricultural export enterprises more. In other words, improving technical efficiency is one of the important factors for agricultural development. In addition, people began to pay more attention to the development of the performance of the subdivided industries and total industry in the research object. used data analysis: the data were collected from 82 publicly listed companies during the period of 2010 to 2016 and concluded that not all companies are DEA (Data Envelopment Analysis) effective. Under the harsh agricultural business environment, the industry has developed steadily. However, in the process of sustainable development, there are still some problems. These companies are in different life cycles. Furthermore, some companies are still in the stage of emphasizing scale or efficiency, while others are sufficient in resource allocation and focus on growth, and the research results showed that agricultural listed companies have significant room for development in terms of performance. Moreover, the relationship between the company's internal conditions and the company's performance is more noteworthy than the pure financial report performance [2].

2.2 Possible Factors on Affecting the Agricultural Companies Performance

With the deepening of research, people are more eager to explore effective factors. First of all, through the factor analysis method, the company's operating performance was comprehensively analyzed and evaluated, providing a basis for decision-making for information users and agents, as well as a reference for agricultural listed companies to improve their operating quality, based on the financial data of agricultural listed companies in 2014, use factor analysis to evaluate the financial competitiveness of agricultural listed companies from three aspects: financial viability, financial development, and financial potential. The research results show that profitability, short-term and long-term liquidity can show a company's financial viability. Asset operation situation and cash acquisition capability can express a company's financial development. Growth capability can reflect a company's financial potential, and profitability plays a leading role in the comprehensive evaluation

of financial competitiveness. Later, analyzed the profitability of listed companies based on relevant data from agricultural listed companies from 2011 to 2016 and selected relevant indicators reflecting the sustainable operation ability of agricultural listed companies as analysis variables. It is found that the overall operating conditions of agricultural listed companies are significantly related to their balance sheets, equity concentration, and tax subsidies. Based on this research conclusion, improving the ownership structure and capital structure, reducing business risks, and improving the company's modernization may be the limiting factors for improving the sustainable operation ability of agricultural listed companies. used the factor analysis model method to conduct performance evaluation, research, and empirical analysis on 37 agricultural listed companies in China in 2017, they obtained the results that agricultural listed companies were small in scale, their overall operating performance was relatively poor, agricultural listed companies were heavily divided at two levels, and the gap between scale and income was significant; And what is more serious is that China's agricultural listed companies are developing unevenly in four aspects: profitability, operation ability, development ability, and solvency ability [3].

2.3 Research on the effectiveness of Agricultural Policy

The introduction and implementation of agricultural policies, what kind of role and impact they can have on agricultural development is an important issue of national and social concern, which has also attracted the attention of researchers. From the research literature, foreign researchers have also conducted much research, mainly focusing on the evaluation of agricultural policy effects, which can be summarized as follows:

2.3.1 Research on the effectiveness of Agricultural Policy in United State

Firstly, it is the research on the setting of quantitative evaluation indicators and methods. mainly involved the selection and comparison of evaluation methods for policy effects and discussed the synergy between different policies and how to build a corresponding indicator system, which lays a foundation for the evaluation and quantification of agricultural policy support in the future. Second aspect is the research on the effect of agricultural support policy. The research on this aspect is based on previous research, that mostly analyze whether the agricultural market operates normally and the impact of policies on producers and consumers through econometric models to determine whether policies need to be adjusted to change the market status. They used the producer support equivalence (PSE) index and comprehensive support T index to analyze the United States and the European Union. used a partial equilibrium model of the agricultural market and detailed PSE data to determine trade, production, or farmers' income and uniform tariff and compared the indicators with other measures of agricultural policy intervention. In addition, analyzed Japan's agriculture and agricultural policies, and the progress made in the adjustment of agricultural support policies was compared [4].

People study the input and output efficiency of agricultural financial support, that is, the efficiency of production. Since the introduction of the National Plan of Russia, some indicators have not reached the planning level, which to some extent, shows that the overall effectiveness of the industry is insufficient. In comparison, labor productivity has been improved to varying degrees, which is also a different conclusion drawn by two different research methods on input efficiency. In addition, the cardinal utility theory is mainly used to evaluate financial efficiency from the perspectives of gross national income growth and national income distribution. This method is relatively traditional. In addition, the research on the relationship between social and economic growth and agricultural fiscal expenditure is also one of the focuses, they selected the public expenditure of agricultural fiscal expenditure as the main research policy and analyzed its impact on social and economic changes. The research results showed that different uses of public expenditure had different effects on economic growth, and the impact relations between the two were also different [5].

2.3.2 Chinese Research on the effectiveness of Agricultural Policy

There is also much research literature on the role of agricultural policies by domestic scholars. Qicheng, in 2009 systemically combed China's agricultural policies from 2000 to 2006, evaluated

them from both the total amount of support and the support structure using the OECD agricultural policy evaluation method, and obtained that although the list of the total amount of government support continues to increase, the support structure is unreasonable and lacks direct support for producers. Therefore, the improvement of the agricultural policy effect depends on the government's one-step adjustment of the support structure. Comparatively speaking, it is more interesting to apply the theoretical economic model to the combination of agricultural economy and society. For example, Horowitz, Just, and Netanyahu 1996 used the Bayesian equilibrium game theory to analyze the impact of agricultural policies on the rural economy and society and proposed that there are multiple games between policies and farmers. Through research, it was found that the combination of policies and farmers' Bayesian equilibrium strategies is balanced and unique. Therefore, we should pay attention to the game analysis of agricultural policy. Of course, there is also research on the input efficiency of agricultural financial support in China. With the help of the DEA Malmquist index method, the study evaluated the efficiency of financial support for agricultural industrialization and made an in-depth study of its influencing factors. These factors have an extremely important impact on improving the development of agricultural industrialization, and the study found that there are some problems in the development of China's agricultural industry, such as insufficient financial support [6].

2.3.3 Different Evaluation Methods on Affects of Agricultural Policies

Through the construction of an evaluation system of absolute quantity indicators and relative level indicators, the study evaluated the implementation effect of China's agricultural support policies from 2005 to 2011. The study found that China's agricultural subsidy support has entered a rapid growth stage, and the total amount of agricultural support and the level of subsidies for major agricultural products have increased significantly. However, Gale, in 2013, proposed that measures such as price support and related subsidies may increasingly intervene in the market. Through the application of correlation analysis, fitting analysis, and other statistical methods, the study studied the relationship and impact between income increase and poverty reduction of households in rural areas, especially farmers in poor areas, and agricultural policies, so as to verify and explore the positive impact of various preferential policies of the Chinese government on rural residents' income increase and poverty reduction. Coincidentally, the research of Cervantes Goodoy and Dewbre in 2010 found that the indicators of macroeconomic characteristics, especially the indicators of agricultural economic characteristics, show almost all geographical regions. The results of time series and cross-section regression analysis show that agricultural income growth is particularly important for poverty reduction [7].

2.4 Reason for Why “Policy Effect” Exist

The research mainly focuses on the psychological mechanism of venture capital behavior in China's stock market, using a structural equation model to generate an investment behavior model with risk perception as the intermediary. And the result is that information from the organizational/institutional level will encourage investors to have a lower risk perception and policy-oriented speculation, which may be related to China's collectivist culture and may be detrimental to the risk management of China's stock market. In addition, Wang, Tsai, and Li 2017 studied the structural change of risk with the implementation of a series of policies through the GARCH model, from the rescue policy in 1994 to the Shanghai-Hong Kong Stock Connect in 2015. The results show that although many policies have improved or stabilized the stock market, some policies have caused substantial fluctuations. In addition, policy effects are also affected by the uncertainty of global economic policies. For the first time, based on the change direction of global economic policy uncertainty (GEPU) and China's economic policy uncertainty (EPU), the study explored the impact of directional GEPU. The results show that the fluctuation of GEPU will lead to significant fluctuations in China's stock market [8].

2.4.1 Influence of “Policy Effect” on Stock Market

The policy research can also be divided into continuous policy and short-term discrete policy. used the garch model to study the impact of macroeconomic policy changes on the fluctuation of conditions in China's stock market. When the government adopts the compound policy of money supply, interest rate, stamp duty, and fiscal expenditure to regulate the stock market, the impact of monetary policy changes on the fluctuation of conditions in China's stock market is not statistically significant. This finding, to a certain extent, verified the capital pull characteristics and weak form efficiency characteristics of China's stock market. In addition, for short-term discrete policy events, the study evaluates the dynamic correlation and causal relationship between the uncertainty of American economic policy (EPU) and the Chinese and Indian stock markets from 1997 to 2018. It is also found that the interaction between the U.S. EPU and the stock returns of China and India is weak in the short term but gradually strengthens in the long term, especially when major financial events occur. Based on the above research results, it is found that the impact of the two types of policies on the stock market is significantly different. In addition, proposed the opposite experimental results. They examined the relationship between China's stock market and three widely used macroeconomic variables, namely, industrial production growth, inflation, and long-term interest rates. They mainly studied the correlation and lead-lag relationship between them. The inexplicable positive correlation between stock returns and interest rates and the mixed lead-lag relationship showed that China's stock market is quite underdeveloped, and there is a certain rupture between the stock market and the macroeconomic.

The conclusion that China's stock market has a policy effect, obvious characteristics of a "policy market," and low policy efficiency is widely accepted. The impact of policy factors on the stock market is huge. Later, Wang, in 2010, believed that it was necessary to adjust macro policies. The study found that the abnormal fluctuation of the stock price has a great relationship with the policies issued by the government and is the first factor affecting the fluctuation of the stock index. In addition, by comparing the stock markets of essential oil and agricultural products, this study analyzes the relationship between the global oil market, stock market, and economic policy and observes that there is a significant correlation between the stock market volatility of the two countries and the global oil price volatility, it can be seen that China's stock market has a certain synergy effect on the global market [9].

2.4.2 Link of Liquidity and Volatility with “Policy Effect”

The research on the relationship between stock market liquidity and volatility and policy is of great concern. The impact of China's institutional reform on market liquidity concludes that regulatory changes have a considerable impact on liquidity by using the monthly data of turnover, turnover volatility, and stock return of Shanghai and Shenzhen Stock Exchanges and applying the intervention model. And Zeng, Huang, and Huang 2016 made a descriptive analysis of the volatility of China's stock market in 2015 and assessed the effectiveness of the Chinese government's efforts to save the stock market. Although it is understandable and seems necessary for the Chinese authorities to intervene to prevent the further outbreak of the crisis, unfortunately, this undermines the credibility of the current leadership's management ability and the principle of not intervening in market volatility, and also shows us the vulnerability of the market under the intervention.

Based on the above analysis, the policy intervention in the stock market is huge, and the "policy market" characteristics are obvious. There are two main reasons: First, the government uses policies to influence the stock index, and the introduction of policies causes the rise and fall of stock prices, which has a significant effect; Second, the government uses policies to affect the operation of the stock market. Due to China's economic system and national nature, investors in China's stock market have a "policy dependence bias."

Hypothesis 1: For the relationship of ecological agricultural stock fluctuations and the publication of the No. 1 central document, there is a significant “policy effect.”

2.5 Reason for Why “Policy Effect” ineffectiveness

Local governments actively participate in earnings management by providing financial transfers to listed companies within their jurisdictions. The main purpose of this government-assisted earnings management is to assist enterprises in accounting earnings management to meet the regulatory requirements of the central government. However, this inertia is the biggest obstacle to the full marketization of leading agricultural enterprises. Similarly, enterprises that provide many government subsidies to Chinese enterprises and obtain more subsidies often have lower debt costs. However, companies have lower social performance. Because the subsidy income has created a certain illusion in the short term, covering up the operational risks of agricultural listed companies, the Chinese government uses non-tax subsidies to achieve its social policy objectives, but at the expense of the profitability of enterprises. This is the national preferential policy and the risk brought to listed companies by vigorously developing agriculture. But research shows that at the same time, China has issued a series of policies to support agricultural enterprises to engage in biotechnology research. Government policies impact enterprises' investment in biotechnology R&D. As reported by Li in 2018, in recent years, the state has taken many measures to support agricultural development, such as adopting preferential policies for agricultural-related enterprises, promoting the product structure adjustment and scale expansion of agricultural enterprises, and developing large-scale production and industrialization of agricultural enterprises to promote the overall and efficient development of the agricultural industry. In order to better test the achievements of the subsidy preferential policies in terms of performance, concluded that the current national fiscal and tax subsidies have improved the operating profits of enterprises to some extent, but have not contributed to improving the comprehensive performance, economic performance, social performance and other aspects of enterprises, which cannot help to improve the business ability of enterprises [10].

2.5.1 Factors affecting the stock return

these studies mainly focus on the relationship of elections, government corruption, political connection (PC), and government policy (GP) with stock's return. Although an exact effect on the whole stock market can be found when the two factors are studied separately, the policy will not play a decisive role when the two factors are considered simultaneously. show that investor sentiment has a significant influence on returns, varying in intensity across markets. finally got the exact results about the impact of investor sentiment on stocks He used Markov Switching Vector Autoregression (MS-VAR) model to study the impact of investor sentiment and policies on stock prices in different market states, that is, whether it will lead to abnormal returns. The results confirmed that emotional shocks can cause stock price volatility more than policy shocks and last longer. found that China's stock market is no longer only affected by domestic policies, especially when major events are released at home and abroad. In fact, with the development of the global economy, China's stock market is gradually integrated into the global economy after a series of liberalization policies, so China's stock market is more strongly affected by policy uncertainty worldwide. found that economic policies affect investor sentiment and thus lead to stock price volatility, and confirmed that there is no significant information flow transmission relationship between EPU (economic policy uncertainty) and stock market volatility, indicating that stock market volatility is not affected by national policy fluctuations in essence. Later, we determined the multiple reasons that affect the stock market and determined the direction. Moreover, their research has finally established that the fluctuation of the stock market is not only caused by policy changes, but also the size of the listed company itself, the company's book value, debt ratio, profitability and growth value play a key role.

Based on the above research, we can find that the factors that affect the effect of policies in the market and the stock value are complex. In fact, it is widely accepted that economic policies affect investor sentiment and will eventually be reflected in the stock market through investment decisions, leading to stock price fluctuations. In fact, it is not true. Based on the above research, changes in stock prices are affected by many factors. On the one hand, stock prices are affected by investors' psychological expectations, that is, investor sentiment, there will be fluctuations in sentiment. These

emotional factors do not only exist at the time of policy release. On the other hand, the stock price is affected by the company's basic information, that is, the company's financial management and the company's valuation management, and even these factors play a decisive role.

Hypothesis 2: For the relationship of ecological agricultural stock fluctuations and the publication of the No. 1 central document, there is not a significant "policy effect", stock price is possible affected by investor sentiment or company's valuation.

2.6 Research Connection and Supplement

As far as the current research and development stage is concerned, Xilong, Qi, and Yinchuan in 2017 have studied the relationship between agricultural development, stocks, and policies, but there are obvious drawbacks and incompleteness. The research on ecological agriculture and agricultural modernization-related industries highlighted in the No. 1 Document of the Central Committee after 2014 was not conducted. The research on the No. 1 Document of the Central Committee only twice from 2012 to 2013 was not sustainable and could not avoid the existence of contingency. Therefore, it is necessary to select a larger and specific sample. In addition, based on the research on the upstream and downstream industries of ecological agriculture mentioned in ecological agriculture, the research is limited to the research on publishing of policies and returns and does not involve the overall industry and the performance of the industry in the capital market.

On the other hand, the research on agricultural listed companies is aimed at the specific problems of listed companies, ignoring the role of the stock market as a fund platform for agricultural listed companies, while the research on the impact of agricultural policies on the stock price volatility of listed companies is relatively few, so it is reliable to study the synergy of policies on the stock market and enterprise development. From the existing literature, the research on China's stock market has confirmed the effectiveness of China's stock market and the characteristics of the "policy market." However, the research on stock price volatility is more focused on the volatility of the composite index of the main board market in China's two cities than on the volatility of the industry component index. Therefore, as an important subdivision of the agricultural sector, ecological agriculture is worth studying.

3. Data and Methodology

3.1 Data

This paper integrates three different databases: Wind database, Central University of Finance and Economics, and the Central Committee of the Communist Party of China important documents of Xinhua News Agency, as the analysis of the article data, and the period is from January 1, 2015, to August 31, 2022.

Wind database provided the 1836 days of transaction data of 36 listed enterprises, and we obtained 4,320 quarterly data, which was consistent with the usual division of agricultural periodicity and the changes included in the data on exogenous variables. According to the monthly revenue changes in the database, 37,152 data were obtained as important measures to meet the timeliness of policy factors in exogenous factors.

East Money Information database provides in line with the ecological agriculture service sector of 36 listed companies stock information, which is the sample shares of this article, and the listed companies to meet the 2001 China Securities Regulatory Commission issued China listed companies industry classification guidelines. Since 2004, China has issued the no. 1 central document about agriculture, rural areas, and farmers every year. However, because the listed companies of ecological agriculture began to have the segments in 2015, so the sample period is from 2015 to 2022. In terms of the industry index, this paper selects the ecological agriculture leading sector index as the industry index, to better study the overall fluctuation status and trend of the stock price of the ecological agriculture sector. The stock price studied in this paper refers to the daily closing trading price of the secondary market, and the stock price is treated by the forward recovery right, to exclude the impact

of the listed company's rights issue, dividend payment, and other factors on the stock price, and to ensure the stability and comparability of the stock price.

In addition, from the Central University of Finance and Economics, set the variables of endogenous factors including profitability, solvency, and investment ability, and we also got the five factors of Fama-French five factors model. And according to the Xinhua News Agency and the Chinese government network released about agricultural growth planning and special expression of the industry, to select the market volatility of before and after no. 1 file published from 2015 to quantify the exogenous factors.

3.2 Methodology

Following what Xilong, Qi, and Yinchuan in 2017 have made, we use the event study approach to examine the impact of the publication of No. 1 central documents on the performance of Chinese ecological agricultural companies. The event window selection is variable to test the impact during a limited time interval and border times, we choose the event window interval is $[-30, 30]$. The estimation window is defined as $[-150, -31]$. Furthermore, the paper use models of abnormal returns to measure the sample's excess returns within the event window. In order to estimate the expected return (ER) and abnormal return (AR), the market model is used based on the following calculations:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \mu_{i,t}, \quad (1)$$

$$E(R_{i,t}) = \hat{\alpha}_i + \hat{\beta}_i R_{m,t}, \quad (2)$$

$$AR_{i,t} = R_{i,t} - E(R_{i,t}), \quad (3)$$

Where $E(R)_{i,t}$ is the expected return of firm i on the t -th day based on the estimation window. $R_{m,t}$ indicates the excess return of market index m on the t -th day, and α , β , and μ denote the intercept, the slope of the market model, and a random error term, respectively. In Equation. (3), $AR_{i,t}$ represents the abnormal return of the listed company i on the t -th day, and $R_{i,t}$ is the stock return of the firm i on the t -th day. CARs are computed as follows:

$$CAR_{i,T} = \sum_{t=t_1}^{t=t_2} AR_{i,t}, \quad (4)$$

$$AAR_t = \frac{1}{N} \sum_{i=1}^n AR_{i,t}, \quad (5)$$

$$CAAR_T = \frac{1}{N} \sum_{t=1}^T AAR_{i,T}, \quad (6)$$

Where $CAR_{i,T}$ is the cumulative abnormal return of company i with the time interval $T[t_1, t_2]$, from initial moment t_1 to final moment t_2 . In equation 5, AAR_t calculates the average abnormal return of all the GB-issuing listed firms on the t -th day, where N is the number of the firms (from 1 to n). Similarly, in equation 6, $CAAR_T$ is the cumulative average abnormal return of all the companies in the sample within the time interval T on the t -th day.

Table 1. Descriptive of Ecological Agriculture Company Stocks

Variables	N	Mean	StdDev	Min	Max	Skewness	Kurtosis
$R_{i,t}$	15,631	-0.3356	2.1765	-10.1266	43.9394	0.6659	19.1548
$R_{m,t}$	15,631	0.0396	1.2880	-7.8809	3.8608	-1.1190	10.3250
$E(R)$	15,631	-0.1858	1.9751	-12.8163	4.1960	-2.7517	13.0970
AR	1,386	-0.0347	2.3473	-10.9260	17.1436	1.1465	11.1253
CAR	1,386	-0.5474	9.3571	-23.6497	55.5644	2.1368	8.3158

The table 1 reports descriptive statistics for the sample of 36 Chinese public ecological agriculture companies from 2015 to 2021. The data set of stock closing prices and market stock returns is obtained from the Finance Yahoo database. Using the event study approach, we select seven event dates as $t=0$. Seven No. 1 central documents were issued on February 1st, 2015, which clearly defined the expenditure on developing green agriculture and ecological economy. The documents issued on January 27th, 2016 and February 5th, 2017 showed that the focus of development was to promote the sustained and rapid growth of farmers' income and achieve the structural reform of the agricultural supply side. The document issued on February 4th, 2018 pointed out that it was expected to achieve agricultural modernization, The document of February 19, 2019 mentioned the hope to increase the input of agricultural equipment and other resources. February 5, 2020 and February 19, 2021 respectively explained the strategies to achieve rural poverty alleviation and implement green villages and rural revitalization The estimation event window is $[-150, -31]$. The event window is $[-30, 30]$. The raw returns ($R_{i,t}$) are calculated from daily stock closing prices. We use the daily market return ($R_{m,t}$) from Central University of Finance and Economics. The expected return ($E(R)$) is the expected return within the predicted event window based on the market model. The abnormal returns (AR) equal raw returns minus the expected return based on a market model. The cumulative abnormal returns (CAR) are the sums of each company's abnormal returns within the event window. Table 1 shows the summary statistics of the stock performance of the ecological agriculture companies in our sample. Also, we used the t-test method to test the event study results, investigating whether the publication of No.1 central documents impacted the firms' stock performance. The calculation is based on the following equations,

$$T-test_{AAR_t} = \frac{AAR_t}{S(AR_{i,t}) / \sqrt{N}}, \quad (7)$$

$$T-test_{CAAR_T} = \frac{CAAR_T}{S(AAR_{i,T}) / \sqrt{N}}, \quad (8)$$

Where S is the standard deviation. Finally, the study focuses on the CARs results of seven events to investigate the cumulative stock price influence of publication of No.1 central documents on ecological agricultural companies in the event window.

4. Results and Discussions

4.1 Main Results

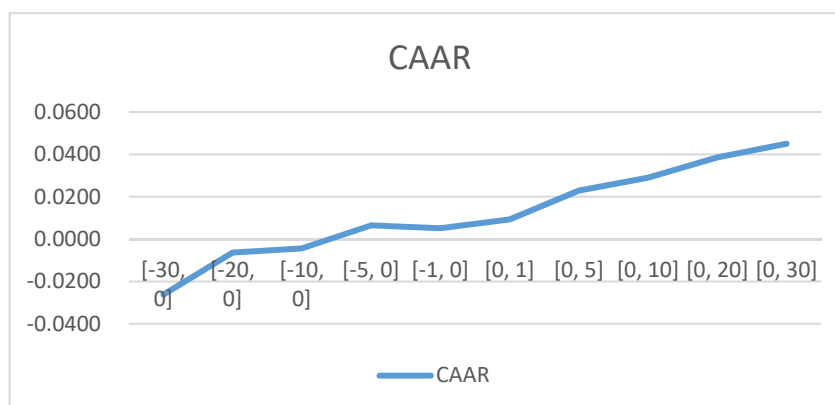


Figure 1. CAARs of NO.1 central document publication on seven years.

Table 2. This table presents summary statistics for the variables used in the event study, especially summary the total sample, the character of sample and the observation.

Event window	Car	T-test	Frequency
[-30, 0]	-0.0262	-2.0773	0.0415
[-20, 0]	-0.0064	-0.4574	0.3317
[-10, 0]	-0.0044	-0.2536	0.4041
[-5, 0]	0.0065	0.4391	0.3380
[-1, 0]	0.0051	0.3636	0.3643
[0, 1]	0.0093**	0.6922	0.2573
[0, 5]	0.0229*	1.6706	0.0729
[0, 10]	0.0290*	1.6594	0.0741
[0, 20]	0.0385*	1.5520	0.0858
[0, 30]	0.0450*	1.6841	0.0716

Figure 1 shows the trend of cumulative average abnormal return in the past seven years. When the No. 1 central document is released, although the seven policies are conducive to the development of ecological agriculture and are not conducive to the development of ecological agriculture, when the impact of the seven policies is averaged, we can clearly see that CAAR shows an upward trend, According to this trend, we can get that at least during our event study period, the average cumulative income is increasing, but whether it is affected by policies cannot be determined. According to table 2, we can see that our data is valid within the scope of event research, that is, it is certain that there is indeed a trend of increasing cumulative returns within the scope of event research.

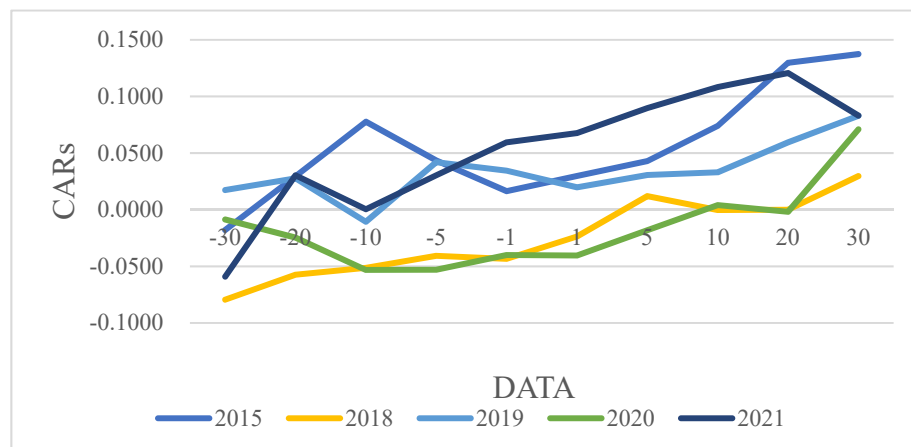


Figure 2. CARs of NO.1 central document publication on 2015/02/01, 2018/02/04, 2019/02/19, 2020/02/05, 2021/02/21

Figure 2 and Figure 3 presents the CAR trend for stocks of Chinese Ecological Agricultural listed companies impacted by the publication of No.1 central document during the event window [-30, 30]. Figure 1 shows an obviously rising trend of CARs of all the companies after the event window of publication of the document in 2015, 2018, 2019, 2020, and 2021. However, it is worth noting that on the day of the event, there was no sharp increase or decline in a short period of time, even the CAR is in the increasing trend.

Table 3. The table reports the event study result on the event date, 2015/02/01, 2018/02/04, 2019/02/19, 2020/02/05, 2021/02/21, when the official documents are published.

Event Window	CAR	t value	CAR	t value	CAR	t value	CAR	t value	CAR	t value
	20150201	20150201	20180204	20180204	20190219	20190219	20200205	20200205	20210221	20210221
[-30, 0]	-0.0179	-0.6850	-0.0794	-3.6824***	0.0175	0.5783	-0.0086	-0.3814	-0.0591	-1.9457*
[-20, 0]	0.0296	1.1818	-0.0574	-3.4020***	0.0277	1.1384	-0.0246	-1.1696	0.0304	1.4400
[-10, 0]	0.0778	4.3590***	-0.0513	-3.6038***	-0.0106	-0.8766	-0.0532	-3.2982***	0.0004	0.0224
[-5, 0]	0.0435	3.9285***	-0.0407	-3.0531***	0.0419	3.5907***	-0.0530	-3.7833***	0.0304	3.0385***
[-1, 0]	0.0163	1.9540*	-0.0433	-4.3631***	0.0345	4.4440***	-0.0400	-4.2952***	0.0595	6.5787***
[0, 1]	0.0299	3.1937***	-0.0236	-2.2856**	0.0197	2.7309***	-0.0403	-5.0238***	0.0677	6.1892***
[0, 5]	0.0429	1.8285*	0.0120	0.6006	0.0306	1.9004*	-0.0181	-1.7705*	0.0897	6.4191***
[0, 10]	0.0741	1.7116*	-0.0002	-0.0119	0.0330	1.6590	0.0041	0.2426	0.1083	6.6157***
[0, 20]	0.1297	2.7228**	0.0000	-0.0002	0.0594	2.4584**	-0.0018	-0.0942	0.1207	5.8220***
[0, 30]	0.1375	2.4926**	0.0297	0.6631	0.0830	2.1985**	0.0710	3.2023***	0.0831	3.5539***

The exact values and t-test results are shown in Table 3. The results show that the stock returns of all companies have a significant upward trend of CARs after the release of the No. 1 central document. In particular, in 2015, 2019 and 2021, CARs were positive from the event to the 20th day and showed an upward trend. Comparatively, in 2018 and 2020, there was a situation where the returns on the event day were negative but in the following days were positive, because CARs were negative when the event occurred, but in the following days CARs continued to rise and become positive. Although the data is reliable and we can see that CAR continues to show positive values, it does not reflect the stock price and the abnormal fluctuations affected by the event. This result cannot show that the No. 1 central document issued between 2015, 2018, 2019, 2020, and 2021 has a significant impact on the performance of stocks related to the ecological agriculture.

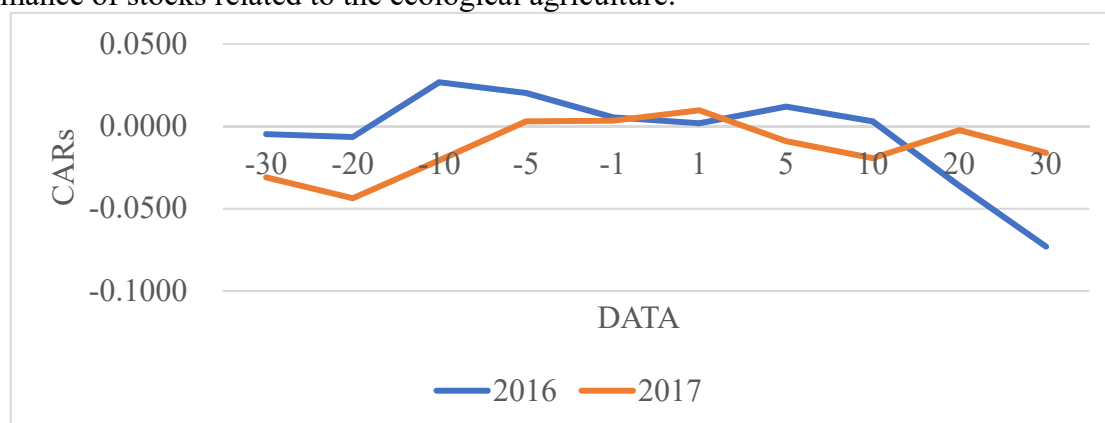


Figure 3. CARs of NO.1 central document publication on 2016/01/27, 2017/02/05

On the whole, figure 2 shows a decreasing trend of CARs of all the companies after the event window of publication of the document in 2016 and 2017. Figure 2 shows a mixed and disorderly trend of CARs during the event window of the second event date [-30, 30], and it fluctuates almost around zero values.

Table 4. CARs in the Event Window in 2016 and 2017

Event Window	CAR	t value	CAR	t value
	20160127	20160127	20170205	20170205
[-30, 0]	-0.0047	-0.1642	-0.0310	-2.0677**
[-20, 0]	-0.0065	-0.3222	-0.0436	-3.5010***
[-10, 0]	0.0267	2.1337**	-0.0206	-2.8257***
[-5, 0]	0.02024	1.8275*	0.00305	0.9852
[-1, 0]	0.00546	0.8761	0.00340	1.6858
[0, 1]	0.00184	0.2148*	0.0097	2.0190*
[0, 5]	0.0119	0.9713	-0.0090	-0.8028
[0, 10]	0.00305	0.2434	-0.0193	-1.4672
[0, 20]	-0.03617	-1.6861	-0.00228	-0.1123
[0, 30]	-0.07303	-3.0630***	-0.01608	-0.6857

Moreover, the detailed results in Table 4 show that in 2016 and 2017, the CAR value on the first day after the event was significantly positive, but when the event lasted for 30 days, there would be a significant negative value, which can only be obtained on the day when the policy was announced. However, the policies announced on these two days did not have a lasting, or even negative, impact on the movie stars of the ecological agricultural company. However, this does not reflect the impact of policies on all companies.

4.2 Alternative Models

on the basis of the three factor model, the profit factor RMW and investment factor CMA were added, and a five factor model was proposed. The effectiveness of the five factor model was verified by more than 50 years of market data in the United States. The empirical evidence of the stock market has promoted the continuous enrichment and improvement of the asset pricing theory system, which has evolved from the original CAPM single factor model to a multi factor model. It comprehensively considers the impact of system risk, book to market value ratio, market value scale factor, profitability factor and investment factor on the fund performance, which can more comprehensively evaluate the fund performance, and more effectively measure the ability of the fund to obtain excess returns through active investment management. At present, most of the research on China's capital market is based on the model of the US stock market. Liu, Stambaugh, and Yuan in 2019 can be regarded as the model of factor pricing system in China's market, and has constructed the Chinese version of scale factor and value factor according to the characteristics of China's stock market. We used this as an alternative method to re-estimate expected stock returns and obtain new CAR values. Doing so allowed us to investigate whether the conclusions of the event studies based on two different return models were the similar. Using the Fama-French Five-factor model, the abnormal return is calculated as follows:

$$R_{i,t} = \alpha_i + \beta_{i1}R_{m,t} + \beta_{i2}SMB_t + \beta_{i3}HML_t + \beta_{i4}RAW_t + \beta_{i5}CMA_t + \varepsilon_{i,t}, \quad (9)$$

$$E(R_{i,t}) = \hat{\alpha}_i + \hat{\beta}_{i1}R_{m,t} + \hat{\beta}_{i2}SMB_t + \hat{\beta}_{i3}HML_t + \hat{\beta}_{i4}RAW_t + \hat{\beta}_{i5}CMA_t \quad (10)$$

$$AR1_{i,t} = R_{i,t} - E(R_{i,t}) \quad (11)$$

Where $\beta_{i1}, \beta_{i2}, \beta_{i3}$ and β_{i4} are estimated by regressing company i 's returns on three factors—daily market excess returns, firm size factor, book-to-market, Profitability and investment levels (reproduction of capital)—in the estimation windows [-150, -31]. HML_t and SMB_t are the high-minus-low book-to-market and the small-minus-big size factors on day t , respectively. sort firms into six portfolios based on large/small market-capitalization and large/intermediate/small book-to-market ratios. HML is the difference between the simple average of the returns on the two high book-to-market portfolios and the average of the returns on the two low book-to-market portfolios. SMB is the difference between the simple average of the returns on the three small-capitalization portfolios and the simple average of the returns on the three big-capitalization portfolios.

Like SMB and HML, RMW and CMA explain the return rate of stocks through profitability and investment respectively. RMW represents the difference between the returns of diversified stock portfolios with good and poor profits at time t , that is, from the perspective of profitability, we can use this factor to explain the stock return rate. CMA represents the difference between the returns of diversified stock portfolio with more new total assets and less new total assets at time t . This factor predicts the stock return rate from the perspective of investment capability. For RMW, it is the difference between the (market capitalization weighted) yield of high profit stock portfolio and low profit portfolio. CMA is the difference between the (market capitalization weighted) yield of low investment proportion stock portfolio and high investment proportion stock portfolio. For the error term, there may be risk-free returns α Factors and risk factors, what we have to do is to find out α factor. For example, market risk premium is actually a risk factor, because it may be negative or positive, rather than the larger one β Can guarantee good stock returns. AR_1 is the abnormal return

based on Fama-French three-factor model. CARs are calculated based on Equation (4) in the methodology section.

Table 5. Five Factor Model: CARs of total companies in 2015, 2018,2019,2020 and 2021

EVENT WINDOW	Total Companies									
	CAR	t value	CAR	t value	CAR	t value	CAR	t value	CAR	t value
	20150201	20150201	20180204	20180204	20190219	20190219	20200205	20200205	20210221	20210221
[-30, 30]	0.099871878	1.4485	-0.031272226	-0.6016	0.098012813	1.6612	0.019768691	0.6777	0.009937548	0.2865
[-20, 20]	0.08464687	1.3964	-0.03985634	-1.0120	0.091786684	2.2150**	-0.000091650	-0.0034	0.029222999	0.9408
[-10, 10]	0.096573532	1.8073*	-0.048123959	-1.3552	0.032596031	1.2336	-0.026308505	-1.3999	0.004620911	0.1848
[-5, 5]	0.030225471	1.1600	-0.015887902	-0.7083	0.036532672	1.7376*	-0.017478494	-1.2824	0.03061811	1.8490*
[-1, 1]	0.012766101	1.0159	-0.015648908	-1.1983	0.030969735	3.7672***	-0.021725557	-2.0630**	0.035823142	2.4787**
[-30, 0]	0.044879823	1.5462	-0.000324912	-0.0140	0.055061667	1.7485*	-0.000429292	-0.0185	0.037655748	1.2667
[-20, 0]	0.027553599	1.0154	5.75488E-05	0.0031	0.070456858	2.7836***	-0.002153774	-0.1012	0.042255844	1.9542*
[-10, 0]	0.039480261	2.1752**	-0.00821007	-0.5850	0.011266206	0.9428	-0.028370629	-1.6206	0.017653756	1.0870
[-5, 0]	0.022292227	2.0482**	-0.008532074	-0.6519	0.026027734	2.3355**	-0.030183587	-2.0404**	0.016856924	1.5327
[-1, 0]	0.009259762	1.1160	-0.017202841	-1.7855*	0.024507454	3.2082***	-0.017495064	-1.7877*	0.02034531	2.1861**
[0, 1]	0.015722983	1.6405	-0.009138088	-0.9071	0.01456374	2.0386**	-0.018721987	-2.2698**	0.022800897	1.9828*
[0, 5]	0.020149888	0.8650	-0.01804785	-0.9299	0.018606397	1.1736	-0.001786401	-0.1655	0.021084251	1.4320
[0, 10]	0.050777777	1.2590	-0.015653683	-0.7613	0.022423085	1.1370	0.005696336	0.3364	0.009877904	0.5507
[0, 20]	0.069309916	1.5915	-0.050605911	-1.5300	0.029431285	1.2446	-0.01242937	-0.6706	-0.00570978	-0.2595
[0, 30]	0.0672087	1.3261	-0.041639336	-1.0063	0.051052605	1.3441	0.005706488	0.2715	-0.020395135	-0.7779

Table 5 and 6 shows the CAR values of all companies measured by the five factors model when the first type of documents were released. First, based on the five factor model, the impact of No. 1 central document on all companies is almost the same as the previous results, but the effect results are not as significant as in the market model, but it is undeniable that the policy does not play a relatively strong role, but when the effect reflects the company value, it will still be affected by the investor sentiment and value effect, especially when the investors have expect the policy and the valuation is determined by the small market value, high book value, high profit portfolio and conservative investment plan.

5. Conclusions

on the stock market, agricultural listed companies have divided themselves into sectors, such as agricultural integration, forestry, animal husbandry, fishery, service industry, etc. The main businesses of listed companies in different sectors have their own characteristics, the agricultural policies they enjoy may also be different, and the fluctuations of their stock prices may also have different rules and performances, The analysis in this paper is just based on one of the subdivided industries, the ecological agriculture sector, so it has particularity. In terms of research content, we analyzed the comparison between the stock price characteristics of agricultural listed companies and the ecological agriculture index, market index and the results of various expected income models, especially for the comparison of sub sectors in the agricultural industry. In addition, as this paper focuses on agricultural policies and stock price fluctuations, it mainly studies the extent and law of the impact of specific policies on stock prices, analyzes the fundamentals and probability statistics, interprets the No. 1 central document and calculates the corresponding changes in the market, which is of great significance for investors to invest and scholars to study the No. 1 central document. Selection of samples and data. Due to the short listing period of ecological agricultural enterprises, the number of agricultural listed companies is small. Finally, only 36 agricultural listed companies were obtained as the research samples, which may have a certain impact on the research results due to the problem of sample size. In addition, with regard to the calculation method and in-depth research, this study involves the selection and calculation of influencing factors in different models, such as the measurement of profitability and investment capacity in influencing factors. However, because this paper analyzes with a single indicator from the perspective of industry segmentation, the universality of the conclusions may be affected. For future research, the correlation between policy factors, profit factors and investment factors, as well as the impact of specific agricultural policies on the intrinsic value of agricultural listed companies, are worthy of further study. Because the internal value of enterprises is closely related to profitability and investment, and agricultural listed companies may enjoy a variety of subsidy policies and preferential policies, which have a relatively large impact

on the company's profitability and growth. Therefore, the interpretation of special policies and the severity of their impact on the company also need to be studied. Therefore, it is worth studying how to establish a regression model, analyze some indicators that affect profitability and policy effects, establish their correlation with the enterprise's intrinsic value, how much they contribute to the enterprise's value, and the impact of the implementation of specific agricultural policies on long-term stock price volatility.

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