agriculture

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Impacts of the National Nutrition Plan 2017–2030 on Listed Agrifood Enterprises: A Financial Statement Perspective

Jianxiong Chen [1], Chung-Cheng Yang [2,*] and Yu Lin [2]

[1] College of Economics and Management, Fujian Agriculture and Forestry University, Fuzhou 350002, China; cjx@fafu.edu.cn
[2] College of Management, National Yunlin University of Science and Technology, Yunlin 64002, Taiwan; d10525004@yuntech.edu.tw
* Correspondence: ycc@gemail.yuntech.edu.tw

Abstract: The Chinese government promulgated the National Nutrition Plan 2017–2030 to provide scientific guidance for agrifood consumption and enhance nutrition intake. We categorized the sample into pre-2018 and post-2018 periods. By evaluating the effects of the National Nutrition Plan 2017–2030 through economic theory and a translog revenue function model based on financial statement data from 2015 to 2022, our findings indicate that the National Nutrition Plan 2017–2030 has increased the overall agrifood sales of listed agrifood enterprises, but the increase in agrifood sales produced by large listed agrifood enterprises has been slight. Finally, we offer policy recommendations for regulatory authorities and develop strategies for agrifood firms to encourage local food procurement. This study also contributes to our understanding of China's agrifood industry dynamics and underscores the significance of the National Nutrition Plan 2017–2030 in enhancing nutritional intake and fostering sustainable growth in China's agriculture industry.

Keywords: agrifood sector; listed agrifood enterprises; the National Nutrition Plan 2017–2030; economic theory; agrifood supply chains

Citation: Chen, J.; Yang, C.-C.; Lin, Y. Impacts of the National Nutrition Plan 2017–2030 on Listed Agrifood Enterprises: A Financial Statement Perspective. *Agriculture* **2024**, *14*, 677. https://doi.org/10.3390/agriculture14050677

Academic Editors: Karel Tomšík, Pavel Kotyza and Josef Abrhám

Received: 9 February 2024
Revised: 20 April 2024
Accepted: 24 April 2024
Published: 26 April 2024

1. Introduction

Food security and agricultural sustainability significantly impact China's economic development and social stability. In today's world, many international issues are related to food shortages and sustainable development. Food security and agricultural sustainability are essential to global governance and are related to China's national security. As the world's most authoritative and representative international intergovernmental organization today, the United Nations plays an irreplaceable role in global governance issues such as food security and agricultural sustainability. In the face of global agricultural development and sustainable development circumstances, and under the background of the United Nations Sustainable Development Agenda, it is of great significance for China and the United Nations to expand and deepen cooperation in food security and agricultural sustainability.

In November 1996, the first World Food Summit (WFS) adopted the Rome Declaration on World Food Security, which reaffirmed the WFS's goals of "everyone's right to access to safe and nutritious food" and "reducing the number of undernourished people to half of the current number by 2015" [1]. Since then, China has gradually improved public health and agricultural food production [2]. With the remarkable achievements in the Chinese economy alongside the rapid advancements in the food industry and agriculture, there has been an increase in agrifood availability for the population, fostering growth and development in adolescents while reducing malnutrition rates [3].

Nevertheless, China continues to face challenges related to malnutrition, mainly due to the inadequate intake or poor quality of agrifoods, leading to undernourishment of the population in certain regions. The National Nutrition Plan 2017–2030 (NNPRO) is a crucial policy designed to tackle these problems and is expected to play a significant role in enhancing nutritional status and increasing access to agrifoods. The objective of this study is to assess the influence of the NNPRO on listed agrifood enterprises. This will be achieved by employing a translog revenue function model to analyze accounting data spanning from 2015 to 2022.

Government policies play a crucial role in shaping a nation's progress toward achieving optimal nutrition and ensuring an adequate supply of agrifoods. In 2017, China introduced the National Nutrition Plan 2017–2030 to enhance the nutritional status of China's population and agrifood availability. We have constructed the agrifoods industry's translog revenue function and utilized the annual pooling data of agrifood companies between 2015 and 2022. Our empirical results indicate that the average partial effect (APE) of the *NNPRO* on listed agrifood enterprises' total revenue (*AREVENUE*) is positive. This means that the *NNPRO* positively impacts the overall agrifood sales of listed agrifood enterprises. Furthermore, we have found that the APE value of small listed agrifood enterprises on *AREVENUE* is also positive, and the APE value is higher than the APE value of the *NNPRO* on *AREVENUE*. This suggests that after the *NNPRO* launch, the increase in agrifood sales produced by large listed agrifood enterprises has been slight.

Boysen et al. [4] studied the impact of agrifood policy changes on the Irish economy and income distribution, using the CGE model to introduce the agrifood sector, differentiated household groups, and agricultural policy tools in particular detail, including their links to production and household factors. Niemi et al. [5] used the AG-MEMOD modeling framework to analyze the impact of policy changes on the Finnish agrifood industry. Solis-Navarrete et al. [6] analyzed the impact of innovation policies on the agrifood industry in Guerrero and Michoacán states through case studies and unit of analysis (UA) processing. However, none of these studies used the agrifood sector's revenue function to study policy impact. This paper aims to fill this literature gap. To the best of our knowledge, we may be the first team to conduct policy research using the revenue function of the agrifood sector. This is the first contribution to this study. Secondly, our research suggests that China's policymakers in the agrifood and nutrition sectors could develop stricter agrifood policies to address concerns about the safety of Chinese agrifoods. We propose specific measures for the agrifood industry's regulatory agencies to consider, and we also highlight matters that stakeholders such as the public, investors, and agrifood enterprises should pay attention to. By doing so, people's rights are increased, and they become more interested in purchasing agrifoods, safeguarding stakeholders' interests. Thirdly, this study can provide a meaningful reference for some countries or regions, especially those with significant agrifood trade with China, when formulating nutrition and agrifood trade policies and adjusting the structure of exported agrifoods. Meanwhile, this study will help policymakers update policies, help stakeholders such as the agrifood sector and agrifood supply chain adjust development strategies, and provide better policy guidance for international agrifood traders.

2. Background and Hypothesis Development

The NNPRO has a significant impact on the price of agricultural products. The theory of price formation has been studied alongside the entire development of economics. Petty [7] pointed out that labor time determines the value of a commodity, and the value of a commodity determines its price. Smith [8], based on Petty's theory of natural price, believed that in addition to labor, capital and land were also necessary inputs in producing a commodity. Hence, the price of a commodity not only contains the value of labor but also the remuneration for land and capital, namely rent and interest. In Smith's theory of production cost value, it is believed that the remuneration for labor, rent of land, and interest constitute the natural price of a commodity. Ricardo [9] distinguished between value and use value, believing that the exchange value was the object of use value and a commodity was the sum of new value creation and original value. In the utility price theory, the price of a commodity is determined by its utility value. From the perspective of consumers, the reason why they buy a commodity is that the commodity can be of particular use to them, which is the source of commodity value. Bailey [10] believed that the use value of a commodity determines its value, and a commodity is a specific consumer demand that has been satisfied. Consumer evaluations regarding the satisfaction they gain from a commodity determine the value and price of a commodity. The use value of a commodity is closely related to the price of the commodity. However, the confusion between use value and price significantly weakens the persuasiveness of the utility price theory. Based on the labor theory of value, Malthus [11] and Say [12] believed that the price of the commodity depends on its production cost, that is, the cost of producing the commodity, including the wages of workers, the profits of entrepreneurs, and the rent of land. Say [12] believed that the creation of commodity value included the interaction of capital, labor, and natural resources, including land, and the price of a commodity was determined by the cost of input factors.

Marshall [13] proposed the theory that supply and demand determine the price based on exchange theory, which is widely recognized in the theoretical community. Marshall [13] believed that in a market economy, the operation of the market mechanism reflects the interrelated and restrictive relationship between price, supply, and demand. The price mechanism mainly consists of price formation, operation, and regulation, which all allocate economic resources together. In other words, the key to the market mechanism's operation is the price mechanism. Price fluctuations will change the relative relationship between market supply and demand. As producers adjust their allocation of production resources according to the market price, consumers adjust their consumption plans and methods. Prices affect supply and demand, and the relative changes in supply and demand determine the formation and fluctuation of prices. Equilibrium price theory states that the market reaches equilibrium when supply and demand are equal. The realization of this equilibrium is achieved through the continuous mutual game between supply and demand. In short, the core of the operation of the market mechanism is price, which spontaneously adjusts the allocation of market resources and consumer choice behavior, and supply and demand determine the price in essence. The NNPRO significantly impacts the demand for agricultural products and affects their prices. Their price affects the overall sales of listed companies' agricultural products.

Numerous studies have meticulously analyzed industry and government data to understand the impact of public policy. These studies have covered a wide range of topics, such as the EU food law [14–17], the US Food Safety Modernization Act [18–21], the British Food Safety Act [22–24], the Organic Foods Production Act [25–27], healthy food subsidies [28–32], fat tax [33–37], sugar-sweetened beverage labels [38–41], the sugary drink tax [42,43], and chain restaurant menu labeling [44–47]. The main focus of these studies was to comprehend how policy influences markets, public behavior, and associated industries.

Food-related policies and alterations significantly impact the food industry and people's food purchases. The competitive food law has implemented restrictions on selling "competitive foods" in schools. Many US states enacted these policies in response to concerns about the unhealthy diet of students on campus [48,49]. Competitive foods harm human health in many ways, and the candy and sugar-sweetened drinks commonly found on campuses have led to an increase in obesity rates among students [50–53]. Policy changes that set nutritional standards can promote a more appropriate dietary intake among students, reduce their average weight, and improve the school dining environment [54–61]. Such policies effectively reduce students' reliance on non-nutritious foods [62–68]. Previous research has also pointed out that these regulations promote healthier product purchases in adolescents [54] and healthier weights [60]. Additionally, these policies increase revenues in the food sector [69]. Given the impact of policies on the food industry and people's food purchases, we are interested in studying the effects of the NNPRO on agrifood sales, agri-markets, and the agrifood sector in emerging markets.

The NNPRO suggests ways to address undernutrition in specific populations. These methods are as follows: First, the monitoring of the agricultural food composition should be strengthened by expanding the breadth of monitoring, conducting regular monitoring, and collecting data on nutritional, functional, and harmful components and components related to specific diseases. The national agricultural food composition database should be continuously updated and improved, and a laboratory reference system should be established to strengthen quality control. Second, the quality and safety of agricultural food for infants and young children should be improved, and the healthy development of the industry should be promoted. This can be achieved by strengthening the monitoring of nutritional components and key pollutants in infant formula and complementary foods to promptly revise and improve their standards. The research and development capacity and the quality of infant formula and complementary food should be continuously improved. In addition to the NNPRO's impact on undernutrition in specific populations, it also profoundly impacts agricultural food purchases.

We align with Testa et al.'s [70] perspective and emphasize "soft" policies that employ persuasion and voluntary actions to influence agrifood purchases. A prominent example of such a policy in China is the NNPRO, which addresses issues related to agrifood consumption and undernutrition among specific populations. Cai et al. [71] studied the role of the NNPRO in China in responding to the call of the Sustainable Development Goals (SDGs). Wu [72] analyzed the challenges and opportunities faced by the development of China's nutrition and functional food industry based on the background of the NNPRO and explored how to stimulate enterprise innovation, enhance competitiveness, and improve the health efficiency of nutrition and health food in a modern-day context. Yang et al. [73] identified trends in child nutrition, gaps in achieving child-nutrition-related targets, and implications for the Chinese government's plans and policy choices based on the NNPRO policy. However, there is currently no research on the economic impact of the NNPRO on the agrifood sector, and this paper will fill this literature gap.

The NNPRO ensures the supply of agrifoods and nutrition at multiple levels:

(1) The NNPRO aims to transform and upgrade nutrition-oriented agriculture with innovation, enrich the supply of nutritious, healthy agrifoods, and promote the integration of nutrition and health with agricultural development.
(2) The NNPRO aims to strengthen the production of nutritious, high-quality agrifoods. It has formulated guidelines on improving the nutrition quality of agrifoods, increasing the proportion of pollution-free agrifoods, green foods, and organic agrifoods in the same kind of agrifoods to more than 80%.
(3) The NNPRO also aims to establish a nutritional promotion system for agrifoods, upgrade their quality, and promote agrifoods produced in underprivileged areas globally.
(4) The NNPRO aims to study and build a national agrifood nutrition quality database and a food nutrition supply and demand balance decision support system.
(5) Using China's rich agrifood resources, the NNPRO is targeted at the health needs of different groups of people, focusing on developing healthy, nutrition-enriched, double-protein, and other new nutritious agrifoods.

Figure 1 shows the implementation mechanism of the NNPRO.

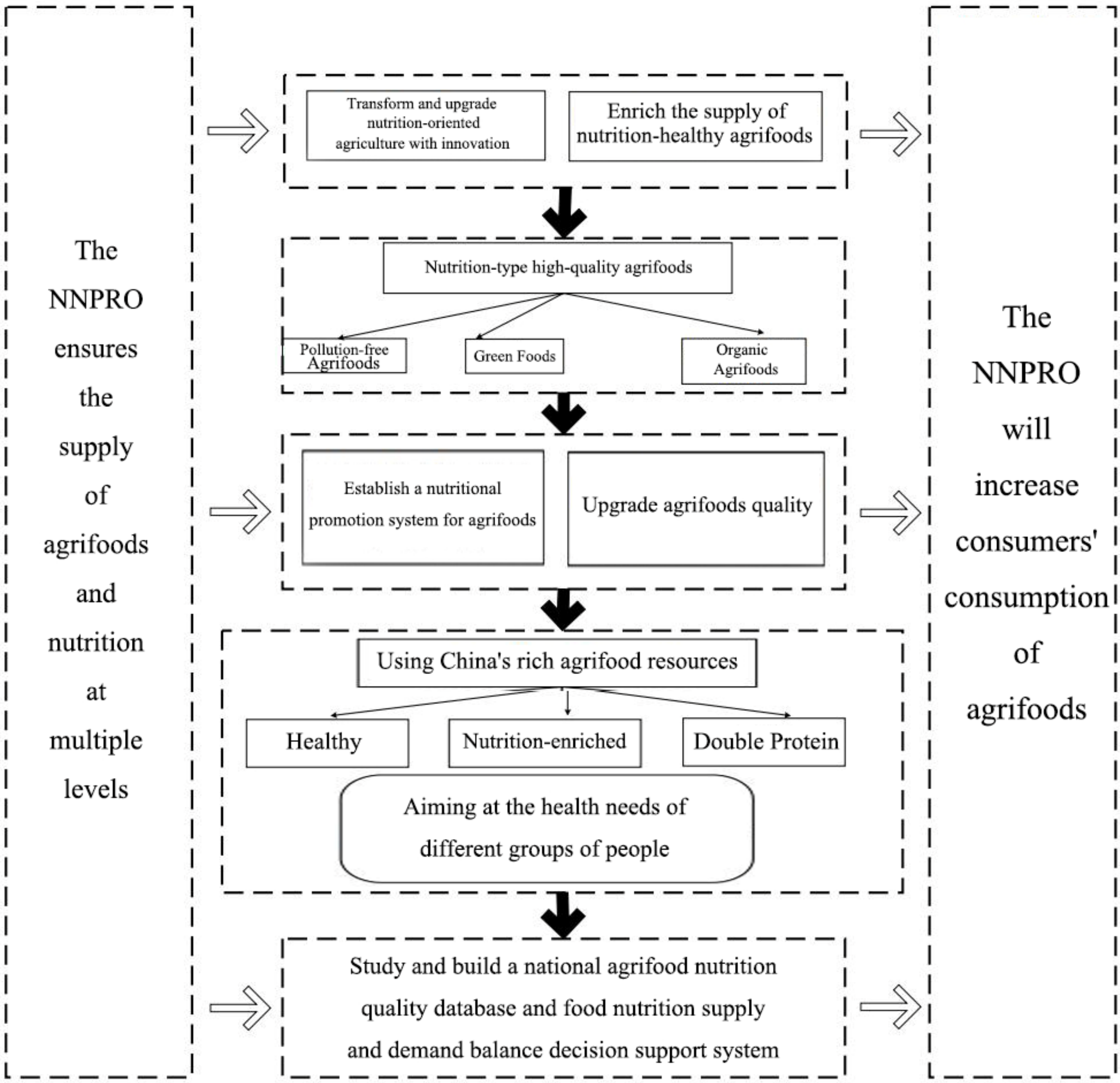

Figure 1. Implementation mechanism of the National Nutrition Plan 2017–2030.

Considering the above policy details of the NNPRO, we expect the NNPRO will increase the consumption of agrifoods, especially agrifoods from listed agrifood enterprises. Given the plan has strengthened the support of small- and medium-sized agrifood companies, we expect the sales of agrifoods produced by these enterprises will increase significantly, but there has only been a small increase in the sales of agrifoods produced by large agrifood enterprises. Therefore, we put forward the following research hypothesis:

Hypothesis 1. *The National Nutrition Plan 2017–2030 has increased the overall agrifood sales of listed agrifood enterprises, but the increase in agrifood sales produced by large listed agrifood enterprises has been slight.*

3. Method

3.1. Theoretical Model

Tsai et al. [74] identified that the cornerstone of any enterprise's steady advancement lies in the quality of its human resources. Within the agrifood industry in China, a diverse workforce is present, encompassing managers, R&D experts, and regular staff members. The production function of the agrifood sector is as follows:

$$y = f(f,\ d,\ b, x_1, x_2, x_3) \tag{1}$$

In the context of agrifood sales, denoted by y, the inputs are categorized as x_1 for management personnel, x_2 for research and development personnel, and x_3 for the count of general staff. Additionally, investments are made in three key areas: fixed assets (f), research and development (R&D) (d), and intangible assets (b). From an economic standpoint, inputs must exceed zero, applicable to $y, x_i, f,\ d \geq 0$, and for $i = 1, 2$, and 3, respectively. Moreover, these variables must adhere to specific theoretical prerequisites: $\partial^2 f(\cdot)/\partial b^2 \leq 0$, $\partial^2 f(\cdot)/\partial d^2 \leq 0$, $\partial^2 f(\cdot)/\partial f^2 \leq 0$, and $\partial^2 f(\cdot)/\partial x_i^2 \leq 0$.

The equation in this study represents the revenue function within the agrifood sector:

$$\begin{gathered} r(p; f,\ d,\ b, x_1, x_2, x_3) = max\ py \\ subject\ to\ y = f(f,\ d,\ b, x_1, x_2, x_3) \end{gathered} \tag{2}$$

In the agrifood industry, revenue, denoted as r, and the price of its products, represented by p, are described in Equation (2). Studies frequently apply the Cobb–Douglas function to convert this equation. The transformed function of revenue is depicted in Equation (3):

$$lnr = \alpha_0 + \delta lnp + \sum_{i=1}^{3} \alpha_i lnx_i + \beta_1 lnf + \delta_1 ln\ d + \epsilon_1 ln\ b \tag{3}$$

The model discussed produces a single output, characterized by its feature of being of homogeneous degree 1 concerning the output price (δ = 1). By normalizing this model with $p = 1$ as per reference [63], it is represented through Equation (4):

$$lnr = \alpha_0 + \sum_{i=1}^{3} \alpha_i ln\ x_i + \beta_1 ln\ f + \delta_1 ln\ d + \epsilon_1 ln\ b \tag{4}$$

Building upon the methodologies used by earlier researchers regarding the translog revenue function [75,76], we define the model's application to the agrifood sector as shown in Equation (5) [77]:

$$\begin{aligned} ln\ r = \alpha_0 + \sum_{i=1}^{3} \quad & \alpha_i\ ln\ x_i + \beta_1 ln\ f + \delta_1 ln\ d + \epsilon_1 ln\ b + \tfrac{1}{2}\sum_{i=1}^{3}\sum_{l=1}^{3} \alpha_{il}\ ln\ x_i\ ln\ x_l + \tfrac{1}{2}\beta_{11}(lnf)^2 + \tfrac{1}{2}\delta_{11}(lnd)^2 \\ & + \tfrac{1}{2}\epsilon_{11}(lnb)^2 + \sum_{i=1}^{3} \gamma_{i1} lnx_i ln\ f + \sum_{i=1}^{3} \varepsilon_{i1} lnx_i ln\ d + \sum_{i=1}^{3} \mu_{i1} lnx_i ln\ b + \theta_{11} ln\ f\ ln\ d \\ & + \rho_{11} ln\ f\ ln\ b + \sigma_{11} ln\ d\ ln\ b \end{aligned} \tag{5}$$

In this research, setting $\alpha_{il} = \gamma_{i1} = \varepsilon_{i1} = \mu_{i1} = \theta_{11} = \rho_{11} = \sigma_{11} = 0$ transforms the equation back to its Cobb–Douglas form, characterized by a log-linear specification.

3.2. Variables and Samples

3.2.1. Choose Samples

In this study, we extensively examined the input variables in the agrifood sector from 2015 to 2022, employing financial statement data from the CSMAR database, recognized as China's definitive source. This study deleted some unreasonable data. For example, we eliminated agrifood companies that reported no total revenue, no managers, R&D

personnel, or other employees, had no fixed or intangible assets, and made no investments in R&D, and so on. This process resulted in a quarterly dataset of 406 valid observations.

3.2.2. Variables

The independent variables included multiple inputs from the agrifood sector; the dependent variable is the revenue of the agricultural food sector (*AREVENUE*). To capture the contribution of personnel, we utilized proxies such as the count of management staff (*MSTAFF*), R&D staff (*RSTAFF*), and general employees (*OSTAFF*). Additionally, we extracted financial metrics for intangible assets (*INTASSE*), fixed assets (*FIXED*), and research and development spending (*DEVELOP*) from the annual reports of publicly traded agrifood firms to gauge the impact of these asset-based inputs.

Efficient human resource management enhances the quality of business operations [78–81] and boosts profits [82–85]. The educational background of employees plays a crucial role in human resources [86–88]. Workers with varying educational levels offer different levels of work efficiency and make distinct contributions to a company's income. Employees with diverse educational and professional experiences collaborate, creating varied human resource structures. These structures exhibit unique coordination effects, influencing companies' overall performance and function. Viewing inter-company collaborations as a team, the composition of team members significantly affects the collective revenue. Understanding how different types of employees interact with other factors is critical to grasping the complexities of income generation in the agrifood sector from a holistic input perspective.

In our analysis, we incorporated a dummy variable named *NNPRO* to evaluate its impact on listed agrifood enterprises. *NNPRO* is set to 1 for representing the data spanning five years, from 2018 to 2022, and set to 0 for data covering three years, from 2015 to 2017. Additionally, our study introduces another dummy variable, *BIG*, to denote the presence of China's three largest agrifood companies, which hold a significant market share, where an agrifood company is marked as *BIG* = 1 if it is among the top three in China and non-*BIG* = 0 otherwise.

In the study conducted by Coelli et al. [89], including the *YEAR* variable was crucial for adjusting the model to account for various impacts across different years, encompassing economic growth. *YEAR* allows for capturing industry evolution over time, technological advancements, and shifts on both the supply and demand sides. As economic growth fosters an increase in demand, the supply side is invariably affected. The *YEAR* variable encapsulates several factors, including economic progress, fluctuations in GNP and GDP, the rising number of agrifood enterprises, economic downturns, and other annual influences. Table 1 provides detailed definitions for variables.

Table 1. Variable definitions.

Variable		Definition
Theoretical Variable	**Proxy Variable**	
r	*AREVENUE*	The revenue of agrifood enterprise
x_1	*MSTAFF*	Management employees
x_2	*RSTAFF*	R&D employees
x_3	*OSTAFF*	Ordinary employees
	EMPLOYEE	Number of employees of all types
f	*FIXED*	Fixed assets
d	*DEVELOP*	R&D expenses
b	*INTASSE*	Intangible assets
	BIG	Dummy variable. If the agrifood company is in the top three agrifood companies in China, *BIG* = 1; otherwise, *BIG* = 0
	NNPRO	Dummy variable. In 2018–2022, *NNPRO* = 1; in 2015–2017, *NNPRO* = 0
	YEAR	In 2015, *YEAR* = 1; in 2016, *YEAR* = 2, and so on

3.3. The Estimation Model

In this study, the theoretical model is rewritten into an estimation model, and we have added *BIG*, *NNPRO*, and *YEAR* to the model. Next, we rewrote Equation (5) as follows:

$$\begin{aligned} lnAREVENUE = \ & \alpha_0 + \alpha_1 lnMSTAFF + \alpha_2 lnRSTAFF + \alpha_3 lnOSTAFF + \beta_1 lnFIXED + \delta_1 lnDEVELOP \\ & + \epsilon_1 lnINTASSE + \tfrac{1}{2}\alpha_{11}\ (ln\ MSTAFF)^2 + \tfrac{1}{2}\alpha_{22}\ (ln\ RSTAFF)^2 + \tfrac{1}{2}\alpha_{33}\ (ln\ OSTAFF)^2 \\ & + \tfrac{1}{2}\beta_{11}\ (ln\ FIXED)^2 + \tfrac{1}{2}\delta_{11}\ (ln\ DEVELOP)^2 + \tfrac{1}{2}\epsilon_{11}\ (ln\ INTASSE)^2 \\ & + \alpha_{12} lnMSTAFFlnRSTAFF + \alpha_{13} lnMSTAFFlnOSTAFF + \alpha_{23}\ ln\ RSTAFF\ ln\ OSTAFF \\ & + \gamma_{11} lnMSTAFFlnFIXED + \gamma_{21}\ ln\ RSTAFF\ ln\ FIXED + \gamma_{31}\ ln\ OSTAFF\ ln\ FIXED \\ & + \varepsilon_{11} lnMSTAFFlnDEVELOP + \varepsilon_{21} ln\ RSTAFF\ ln\ DEVELOP + \varepsilon_{31}\ ln\ OSTAFF\ ln\ DEVELOP \\ & + \mu_{11} lnMSTAFFlnINTASSE + \mu_{21} lnRSTAFFlnINTASSE + \mu_{31}\ ln\ OSTAFFlnINTASSE \\ & + \theta_{11}\ ln\ FIXED\ ln\ DEVELOP + \rho_{11}\ ln\ FIXED\ ln\ INTASSE + \sigma_{11}\ ln\ DEVELOP\ ln\ INTASSE \\ & + \varphi_1\ BIG + \varphi_2\ NNPRO + \varphi_3\ BIG\ NNPRO + \tau_1\ YEAR + \tau_2\ YEAR^2 \end{aligned} \quad (6)$$

The expected challenges in estimating the average partial effects of different inputs on agrifood revenue are twofold: first, there may be some inputs whose average partial effects on agrifood revenue are not statistically significant, and second, there may be some inputs whose average partial effects on agrifood revenue are not theoretically consistent. These challenges may affect the final interpretation of the model outputs.

The APE of *MSTAFF* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnMSTAFF \\ & = \hat{\alpha}_1 + \hat{\alpha}_{11}\overline{lnMSTAFF} + \hat{\alpha}_{12}\overline{lnRSTAFF} + \hat{\alpha}_{13}\overline{lnOSTAFF} \\ & + \hat{\gamma}_{11}\overline{lnFIXED} + \hat{\varepsilon}_{11}\overline{lnDEVELOP} + \hat{\mu}_{11}\overline{lnINTASSE} \end{aligned} \quad (7)$$

The APE of *RSTAFF* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnRSTAFF \\ & = \hat{\alpha}_2 + \hat{\alpha}_{22}\overline{lnRSTAFF} + \hat{\alpha}_{12}\overline{lnMSTAFF} + \hat{\alpha}_{23}\overline{lnOSTAFF} \\ & + \hat{\gamma}_{21}\overline{lnFIXED} + \hat{\varepsilon}_{21}\overline{lnDEVELOP} + \hat{\mu}_{21}\overline{lnINTASSE} \end{aligned} \quad (8)$$

The APE of *OSTAFF* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnOSTAFF \\ & = \hat{\alpha}_3 + \hat{\alpha}_{33}\overline{lnOSTAFF} + \hat{\alpha}_{13}\overline{lnMSTAFF} + \hat{\alpha}_{23}\overline{lnRSTAFF} \\ & + \hat{\gamma}_{31}\overline{lnFIXED} + \hat{\varepsilon}_{31}\overline{lnDEVELOP} + \hat{\mu}_{31}\overline{lnINTASSE} \end{aligned} \quad (9)$$

The APE of *FIXED* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnFIXED \\ & = \hat{\beta}_1 + \hat{\beta}_{11}\overline{lnFIXED} + \hat{\gamma}_{11}\overline{lnMSTAFF} + \hat{\gamma}_{21}\overline{lnRSTAFF} \\ & + \hat{\gamma}_{31}\overline{lnOSTAFF} + \hat{\theta}_{11}\overline{lnDEVELOP} + \hat{\rho}_{11}\overline{lnINTASSE} \end{aligned} \quad (10)$$

The APE of *DEVELOP* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnDEVELOP \\ & = \hat{\delta}_1 + \hat{\delta}_{11}\overline{lnDEVELOP} + \hat{\varepsilon}_{11}\overline{lnMSTAFF} + \hat{\varepsilon}_{21}\overline{lnRSTAFF} \\ & + \hat{\varepsilon}_{31}\overline{lnOSTAFF} + \hat{\theta}_{11}\overline{lnFIXED} + \hat{\sigma}_{11}\overline{lnINTASSE} \end{aligned} \quad (11)$$

The APE of *INTASSE* on *AREVENUE:*

$$\begin{aligned} & \partial ln\widehat{AREVENUE}/\partial lnINTASSE \\ & = \hat{\epsilon}_1 + \hat{\epsilon}_{11}\overline{lnINTASSE} + \hat{\mu}_{11}\overline{lnMSTAFF} + \hat{\mu}_{21}\overline{lnRSTAFF} \\ & + \hat{\mu}_{31}\overline{lnOSTAFF} + \hat{\rho}_{11}\overline{lnFIXED} + \hat{\sigma}_{11}\overline{lnDEVELOP} \end{aligned} \quad (12)$$

The APE of *BIG* on *AREVENUE:*

$$\partial ln\widehat{AREVENUE}/\partial BIG = \varphi_1 + \varphi_3 NNPRO \quad (13)$$

The APE of *NNPRO* on *AREVENUE*:

$$\partial ln\widehat{AREVENUE}/\partial NNPRO = \varphi_2 + \varphi_3 BIG \quad (14)$$

The APE of *YEAR* on *AREVENUE*:

$$\partial ln\widehat{AREVENUE}/\partial YEAR = \tau_1 + 2 * \tau_2\, \overline{YEAR} \quad (15)$$

4. Results

4.1. Descriptive Statistics and Correlation Matrix

Table 2 presents statistical data for China's listed agrifood enterprises from 2015 to 2022. Table 2 reveals that, throughout the study duration, the listed agrifood enterprises recorded average values for metrics such as *AREVENUE*, *EMPLOYEE*, *FIXED*, *DEVELOP*, and *INTASSE* that exceeded their respective median values, suggesting a rightward skew in the overall data. Notably, the standard deviation for *AREVENUE* between 2018 and 2022 was considerably high, indicating significant differences in the sizes of companies within the listed agrifood enterprises. From 2017 to 2022, the listed agrifood enterprises' average revenue experienced a steady increase, climbing from CNY 370 million to CNY 608 million, marking a 64.32% growth over six years. This rise highlights the increasing demand for agrifoods among Chinese consumers, potentially influenced by factors such as inflation, demographic changes, or agrifood pricing strategies. Furthermore, we also noticed that during 2015–2017, before the promulgation of the NNPRO, the average revenue of China's listed agrifood enterprises increased slowly. Still, it experienced a substantial increase after 2018, which also shows that consumers paid increasing attention to the intake of agrifoods after the promulgation of the NNPRO. China's listed agrifood enterprises saw a significant increase in the sales of agrifood after the plan's enactment.

Table 2. Sample descriptive statistics.

Panel A:			**2015 (n = 43)**					**2016 (n = 51)**		
Variable	**Max**	**Min**	**Mean**	**Median**	**Std. Dev.**	**Max**	**Min**	**Mean**	**Median**	**Std. Dev.**
AREVENUE	¥1030.00	¥23.27	¥311.00	¥173.00	¥290.00	¥1520.00	¥28.50	¥403.00	¥289.00	¥356.00
MSTAFF	23.00	11.00	15.09	14.00	3.36	29.00	11.00	16.04	14.00	4.96
RSTAFF	316.00	17.00	126.05	88.00	105.68	322.00	11.00	139.14	99.00	106.22
OSTAFF	31,960.00	228.00	3315.93	1188.00	6728.77	31,975.00	208.00	4277.08	1560.00	8355.96
EMPLOYEE	32,289.00	265.00	3457.07	1513.00	6777.46	32,304.00	259.00	4432.26	1687.00	8410.05
FIXED	¥3960.00	¥153.00	¥746.00	¥622.00	¥791.00	¥3810.00	¥137.00	¥910.00	¥724.00	¥894.00
DEVELOP	¥124.00	¥0.45	¥17.46	¥10.37	¥23.05	¥224.00	¥0.44	¥24.15	¥11.54	¥40.96
INTASSE	¥2070.00	¥23.57	¥343.00	¥191.00	¥565.00	¥2970.00	¥16.87	¥401.00	¥201.00	¥704.00
Panel B:			2017 (n = 47)					2018 (n = 45)		
Variable	Max	Min	Mean	Median	Std. Dev.	Max	Min	Mean	Median	Std. Dev.
AREVENUE	¥1930.00	¥41.11	¥370.00	¥263.00	¥369.00	¥2410.00	¥33.62	¥473.00	¥270.00	¥501.00
MSTAFF	28.00	6.00	15.15	14.00	5.56	27.00	7.00	15.47	14.00	5.32
RSTAFF	409.00	13.00	146.60	153.00	119.65	453.00	12.00	138.47	68.00	133.62
OSTAFF	33,932.00	203.00	3255.21	1531.00	6751.64	35,128.00	148.00	5257.84	1646.00	10,029.21
EMPLOYEE	34,261.00	237.00	3416.96	1576.00	6796.61	35,428.00	194.00	5411.78	1668.00	10,077.08
FIXED	¥3260.00	¥123.00	¥833.00	¥700.00	¥700.00	¥3200.00	¥108.00	¥1130.00	¥696.00	¥897.00
DEVELOP	¥323.00	¥0.27	¥29.77	¥8.39	¥61.07	¥449.00	¥0.57	¥40.50	¥11.79	¥86.57
INTASSE	¥2890.00	¥15.12	¥437.00	¥194.00	¥771.00	¥2820.00	¥12.22	¥481.00	¥248.00	¥766.00
Panel C:			2019 (n = 48)					2020 (n = 50)		
Variable	Max	Min	Mean	Median	Std. Dev.	Max	Min	Mean	Median	Std. Dev.
AREVENUE	¥4770.00	¥54.83	¥571.00	¥368.00	¥757.00	¥5750.00	¥38.97	¥588.00	¥376.00	¥860.00
MSTAFF	27.00	7.00	15.33	14.00	4.40	23.00	6.00	14.10	13.50	3.85
RSTAFF	510.00	8.00	116.60	63.50	128.77	456.00	15.00	131.60	71.00	131.29
OSTAFF	34,629.00	77.00	4779.25	1299.00	9510.60	34,100.00	171.00	4571.84	978.00	9218.68
EMPLOYEE	34,921.00	101.00	4911.19	1353.50	9563.40	34,412.00	201.00	4717.54	1036.00	9275.94
FIXED	¥3190.00	¥96.86	¥1100.00	¥640.00	¥917.00	¥3270.00	¥90.47	¥1100.00	¥599.00	¥968.00
DEVELOP	¥412.00	¥0.25	¥30.69	¥10.43	¥66.23	¥346.00	¥0.11	¥27.53	¥10.57	¥54.74
INTASSE	¥2750.00	¥10.73	¥457.00	¥222.00	¥733.00	¥2670.00	¥8.78	¥437.00	¥178.00	¥709.00

Table 2. *Cont.*

Panel D:	2021 (*n* = 60)					2022 (*n* = 62)				
Variable	Max	Min	Mean	Median	Std. Dev.	Max	Min	Mean	Median	Std. Dev.
AREVENUE	¥5000.00	¥33.37	¥518.00	¥301.00	¥745.00	¥4920.00	¥49.27	¥608.00	¥416.00	¥752.00
MSTAFF	21.00	7.00	14.05	14.00	3.19	22.00	6.00	14.02	14.00	3.41
RSTAFF	451.00	14.00	125.62	74.50	117.94	457.00	19.00	134.18	98.00	117.26
OSTAFF	33,224.00	140.00	3885.30	928.00	8271.54	33,048.00	115.00	3887.61	1166.00	8041.56
EMPLOYEE	33,530.00	186.00	4024.97	1061.00	8325.33	33,349.00	169.00	4035.81	1427.00	8087.92
FIXED	¥3260.00	¥48.50	¥999.00	¥534.00	¥973.00	¥3300.00	¥71.69	¥1020.00	¥579.00	¥963.00
DEVELOP	¥275.00	¥0.10	¥25.06	¥12.38	¥41.19	¥423.00	¥0.10	¥38.93	¥14.33	¥71.05
INTASSE	¥2610.00	¥8.08	¥383.00	¥152.00	¥647.00	¥2550.00	¥9.08	¥410.00	¥199.00	¥635.00

Note: *AREVENUE*, *FIXED*, *DEVELOP*, and *INTASSE* are expressed in millions of RMB.

Table 3 displays the Spearman and Pearson correlation coefficients, as detailed in the study. The table reveals a positive correlation between the *NNPRO* and *AREVENUE*. Therefore, implementing the National Nutrition Plan 2017–2030 has partially contributed to an increased consumer inclination toward purchasing agrifoods, as evidenced by the growth in revenue within China's listed agrifood enterprises. However, it is important to note that correlation coefficients only represent a one-to-one relationship between variables and do not consider the influence of other variables. Therefore, for a comprehensive analysis, the impact of different variables must be considered using econometrics. The following section of this paper will delve into the ramifications of the NNPRO on listed agrifood enterprises by analyzing the translog revenue function.

Table 3. Spearman and Pearson correlation coefficients.

Variable	***AREVENUE***	***MSTAFF***	***RSTAFF***	***OSTAFF***	***EMPLOYEE***	***FIXED***	***DEVELOP***	***INTASSE***	***BIG***	***NNPRO***
AREVENUE	1.000 -----	0.175 *** (0.000)	0.421 *** (0.000)	0.563 *** (0.000)	0.572 *** (0.000)	0.579 *** (0.000)	0.293 *** (0.000)	0.661 *** (0.000)	0.634 *** (0.000)	0.132 *** (0.008)
MSTAFF	0.189 *** (0.000)	1.000 -----	0.535 *** (0.000)	0.244 *** (0.000)	0.262 *** (0.000)	0.187 *** (0.000)	0.382 *** (0.000)	0.396 *** (0.000)	0.145 *** (0.004)	−0.064 (0.195)
RSTAFF	0.319 *** (0.000)	0.591 *** (0.000)	1.000 -----	0.405 *** (0.000)	0.448 *** (0.000)	0.351 *** (0.000)	0.561 *** (0.000)	0.537 *** (0.000)	0.425 *** (0.000)	−0.075 (0.132)
OSTAFF	0.324 *** (0.000)	−0.015 (0.769)	0.412 *** (0.000)	1.000 -----	0.996 *** (0.000)	0.884 *** (0.000)	−0.077 (0.123)	0.724 *** (0.000)	0.412 *** (0.000)	−0.018 (0.713)
EMPLOYEE	0.327 *** (0.000)	−0.006 (0.909)	0.424 *** (0.000)	0.999 *** (0.000)	1.000 -----	0.884 *** (0.000)	−0.035 (0.479)	0.729 *** (0.000)	0.419 *** (0.000)	−0.025 (0.614)
FIXED	0.346 *** (0.000)	0.041 (0.405)	0.413 *** (0.000)	0.782 *** (0.000)	0.783 *** (0.000)	1.000 -----	−0.022 (0.652)	0.738 *** (0.000)	0.391 *** (0.000)	0.054 (0.278)
DEVELOP	0.318 *** (0.000)	0.573 *** (0.000)	0.629 *** (0.000)	−0.053 (0.291)	−0.043 (0.387)	0.039 (0.436)	1.000 -----	0.173 *** (0.000)	0.281 *** (0.000)	0.080 (0.106)
INTASSE	0.215 *** (0.000)	0.287 *** (0.000)	0.235 *** (0.000)	0.151 *** (0.002)	0.153 *** (0.002)	0.22 *** (0.000)	0.151 *** (0.002)	1.000 -----	0.499 *** (0.000)	0.036 (0.466)
BIG	0.567 *** (0.000)	0.184 *** (0.000)	0.430 *** (0.000)	0.399 *** (0.000)	0.403 *** (0.000)	0.334 *** (0.000)	0.238 *** (0.000)	0.325 *** (0.000)	1.000 -----	−0.032 (0.515)
NNPRO	0.143 *** (0.004)	−0.103 ** (0.038)	−0.033 (0.505)	0.044 (0.381)	0.043 (0.389)	0.122 ** (0.014)	0.069 (0.168)	0.024 (0.631)	−0.032 (0.515)	1.000 -----

Note: 1. The left and right of Table 3 display the Pearson and Spearman coefficients, respectively. 2. The symbols *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.

4.2. The Policy and Listed Agrifood Enterprises

Our research aims to explore how the NNPRO influences the listed agrifood enterprises. By marking the first year post-NNPRO implementation as the cut-off point, we employ the Chow Test to assess the listed agrifood enterprises' revenue. With an F statistic of 1.88 leading to rejecting the null hypothesis, our findings indicate a significant impact of the NNPRO on the listed agrifood enterprises. Consequently, we incorporated *NNPRO* into our analytical model to pinpoint its effects on the listed agrifood enterprises. Additionally, the introduction of *BIG* allows us to examine how the NNPRO variably affects agrifoods depending on their market origins.

4.3. Model Estimates

4.3.1. Model Test

To convey the findings accurately, the study opted for the translog function over the log-linear function. The translog function differs from the Cobb–Douglas model primarily in its functional form; it offers greater flexibility that leads to more accurate efficiency scores than the Cobb–Douglas model. This study's findings are detailed in Table 4. Nonetheless, it's vital to verify the effectiveness of the translog revenue function in accurately reflecting the results, which necessitates testing Equation (6) as outlined:

$$\alpha_{il} = \gamma_{i1} = \varepsilon_{i1} = \mu_{i1} = \theta_{11} = \rho_{11} = \sigma_{11} = 0 \quad (16)$$

Table 4. Translog model estimates.

Equation (6)			
Variable	**Coeff** / ***t*-Stat.**	**Variable**	**Coeff** / ***t*-Stat.**
Intercept	−25.466 (−0.994)	(ln*MSTAFF*)(ln*DEVELOP*)	0.190 (1.154)
ln*MSTAFF*	9.851 (1.234)	(ln*MSTAFF*)(ln*INTASSE*)	0.025 (0.087)
ln*RSTAFF*	3.009 (1.338)	(ln*RSTAFF*)(ln*OSTAFF*)	−0.024 (−0.234)
ln*OSTAFF*	−7.634 ** (−2.536)	(ln*RSTAFF*)(ln*FIXED*)	−0.061 (−0.496)
ln*FIXED*	4.311 (1.124)	(ln*RSTAFF*)(ln*DEVELOP*)	−0.043 (−0.801)
ln*DEVELOP*	−2.937 ** (−2.501)	(ln*RSTAFF*)(ln*INTASSE*)	0.020 (0.311)
ln*INTASSE*	3.017 (1.058)	(ln*OSTAFF*)(ln*FIXED*)	0.355 (1.617)
$(\ln MSTAFF)^2$	0.248 (0.357)	(ln*OSTAFF*)(ln*DEVELOP*)	−0.025 (−0.495)
$(\ln RSTAFF)^2$	0.088 (1.342)	(ln*OSTAFF*)(ln*INTASSE*)	0.079 (0.767)
$(\ln OSTAFF)^2$	−0.183 ** (−2.166)	(ln*FIXED*)(ln*DEVELOP*)	0.134 * (1.688)
$(\ln FIXED)^2$	−0.153 (−0.911)	(ln*FIXED*)(ln*INTASSE*)	−0.012 (−0.073)
$(\ln DEVELOP)^2$	0.035 ** (2.050)	(ln*DEVELOP*)(ln*INTASSE*)	−0.046 (−1.146)
$(\ln INTASSE)^2$	−0.071 (−1.322)	*BIG*	0.276 ** (2.351)
(ln*MSTAFF*)(ln*RSTAFF*)	−0.792 ** (−2.500)	*NNPRO*	0.144 ** (2.037)
(ln*MSTAFF*)(ln*OSTAFF*)	0.851 ** (2.029)	*BIGNNPRO*	−0.019 (−0.133)
(ln*MSTAFF*)(ln*FIXED*)	−0.867 (−1.568)	*YEAR*	0.966 *** (6.724)
		$YEAR^2$	−0.071 ** (−2.238)
R-squared		0.795	
Degree of freedom		405	
	Null hypothesis ($\alpha_{il} = \gamma_{i1} = \varepsilon_{i1} = \mu_{i1} = \theta_{11} = \rho_{11} = \sigma_{11} = 0$)		
F-stat.		2.51	
Sign. level		0.000	

Note: 1. The symbols *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively. 2. For definitions of all the variables utilized in this study, see Table 1.

According to the equation provided above, where $i = 1, 2, 3$, Table 4 indicates that the model's F statistic is 2.51. Based on this test result, it can be concluded that the translog function is a more suitable method for estimating the impact of the NNPRO on the listed agrifood enterprises in comparison to the Cobb–Douglas function.

4.3.2. APE Analysis

Table 5 demonstrates a positive and significant average partial effect of *YEAR* on *AREVENUE*, suggesting that as the number of enterprises increases, technological advancements occur, and the economy grows, consumption of agrifood also rises. Furthermore, when isolating other variables through the *YEAR*, based on the data presented in Table 5, it can be observed that the APE of the *NNPRO* on *AREVENUE* is positive. Additionally, Table 4 shows that the translog coefficient for the *NNPRO* is also significantly positive, further confirming that the NNPRO has contributed to an overall increase in agrifood sales of listed agrifood enterprises. This may be due to the promotion of the nutritional value of agrifoods by the NNPRO, which has positively impacted consumer agrifood purchases. In addition, Table 5 shows the APE of the *NNPRO* for non-*BIG* (0.144) is greater than the APE of the *NNPRO* for *BIG* (0.125), which indicates that when consumers buy agrifoods from non-*BIG*, the positive impact of the NNPRO on consumer agrifood purchases is more prominent. One of the reasons for this is that the NNPRO has strengthened the support of non-*BIG* agrifood companies. This confirms Hypothesis 1.

Table 5. APE of variables.

	Value	**Significance Test**
APE_MSTAFF	−0.143	$H_0: \alpha_1 = \alpha_{11} = \alpha_{12} = \alpha_{13} = \gamma_{11} = \varepsilon_{11} = \mu_{11} = 0$ *F*-stat. = 2.13 Sign. level = 0.04
APE_RSTAFF	−0.098	$H_0: \alpha_2 = \alpha_{22} = \alpha_{12} = \alpha_{23} = \gamma_{21} = \varepsilon_{21} = \mu_{21} = 0$ *F*-stat. = 2.21 Sign. level = 0.03
APE_OSTAFF	0.210	$H_0: \alpha_3 = \alpha_{33} = \alpha_{13} = \alpha_{23} = \gamma_{31} = \varepsilon_{31} = \mu_{31} = 0$ *F*-stat. = 3.50 Sign. level = 0.00
APE_FIXED	−0.014	$H_0: \beta_1 = \beta_{11} = \gamma_{11} = \gamma_{21} = \gamma_{31} = \theta_{11} = \rho_{11} = 0$ *F*-stat. = 0.80 Sign. level = 0.58
APE_DEVELOP	0.173	$H_0: \delta_1 = \delta_{11} = \varepsilon_{11} = \varepsilon_{21} = \varepsilon_{31} = \theta_{11} = \sigma_{11} = 0$ *F*-stat. = 5.37 Sign. level = 0.00
APE_INTASSE	0.064	$H_0: \epsilon_1 = \epsilon_{11} = \mu_{11} = \mu_{21} = \mu_{31} = \rho_{11} = \sigma_{11} = 0$ *F*-stat. = 0.61 Sign. level = 0.75
APE_BIG When *NNPRO* = 0 When *NNPRO* = 1	 0.276 0.256	$H_0: \varphi_1 = \varphi_3 = 0$ *F*-stat. = 4.23 Sign. level = 0.02
APE_NNPRO When *BIG* = 0 When *BIG* = 1	 0.144 0.125	$H_0: \varphi_2 = \varphi_3 = 0$ *F*-stat. = 2.56 Sign. level = 0.08

Table 5. *Cont.*

	Value	Significance Test
APE_YEAR	0.824	$H_0 : \tau_1 = \tau_2 = 0$ *F*-stat. = 109.88 Sign. level = 0.00

5. Discussion

Crook et al. [90] performed a multivariate analysis to explore the link between human resources and corporate revenue, suggesting a positive association between the two. Hitt et al. [85] examined how human resources affect the revenues of American law firms, discovering a positive relationship, indicating that a higher number of employees leads to better performance. The agricultural food sector requires significant technological investments, necessitating R&D expenditures and investments to boost a company's innovation capabilities, enabling it to capture a more significant market share and increase its overall revenue. The data shown in Table 5 reveal that the APE of *OSTAFF*, *DEVELOP*, and *INTASSE* on *AREVENUE* is positive, showing that the revenue of publicly listed agrifood enterprises increases with the rise in other staff, R&D spending, and intangible assets. This supports the theoretical framework.

The differences in the average partial effect of the *NNPRO* on revenue between *BIG* and non-*BIG* agricultural food listed companies illustrate that the promulgation of the National Nutrition Plan 2017–2030 is conducive to improving the market structure of China's agricultural food industry. Consumer buying intentions for the products of small- and medium-sized listed agrifood enterprises significantly increase, while their buying intentions for the products of large listed agrifood enterprises only slightly increase, which helps to strengthen market competition, accelerate research and development in China's agricultural food enterprises, and improve food safety standards.

In December 2021, the US Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) released the Dietary Guidelines for Americans (2020–2025), which provide recommendations on "what to eat and drink to meet nutritional needs, promote health, and reduce the risk of chronic diseases". The new guidelines include all groups of people of different ages and consist of four health guidelines for healthy people and people at risk of disease, including encouraging residents to make reasonable food and drink choices and maintain a healthy diet throughout their lives.

Specifically, the Dietary Guidelines for Americans (2020–2025) have four core guidelines: (1) Healthy dietary patterns should be followed at every stage of life. (2) Foods and drinks with a high nutritional density should be selected and enjoyed while considering individual dietary preferences, cultural traditions, and costs. (3) Particular attention should be paid to foods and drinks with a high nutrient density to meet food group requirements and energy suitability limits. 4) Foods and drinks with high added sugar, saturated fatty acid, and sodium contents should be reduced, and alcoholic beverages should be limited. However, none of the four core guidelines mention establishing a nutrition promotion system for agricultural products. In contrast, China explicitly accounts for quality agricultural products in the NNPRO.

The positive impact of the NNPRO on revenue can be explained by the fact that the NNPRO has effectively influenced consumer preferences for healthier agricultural foods. One of the initial goals of the NNPRO was to promote the transformation and upgrade of nutritional agriculture through innovation and enrich the supply of nutritional and healthy agricultural products. Therefore, the results of this study are consistent with the initial goals of the policy.

6. Conclusions

In this study, we employ the translog function to evaluate the NNPRO's effect on listed agrifood enterprises. We use agrifood enterprises' annual pooling data from 2015 to 2022. The results indicate that the National Nutrition Plan 2017–2030 has increased the overall agrifood sales of listed agrifood enterprises, but the increase in agrifood sales produced by large listed agrifood enterprises has been slight. In addition to the growth in agrifood sales, we also pay attention to food safety standard improvements and consumers' changing opinions of agricultural product quality caused by the NNPRO. The NNPRO has strengthened the production and supply of nutritionally high-quality agricultural products, established an agricultural product nutrition promotion system, and improved the quality of agricultural products, which are of milestone significance for improving food safety standards and helping consumers place higher requirements on the quality of agricultural products.

In 2023, China's GDP per capita was USD 12,700. As Chinese citizens' purchasing power has increased, they have become more interested in agrifood quality and scientific nutrition. With more convenient trade channels and concerns about the safety of Chinese agrifoods, people in China are paying more attention to international agrifoods. After evaluating the policy content of the NNPRO and our research results, we put forward the following actionable policy recommendations: (1) Further improve agricultural food safety laws; in particular, the food safety problems of listed agrifood companies must be strictly dealt with. (2) Increase the special rectification efforts of listed agrifood companies to prevent food pollution from the source and promote the "Pollution-free Agricultural Food Action Plan". (3) Further strengthen the supervision of agricultural food circulation. (4) Accelerate the construction of a food safety credit system and the development of information technology for listed agrifood companies through the above measures to improve agricultural product safety standards, strictly regulate and enforce the law, and enhance market confidence. Finally, cooperation between all parties in the agrifood sector (such as government, industry, consumers, and investors) should be promoted to promote the development of sustainable and reliable agrifood systems.

Due to the limited availability of data, this study, like many others on the impact of policy, has significant limitations. First, our data span is from 2015 to 2022. This does not cover the effects of the market changes and government policy interventions in January 2023. If scholars can obtain the latest data for 2023 to cover the latest market and policy developments, they can provide a more accurate framework for future surveys. In addition, our conclusions regarding the plan's effect on the listed agrifood enterprises are primarily derived from a quantitative analysis. If combined with a qualitative analysis, more accurate study results may be obtained.

Author Contributions: Data curation, Y.L.; formal analysis, C.-C.Y.; investigation, J.C.; methodology, Y.L.; supervision, C.-C.Y.; writing—original draft, J.C.; writing—review and editing, J.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the General Project of Social Science Foundation of Fujian Province (grant number FJ2024B120).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: CSMAR (2023): China Stock Market and Accounting Research Database; https://data.csmar.com/ (accessed on 21 April 2023).

Conflicts of Interest: The authors declare no conflicts of interest.

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