

Analysis of the Agricultural Subsidy Policy to Be Conducive to Food Security

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Abstract. China formulated a systematic and comprehensive agricultural subsidy policy at the beginning of the 21st century. Under the guidance of the policy, China's grain production has significantly improved. Nevertheless, with the emergence of factors such as the irrational supply structure of staple crops, the rise in importing cost of agricultural products, the chemicalization of grain production, and the degradation of agricultural resource carrying capacity, China's food security is under potential threat. Previous studies show several main factors, among which agricultural subsidy policy is vital for solving food security issues. Therefore, this study will analyse the current policy situation from the perspective of food security and policy suggestions. In terms of subsidy innovation, it is suggested to adjust the focus on subsidies based on a comprehensive concept of food security and increasing support for sustainable agricultural development and technology. The policy recommendations proposed in this paper are also consistent with agricultural development trends.

Keywords: Food security, Agricultural subsidies, Agricultural policies, Market support policy.

1. Introduction

The irrational supply structure of staple food crops, the increasing cost of importing agricultural products, the chemicalization of grain production, and the degradation of the carrying capacity of agricultural resources are the main factors exacerbating China's long-term food security situation. In response, China has implemented a series of agricultural subsidy policies, such as "two exemptions and four subsidies", which is implemented at the beginning of the 21st century and resulted in a significant increase in grain output. Against the backdrop of the "revitalization of the countryside" and the importance of food security to national greatness, addressing the new food security situation has become imperative. While Chinese scholars have conducted extensive research on food security and agricultural subsidy policies, there is a dearth of studies examining the intersection of these two factors. This paper aims to examine the role of subsidy policies in promoting food security, analyze China's inadequacies in agricultural subsidies from a food security perspective, and provide recommendations.

This paper primarily employs a literature review to analyze China's agricultural subsidy policies to date. By considering China's current food security situation and potential policy shortcomings, the paper provides policy recommendations. This study suggests agricultural subsidy policies to better regulate food security and ultimately achieve the policy goals of ensuring food security and promoting farmers' wealth and income growth.

2. Potential Threats to Grain Crops Production and Sale in China

Based on various research in China, the article argues that China's current food security problems are mainly affected by three aspects: the imbalance supply structure of staple food crops, the rising cost of agricultural product imports, and the inherent contradictions in food production.

2.1. Potential Structural Imbalance in the Supply of Crops

Chai gave an analysis based on the current situation of China's grain production and sales, showing that the production-sales ratio of China's grain crops (wheat, rice, corn, barley, soybeans, etc.) is

unbalanced [1]. For some crops such as soybeans and barley, the quantity supplied could not meet the demand. In 2019, China's soybean production-to-sales ratio was 16.9%, and the barley production-to-sales ratio was only 13.2% [1]. The gap between supply and demand needs to be made up by international grain trade, and the unbalanced supply structure has exacerbated China's dependence on foreign grain supply. At the same time, some scholars believe that multiple internal factors contribute to the risk of structural imbalance. Guo argues that the uneven spatial distribution of cultivated land resources, the low efficiency of grain production, and the shortcomings of the implementation of local food security responsibilities may lead to an imbalance in the supply structure of the grain market.

2.2. Increasing Costs of Agricultural Products Imports

Liu pointed out that China's agricultural product import and export trade deficit has become the norm; together with the features of a stable import structure and concentrated import locations [2]. Guo, et al. pointed out that the cost of some bulk agricultural products may rise, causing difficulties for business operations [3]; the increase in tariffs between China and the United States has changed the import target of China's bulk agricultural products, but statistics show that import costs will rise accordingly [3], the trade diversion effect brought by tariff increase may result in the supply shortages.

2.3. Agricultural Production Facing Potential Difficulties

First, agricultural production is chemicalized, and the output needs to be maintained by the application of chemical fertilizers. Therefore, fertilizer supply directly affects food crop productivity. Today's chemical fertilizer supply in China is structurally unbalanced. Liao pointed out that China is self-sufficient in nitrogen and phosphorus fertilizers, while potash fertilizers are highly dependent on imports, and the pricing power is mostly controlled by overseas companies [4]. Second, the carrying capacity of agricultural resources is decreased. The endowment of agricultural resources in China is limited, and with the expansion of production, the contradictions between cultivated land resources, water resources, climatic conditions, and grain production are becoming more and more obvious: 1. The quality of cultivated land is degrading significantly, and the organic matter index of cultivated land decreases nationwide, and the multiple cropping index decreases[5]; The organic matter content in typical black soil areas reached 33.79 g/kg in 2007, and dropped to 20.08 g/kg in 2017, a drop of 40% in 10 years [6]. In addition, the shallowing of the cultivated land in the North China Plain and the acidification of the southern soil all pose threats to the quality of cultivated land [5]. 2. Insufficient water resources per unit of cultivated land and uneven distribution of water resources [5]. Statistics in 2012 show that China's cultivated land water resources are 21846.13 m³/ha, which is only half of the world's average level; agricultural water resources in the north are more threatened, and the average water resources in China from 1956 to 2000 are distributed in the southern region accounting for 81.2%, and the northern region is only accounting for 18.8% [7], Figure 1 is composed of cultivated land water resources data in 2015. SMI_WF is a value describes the equality of water distribution, which higher in the value, the more uneven the distribution of water resources in the region. Figure 1 shows that water resources in southern China are more sufficient than cultivated land resources, while the northern region, that is, the area north of the Qinling-Huai River line, has relatively fewer water resources than cultivated land resources. However, the main grain production areas are concentrated in the north, exacerbating water resource conflicts. 3. Climate change and meteorological disasters affect grain production to remain stable [5]. Climate warming shortens the growth period of crops, lacks water, and causes more pests and diseases; frequent meteorological disasters also directly and adversely affect agricultural production. Third, the problem of self-sufficiency in the seed industry has emerged. Jiang believes that the trade deficit of field crop seeds is obvious, reaching 50 million U.S. dollars [8]. From 2010 to 2018, the number of Chinese seed industry enterprises has shrunk, and there is a gap between the proportion of enterprise R&D investment and international enterprises insufficient [8]. Huang believes that there are challenges in strengthening the seed industry, but under the guidance of a series of policies and regulations, the

number of the three major crop varieties has increased steadily, and the number of seed companies has shown an increasing trend since 2019.

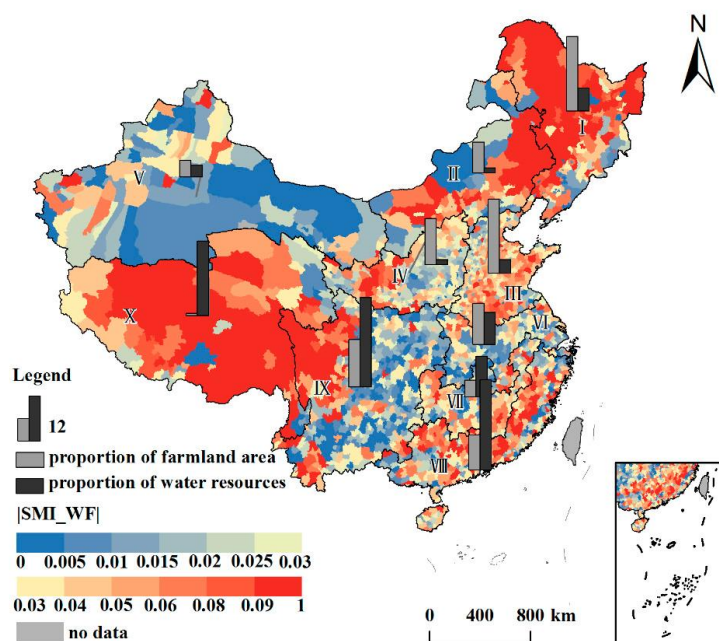


Fig 1. Land water resources [9].

3. China's Agricultural Subsidies for Food Security

Food security is a concept proposed by the World Food and Agriculture Organization, which aims to ensure the quality and safety of food for the people of the world. Modern food security includes the following contents: Quantity security, Quality security, Circulation security, and Ecological security. Agricultural subsidies, that is, the government transfer payments to agricultural activities through financial means. The purpose of agricultural subsidies is to regulate the administrative means of agricultural production factors [10]. Since China acceded to the World Trade Organization (WTO) in 2001, agricultural subsidies have gradually become standardized and systematic. At the same time, they are faced with a trade-off in two aspects: fulfilling WTO agreements, as well as promoting increased production and income, protecting farmers' interests, and ensuring food security [10]. Zhang pointed out that based on the impact of policies on the production and trade of agricultural products, the WTO has divided agricultural subsidies into three categories [10]: Green box policy, which refers to agricultural subsidies with the smallest interaction with trade; amber box policy, refers to policies that distort trade, including agricultural loans, price subsidies, production input subsidies, etc.; blue box policies refer to direct payment subsidy policies linked to production restriction plans.

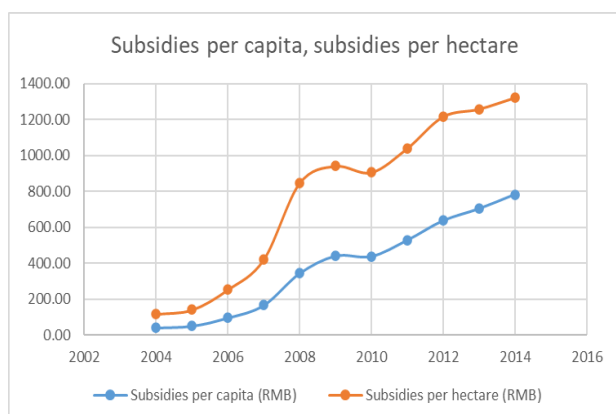


Fig 2. Subsidies per capita and per hectare [11].

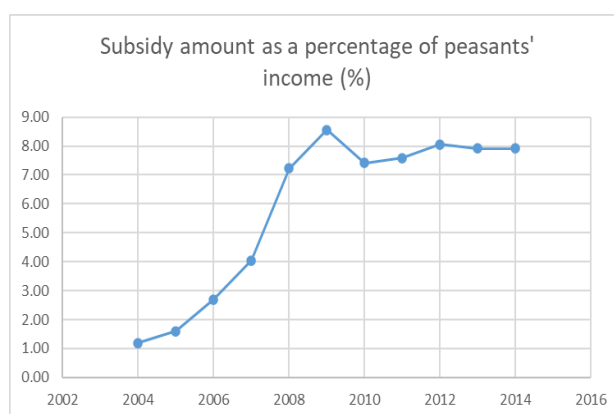


Fig 3. Subsidy amount ratio [11].

Agricultural subsidies in China mainly consist of the following three categories: direct subsidies, input subsidies, and output subsidies. Since 2004, the "Four Subsidies" policy was promulgated, and the agricultural tax was gradually abolished. China's agricultural subsidies focused on direct production subsidies and output subsidies based on the minimum purchase price; as shown in Figure 2-4, the amount of subsidies has steadily increased. After 2016, China implemented the "three subsidies in one" policy, that is, the three subsidy policies were combined into "agricultural support and protection subsidies", farmers received 80% of the subsidy amount, and new agricultural business entities received 20% of the amount [12].

This paper divides the agricultural subsidy policies that are beneficial to food security into direct-effect policies and indirect-effect policies:

3.1. Direct Effect Policies

Direct-acting policies refer to policies that directly affect the production of food crops and are composed of comprehensive income direct subsidies and specific production direct subsidies.

3.1.1. Comprehensive income direct subsidies and specific production direct subsidies

In 2002, China implemented direct subsidies for grain and subsidies for improved varieties for the first time; in 2004, it began to implement subsidies for the purchase of agricultural machinery; since 2006, China has provided direct subsidies for agricultural production materials for food and agriculture, and the agricultural subsidy system of "two exemptions and four subsidies" has been initially established. Based on research by Zhou, direct grain subsidies have a significant positive effect on grain production incentives, and determining the subsidy amount based on the sown area can better stimulate the enthusiasm of grain farmers [13].

3.1.2. Minimum grain purchase price policy

The minimum purchase price of grain is a powerful means for the state to regulate the grain market; the minimum purchase price guarantees the basic interests of grain farmers, mobilizes farmers' enthusiasm for growing grain, supports the stable development of grain production, and steadily increases output. Since the implementation of the minimum purchase price policy for rice from 2004 to 2018, rice production has increased from 180 million tons to 212 million tons, an increase of 18.45 percentages [14]. China also implemented this policy for wheat in 2006. From 2006 to 2018, the increase in wheat production reached 21.18%; since the implementation of the corn temporary purchase and storage policy in 2008, the total corn production has increased by 53.96% from 2008 to 2016 [14]; the above data show that the minimum purchase price policy can effectively promote grain production, which is conducive to food security.

3.2. Indirect Effect Policies

Indirect policies refer to all agricultural subsidy policies that promote the production of food crops, mainly consisting of agricultural tax relief and agricultural environmental subsidies.

3.2.1. Agricultural tax relief

Since 2006, China has completely abolished agricultural taxes (including agricultural tax, animal husbandry tax, agricultural special product tax, and slaughter tax), which has improved the fairness of the distribution of farmers' benefits; at the same time, data from 1999 to 2010 show that after the complete abolition of agricultural tax, agricultural total factor productivity (TFP) has been significantly improved [5].

3.2.2. Agricultural environmental subsidies

At present, China has not yet defined the connotation of agricultural environmental subsidies at the legal level, and this subsidy policy only appears in individual laws and regulations. According to the existing academic analysis, Li believes that agricultural environmental subsidies are to provide support to agricultural subjects or other related subjects to protect the ecological environment [15];

Sun believes that agricultural environmental subsidies are for agricultural environment protection projects which intend to encourage farmers taking protective measures for the ecological environment contribute to the coordination of agricultural production and environmental protection, and promote sustainable agricultural development [9].

4. Insufficiencies of China's Subsidy Policy

Based on various studies, the current agricultural subsidy system mainly has the following deficiencies:

The incentive effect of agricultural subsidies to increase production is gradually weakening, and the subsidy effect varies with crop types and regions. Gao and Wang indicated that the decoupling coefficients in each period calculated based on the decoupling model indicated that with the extension of the policy implementation period of agricultural subsidies, the effect of changes in subsidy intensity on yield growth per mu is no longer obvious [16]. In addition, Xiao et al. pointed out that the agricultural subsidy policy has significantly promoted the growth of grain planting areas, but there are significant differences in the incentive effects on different grain types: the planting of wheat and rice increased significantly after subsidies, while tuber crops decreased significantly [17].

The effect of increasing farmers' income might be weakened. Figure 5 shows the per capita disposable income changes in rural areas and per capita net operating income of rural residents from 2013 to 2020. Figure 5 shows the total cost per hectare of operating the three major food crops (wheat, rice, and maize) from 2009 to 2018. From 2009 to 2018, the average selling price of wheat increased from 0.92 yuan per catty to 1.12 yuan per catty; the average selling price of rice increased from 0.99 yuan per catty to 1.29 yuan per catty; the average selling price of corn increased from 0.82 yuan per catty to 0.88 yuan per catty [8]; although the sales price has increased, the growth rate is extremely limited. The average annual growth rate of wheat is 2.17%, and the average annual growth rate of rice price is 3.03%. However, it can be seen from Figure 5 that the operating cost per hectare has increased significantly. The total cost has risen from 9006.15 yuan in 2009 to 16406.35 yuan in 2018, with an average annual increase of 6.89%. The increase in cost is much greater than the increase in sales price. Profit income is continuously compressed.

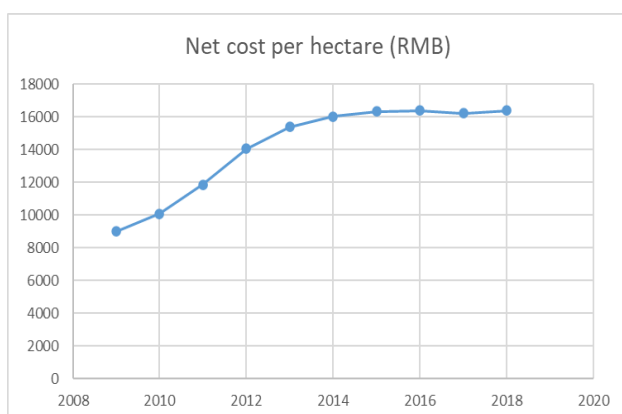


Fig 4. Rural income chart [16].

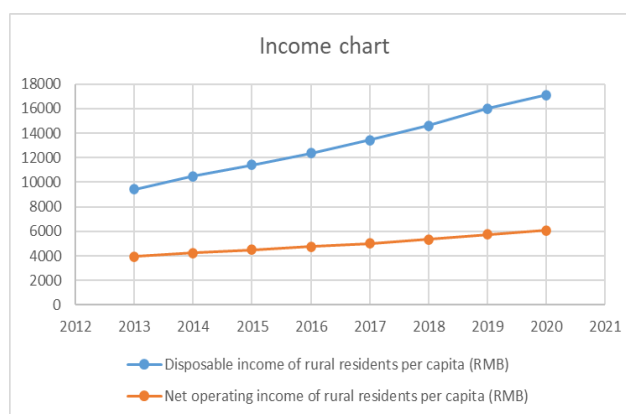


Fig 5. Net cost per hectare [16].

5. Tendency of China's Agricultural Reformation

5.1. Strengthen Infrastructure Construction

First, the quality of farmland will be improved. China plans to build high-standard farmland accounting for more than half of the current total cultivated land area of 1.918 billion mu, and gradually build all 1.546 billion mu of permanent basic farmland into high-standard farmland. During the period, China built 1 billion mu of high-standard farmland. In 2023, 45 million mu will be newly built, and 35 million mu will be upgraded, making a total of 80 million mu of high-standard farmland.

The current construction speed is slowing down, the cost per mu has increased, and the construction quality has been improved.

Besides, the ability to prevent and mitigate disasters will be improved, the construction of water conservancy infrastructure will continue to improve, the modernization of large and medium-sized irrigation areas will be promoted, water diversion will be implemented, the construction of healthy and standby water sources will be implemented, and the development of water-saving agriculture in arid and semi-arid areas will be promoted, monitoring and early warning of pests and diseases will be established.

5.2. Strengthen Agricultural Equipment and Technology and Promote Green Development

In 2023, the "Opinions of the Central Committee of the Communist Party of China and the State Council on Completing the Key Work of Rural Revitalization in 2023" emphasized that it is necessary to promote the breakthrough of key agricultural technologies, accelerate the research and development and promotion of advanced agricultural machinery, realize the promotion and application of agricultural inputs to reduce the amount and increase efficiency, and promote conservation. Because of the intensive use of agricultural resources in the past, the agricultural ecological environment will be rectified, environmental monitoring will be strengthened, ecological protection compensation will be promoted, and ecological restoration of forest and grassland areas will continue. The advancement of agricultural science and technology and the improvement of the agricultural ecological environment will greatly promote the improvement of agricultural productivity and ensure food security.

6. Possible Directions for Agricultural Subsidy Policies for Food Security

Entering the new era, to ensure food security, the agricultural subsidy policy mainly faces three new requirements: the mode of agricultural production and operation deviates from modern technology-intensive agriculture [16]; the contradiction between optimizing the distribution of grain production and sustainable agricultural development [16]; support of new business entities.

This paper believes that the agricultural subsidy policy has the following optimization options:

First, innovating subsidy forms is necessary. Most of the agricultural subsidies in China today are undertaken by central or local finance. The amount is relatively fixed, vertically managed, and lacks grass-roots autonomous participation. Grass-roots units should be relied on to stimulate the production enthusiasm of agricultural business entities. Taking agricultural land as a shareholding cooperative as an example, agricultural financial subsidies go to cooperatives, and the subsidy amount for each member is determined within the cooperative according to standards such as the dividend ratio; this arrangement can enhance villagers' self-government capabilities and promote a more reasonable allocation of subsidy amounts.

Second, it is suggested to improve the concept of food security by adjusting the focal points of subsidies. The type of subsidy should be adjusted based on grain quantity, quality, circulation, and ecological security so that the subsidy policy covers all aspects of food security and maximize the effectiveness of policy. Moreover, the disadvantages of the existing inclusive subsidy should be removed, and the revitalization of rural industries and agricultural sustainable development should be promoted. Guided by sustainable development, this paper suggests clarifying subsidy standards and policy objects, focusing on key areas (main grain production areas and areas with weak agricultural resource endowments), staple food crops, and key links (production and circulation) subsidies, to achieve precise implementation of policies. It is also important to improve the quality of the evaluation method, through the high-quality and high-price strategy and accordingly determine the subsidy amount.

Finally, increasing support for green and sustainable agricultural development and agricultural technology should be a crucial part to be addressed. Agricultural green and sustainable transformation refer to the effective combination of modern science and technology and management methods with

traditional agricultural experience to form a modern agricultural system that coordinates economic, ecological, and social benefits. Agricultural subsidy policies should strengthen the evaluation of green agricultural management entities and support farmers purchasing advanced agricultural machinery and tools to promote the transformation of the traditional chemical agricultural industry. For example, by issuing purchase subsidies to encourage business entities to purchase advanced agricultural machinery and tools, use smart terminals, and implement a subsidy method in which the amount of subsidies is linked to the workload of agricultural machinery.

7. Conclusion

In conclusion, the implementation of agricultural subsidies in China could present a potential solution to the nation's food security issues and offers the possibility of enhancing farmers' income. This study integrates recent agricultural subsidy policies in China, provides a brief analysis of agricultural development trends in China and assesses the impact of each subsidy on food security. Moreover, the study offers policy recommendations that address gaps in policy implementation and align with agricultural development trends. To guide policy adjustments in a more comprehensive and scientifically rigorous manner, future research is suggested to focus on key aspects of China's agricultural policies, considering the development trend of rural revitalization and sustainable agricultural practices, and implementing quantitative analyses for various subsidy policies.

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