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Have agricultural subsidy policies raised the incomes of rural and urban residents?

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Abstract: *Aimed at examining the impacts of food price subsidy policy and food direct subsidy policy to the income and employment of the residents and the national economy, this paper builds agricultural subsidies computable general equilibrium (CGE) model. The results show that, both of the food price subsidy policy and direct subsidy policy have little role to improve farmers' income. The meaning of implementing the policy of agricultural subsidies reflected more in showing the country's strong determination to solve the "three rural" issues, stimulating farmers' enthusiasm for growing grain, and ensuring national food security. As for improving farmers' income, this policy cannot reach these purposes. So, we believe that in order to improve farmers' income, building the "farmer-government-market" trinity long-term linkage mechanism in the process of urban-rural integration is needed, that is based on the market-mechanisms, mobilizing endogenous core strength of the rural economy, as well as the government policy. All of these would have significant role in balancing development of China's economic by expanding domestic demand.*

Keywords: *Residents' income, Rural subsidy policy, CGE model*

1. Introduction

In order to solve the long-standing problems that have plagued the development of rural areas in China, the government has successively promulgated relevant policies to support the development of agriculture, rural areas, and farmers since the early days of reform and opening up. In the new century, facing new development tasks, the country has re-adjusted the relationship between industry and agriculture, issuing a series of No. 1 documents with the theme of "agriculture, rural areas, and farmers". Under the policy of "more support, less burden, and more flexibility" for agriculture and rural areas, China abolished the agricultural tax that had been in place for over two thousand years; implemented a series of financial subsidy policies including minimum purchase prices, direct subsidies for grain, subsidies for high-quality seeds, subsidies for agricultural machinery purchases, and comprehensive subsidies for agricultural inputs. At the same time, the level of financial support has been continuously increasing. The financial investment in just four items including direct grain subsidies, high-quality seed subsidies, agricultural machinery subsidies, and comprehensive agricultural input subsidies increased from 14.522 billion yuan in 2004 to 102.86 billion yuan in 2008. In 2009, in order to stimulate macroeconomic growth, out of the 4 trillion yuan investment by the central government, over 770 billion yuan was invested in agricultural and rural development, ranking first among all industries. Against the backdrop of agriculture, rural areas, and farmers becoming the focus of national economic work, agricultural economic policies are also undergoing a transformation from supporting agricultural production, to supporting agricultural structural adjustment, to promoting the growth of farmers' income.

This article simulates the implementation effect of agricultural subsidy policy using a computable general equilibrium model reflecting the dual economic characteristics of China, and focuses on analyzing the impact of the policy on urban and rural residents' income and employment. The second part explains the scope of the research, model selection, and reviews relevant literature; the third part constructs a computable general equilibrium model of agricultural subsidy policy; the fourth part uses this model to simulate the impact of agricultural subsidy policy on macroeconomics, employment, and urban and rural residents' income; the fifth part is the conclusion and policy recommendations.

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2. Definition of Research Scope, Literature Review and Model Selection

2.1. The research scope of this article

The Organization for Economic Co-operation and Development (OECD) categorizes agricultural subsidies into two types: the first type is support for agricultural producers, including price support and direct subsidies, and the second type is general government services. Since government general service support is not constrained by the provisions of the WTO's "Agreement on Agriculture," its support depends on financial support capacity[1]. Therefore, this article mainly focuses on the two types of subsidies in the first category, namely price support policy and direct subsidy policy. Price support policy belongs to indirect subsidy policy, targeting agricultural product prices. By raising agricultural product prices, it expands the gap between production costs and selling prices of agricultural products, indirectly affecting farmers' income; direct subsidy policy eliminates the intermediate link and transfers directly from the government's finances to farmers. From the perspective of the WTO's "Agreement on Agriculture," direct subsidy policy, because it is decoupled from the production process, belongs to the "green box" policy in the WTO's "Agreement on Agriculture" and is not subject to reduction obligations; price support policy may distort prices and is classified as a "amber box" policy in the WTO's "Agreement on Agriculture," which needs to be reduced.

In terms of price support, China mainly supports the prices of important agricultural products through the policy of minimum purchase prices and temporary storage measures. In the specific implementation process, by increasing subsidies for agricultural production in the process of agricultural product production, reducing the production costs of agricultural products, indirectly raising the prices of agricultural products. Because this subsidy method is directly linked to agricultural production, it will have a certain distorting effect on production, belonging to the "yellow box" policy. However, considering that this policy is widely used in China's agricultural policy and that China still has a large policy space for the "yellow box" policy, this article simulates this policy.

The direct subsidy policy for grain is a policy implemented in recent years in China to stimulate the enthusiasm of grain farmers by providing direct subsidies to them, thereby increasing farmers' income. Among the agricultural financial policies implemented by the country, this subsidy is the largest expenditure apart from agricultural input subsidies, and it also has the widest coverage among many subsidy programs. In 2004, a total of 29 provinces (autonomous regions, municipalities directly under the central government) implemented direct grain subsidies, and by 2006, the subsidy coverage expanded to all 31 provinces (autonomous regions, municipalities directly under the central government), covering basically all major grain crops. In terms of subsidy funds, from 2004 to 2007, the total amount of direct grain subsidies increased from 11.6 billion yuan to 15.1 billion yuan, and has since remained at that level. Due to the wide geographical coverage and substantial financial investment involved in this policy, this article also conducts a simulation study on the policy.

Therefore, the scope of this study is limited to price support policies and direct subsidy policies, and simulates the agricultural subsidy policy with price support policies and direct food subsidy policies as representatives.

2.2. Literature review

On the issue of whether financial subsidies are needed for agriculture, scholars have reached a relatively consistent conclusion that financial subsidy policies are very necessary for agricultural protection, such as Ma Xiaohe et al. (2002)[2]. In terms of the level of financial support for agriculture, scholars have calculated based on the rules of the WTO "Agricultural Agreement" and believe that before China's accession to the WTO, agriculture was in a negative protection stage, with a large gap compared to the support level of developed countries during the same period. After joining the WTO, China's use of the rules in the "Agricultural Agreement" is still not sufficient, and there is still a large policy space[3].

Research on the impact of fiscal agricultural policies on the income of urban and rural residents mainly focuses on the income of farmers, with little discussion on the impact on urban residents' income. Regarding the impact of policies on farmers' income, there are mainly two viewpoints: significant effects and insignificant effects. Those who believe that fiscal agricultural policies have a significant effect on increasing farmers' income; while those who believe that fiscal agricultural policies do not have a significant effect on increasing farmers' income include Wen Tao et al. (2005)[4], Li Peng et al. (2006)[5], who argue that although fiscal support for agriculture in China plays a certain role in increasing farmers' income, due to the low subsidy levels, it has not become a key factor in promoting farmers' income

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growth.

There are many domestic studies on whether to choose price subsidy policies or direct subsidy policies to promote farmers' income. Some scholars believe that China should adopt direct subsidy methods, such as Ma Xiaohe et al. (2002)[2], Mu Yueying (2008)[6], Luo Wanchun (2011)[7], while others hold the opposite view, believing that China is not yet ready to provide direct subsidies to farmers and should implement price protection policies within the scope of WTO's "Agricultural Agreement"[8]. Lin Yifu (2003)[9] opposes China's use of the "Amber Box" policy to increase agricultural subsidies because China's finances cannot afford such a large-scale subsidy, and agricultural subsidies will lead to overproduction of agricultural products, causing a series of political problems once they are canceled.

A review of the above literature shows that, first, it is very necessary to provide financial subsidies to agriculture. From the current practice of financial subsidies to agriculture in China, it can be seen that China is fully utilizing the relevant rules in the WTO "Agreement on Agriculture" and continuously increasing financial support to agriculture. Therefore, it is necessary to conduct a more in-depth study on the role and effects of financial support for agriculture. Second, scholars have different opinions on the impact of agricultural subsidy policies on farmers' income and the national economy. This is related to the choice of research methods and the differences in data acquisition. Considering the characteristics of China's dual economy will inevitably affect the implementation effects of agricultural subsidy policies, it is a better choice to select methods that can reflect the characteristics of China's dual economy and consider the urban-rural differences in policy effects. Third, scholars have less involved in analyzing economic variables other than farmers' income when analyzing the effects of policy implementation. However, the fundamental status of agriculture determines that the implementation of agricultural subsidy policies will inevitably have an impact on the overall economy. Therefore, it is necessary to analyze the effects of policies from more perspectives.

2.3. Choice of research methodology

In order to reflect the interconnected and interactive nature of the economic system, this study uses a Computable General Equilibrium (CGE) model as a research tool. Research on this model started relatively late in China, and its application in agricultural policies mainly began with WTO negotiations and a series of agricultural support policies introduced by the government in recent years. Cai Yuezhou (2007)[10]constructed an 8-sector CGE model to simulate and analyze the effects of rural tax and fee reforms and increased transfer payment policies in the central financial support for agriculture policy in 2006. Mu Yueying (2008)[6] quantitatively analyzed the spillover effects of China's agricultural subsidy policies by constructing a spatially applied general equilibrium model. From the above literature, it can be seen that although some scholars have studied agricultural subsidy policies from a general equilibrium perspective, they have not fully considered the applicability of the model. The urban-rural difference in China is still quite significant, and the simulation of agricultural policies should reflect this urban-rural difference.

In conclusion, this article mainly studies the impact of China's agricultural subsidy policy, especially price subsidy policy and direct subsidy policy, on the income of urban and rural residents. In order to achieve this goal, this article reflects the dual economic characteristics of China from the perspective of urban and rural factor use and urban and rural resident classification, and evaluates the implementation effects of the policy from the aspects of macroeconomic impact, labor employment, etc. using the computable general equilibrium model method, aiming to improve the efficiency of China's fiscal agricultural funds.

3. Construction of a CGE model for agricultural financial subsidies

Due to the setting of China's dual economic characteristics, we have slight differences in the construction of social accounting matrix and model setting compared to the standard CGE model (Hans et al., 2002)[11].

3.1. The data base of the model

In order to study the impact of agricultural subsidy policy on farmers' income and on the national economy, it is necessary to first obtain a balanced data set before the policy implementation, that is, to compile a Social Accounting Matrix (SAM). When compiling this SAM, we mainly consider the following aspects:

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

First, the widening income gap between urban and rural residents is a direct reflection of the dual economic structure characteristics of our country. Therefore, this paper sets up urban resident accounts and rural resident accounts separately. At the same time, the income gap within urban residents and rural residents cannot be ignored, because households at different income levels have different behavioral characteristics, such as decision-making patterns for consumption expenditure and the degree of policy influence. In order to reflect the impact of policies on urban and rural residents of different income groups, it is necessary to divide them according to income levels. This paper divides urban residents into five categories according to income levels, and rural resident households into seven categories according to income levels, in order to study the impact of policy implementation on urban and rural families of different income levels.

Secondly, another important manifestation of our country's dual economy is the duality of factors, that is, the insufficient flow of factors between the rural labor market and the urban labor market due to institutional reasons, and the resulting incomplete transfer of rural labor. This also to some extent constitutes the difference in the proportion of different factors in the income of urban and rural households. Overall, labor remuneration is still the main source of income for low-income households in rural areas and urban areas, but there are also differences. A large proportion of the labor remuneration of rural households is the remuneration for agricultural labor, especially for low-income rural households, while the labor remuneration of urban households comes from labor income in urban employment. This paper specifically divides labor factors into rural labor and urban labor. At the same time, considering that a certain scale of rural migrant workers has been formed in China, although their income is obtained through urban employment, they are still classified as rural residents due to their identity. Therefore, when analyzing labor remuneration, it is necessary to treat rural agricultural labor differently. For this reason, rural labor is further divided into rural agricultural labor and rural non-agricultural labor. At the same time, considering the different nature of urban labor and the different industries in which they work, urban labor is divided into professional and technical personnel employed in all industries and production workers employed outside the primary industry. This constitutes the difference in production structure between the agricultural sector and the non-agricultural sector. As shown in Figure 1 and Figure 2.

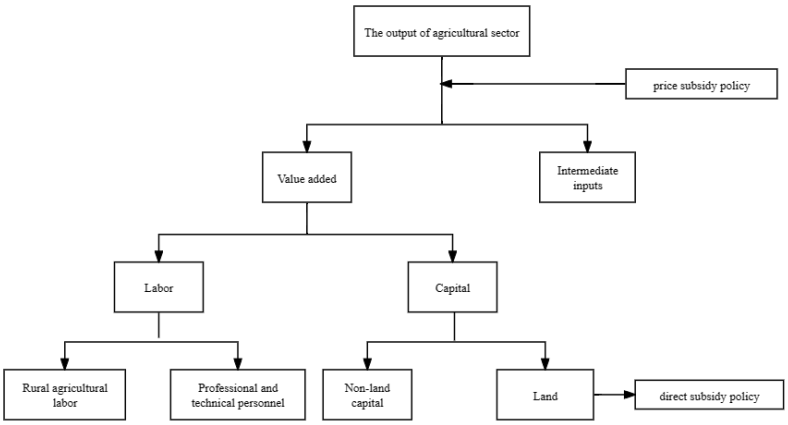

Figure 1: Composition of total output in the agricultural sector.

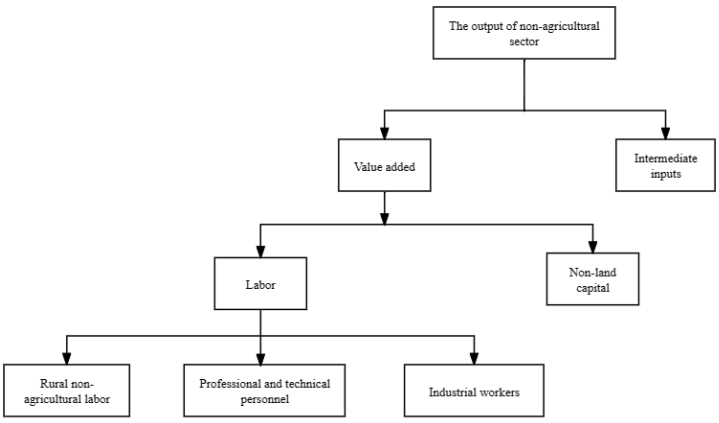

Figure 2: Composition of total output in the non-agricultural sector.

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

Taking the above considerations into account, it not only reflects the characteristics of China's dual economy and conforms to the reality of China, but also reflects the research theme of this article. After collecting authoritative data such as statistical yearbooks, the "macro-balance-micro" compilation method is adopted, ultimately forming the 2007 detailed social accounting matrix of China, which includes 9 industry sectors, 6 factor sectors (rural agricultural labor, rural non-agricultural labor, industrial workers, professional and technical personnel, land, capital), 12 resident classification groups, as well as government, enterprises, investment, inventory, and accounts for other regions of the world.

3.2. Construction of the CGE Model for Agricultural Financial Subsidy Policy

The use of CGE models to characterize the national economic system usually involves four aspects, namely describing the production module of input-output and factor income distribution of each industry, describing the institutional module of income and expenditure of residents, government, enterprises, and other regions of the world, describing the trade module of import and export trade of product sectors, and reflecting the macroeconomic characteristics of the macro closed module. Since agricultural subsidy policies are mainly reflected in the production module, this article briefly introduces the parts related to agricultural subsidies. The price subsidy policy and direct subsidy policy simulated in this article respectively affect the total output production activities and value-added production activities of the planting industry (as shown in Figure 1).

3.2.1. The equation of price subsidy policy

Price subsidy policy is a subsidy given to grain farmers in the grain production sector. The model simulates the policy's impact on the economy by setting the subsidy rate in the production function of the planting industry.

The total output of the planting industry is composed of value added and intermediate input in the form of Constant Elasticity of Substitution (CES) function (Eq. (2)). Under the goal of cost minimization (Eq. (1)), by constructing the Lagrange function, the optimal conditions for value added and intermediate input can be solved (Eq. (3)):

$$\min_{QVA,QINTA} \quad PVA \cdot QVA + QINTA \cdot QINTA \tag{1}$$

$$s.t. \quad QA = A^a \left[\delta^a \cdot QVA^{-\rho^a} + \left(1-\delta^a\right) \cdot QINTA^{-\rho^a} \right]^{1/\rho^a} \tag{2}$$

$$\frac{QVA}{QINTA} = \left(\frac{PINTA}{PVA} \cdot \frac{\delta^a}{1-\delta^a} \right)^{1/\left(1+\rho^a\right)} \tag{3}$$

Where, A^a is the transfer parameter in the CES function of total plantation output, the δ^a is the share of value added in the CES function. $\left(1-\delta^a\right)$ being the share of intermediate inputs. ρ^a are alternative parameters for value added and intermediate inputs. PA is the price of total output in the plantation sector. QA being the total number of outputs. PVA is the price of value added. QVA is the amount of value added. $PINTA$ is the price of intermediate inputs, and $QINTA$ is the number of intermediate inputs. tq is the production tax rate for the plantation sector.

Eq.(4) represents the price equation, i.e., for the plantation sector, the revenues after deducting taxes on production and increasing subsidies are all used to pay for value added and intermediate inputs, which satisfies the assumption of zero economic profitability of the production activity.

$$QA \cdot PA \cdot (1 - tq + taa) = QVA \cdot PVA + QINTA \cdot PINTA \tag{4}$$

In the formula, the tq denotes the production tax rate for plantations. taa for price subsidy policies, and for other sectors. taa is zero. The amount of subsidy paid by the Government can thus be expressed as follows.

$$GT = QA \cdot PA \cdot taa \tag{5}$$

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

When the amount of government subsidy is given, the subsidy rate is expressed as follows.

$$taa = GT / (QA \cdot PA) \tag{6}$$

This paper simulates the implementation effect of the policy when the price subsidy amount is 15 billion yuan.

3.2.2. The equation of the direct subsidy policy

There are four common subsidy methods used in direct subsidy policies: subsidies based on actual planting area of grain, subsidies based on taxable output, subsidies based on taxable area, and subsidies based on the amount of grain deposited. Among them, subsidies based on the planting area of grain have become widely used due to convenience in measurement. In most regions of China, subsidies are based on the area of family-contracted land, allowing non-grain-producing households to also receive subsidies. From this perspective, this operation method is basically decoupled from the production process and is closer to the "green box" policy in the WTO. Therefore, this subsidy method is in line with WTO rules.

This article simulates the direct subsidy policy based on land area as a representative form of subsidy. Since land is one of the production factors of agriculture and other agricultural sectors, combined with other production factors as part of the value-added, the direct subsidy for land is reflected in the setting of value-added, as shown in Figure 1.

In the nested part of value-added, various production factors that constitute value-added have a certain substitutability. Assuming these production factors are combined in the form of CES function (Eq.(8)), under the objective of profit maximization (Eq. (7)), by constructing the Lagrange function, the factor demand functions of various elements in the agricultural production process can be obtained (Eq. (9)):

$$\max_{QF_f} \quad PVA \cdot A^v \left[\sum_{f \in F} \delta_f^v \cdot QF_f^{-\rho^v} \right]^{1/\rho^v} - (1 - subT) \cdot WF_f \cdot QF_f \tag{7}$$

$$st. \qquad QVA = A^v \left[\sum_{f \in F} \delta_f^v \cdot QF_f^{-\rho^v} \right]^{1/\rho^v} \tag{8}$$

$$\frac{(1 - subT) \cdot WF_f}{QVA \cdot PVA} = \frac{\delta_f^v \cdot QF_f^{-\rho^v - 1}}{\sum_{f \in F} \delta_f^v \cdot QF_f^{-\rho^v - 1}} \tag{9}$$

A^v is the transfer parameter of the value added CES function. The δ_f^v as elements f share of the total QF_f for elements of the plantation production process f the number of uses, the number of ρ^v is the substitution parameter for each factor of production. WF_f is the average price of the factor. $subT$ denotes the rate of direct subsidy to the land factor, and since this paper assumes that only the land factor in the plantation industry is subsidized, for the other factors of production and for other industries outside of the plantation industry. $subT$ are zero.This gives the total direct subsidy invested by the Government as Eq.(10).

$$GTld = subT \cdot WF_{ld} \cdot QF_{ld} \tag{10}$$

This paper also simulates the implementation effect of the direct subsidy policy when the subsidy amount is 15 billion yuan.

When the subsidy policy is implemented, it will affect the use of agricultural factors, thereby affecting the demand for factors in all industries, leading to changes in the returns of factors obtained by households and enterprises, thereby affecting the income of households, enterprises, and governments. When the income of these institutional sectors changes, it will also affect their consumption decisions, thereby affecting the demand for products, which will in turn cause industries to reconfigure factors, ultimately causing fluctuations in the variables of the entire national economy.

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

3.3. Setting of Closure Rules and Parameter Estimation

The manifestation of the dual economy in China's macro closure mainly reflects in the setting of macro closure of factors in the model. Considering that there is still a large amount of involuntary unemployment in rural agricultural labor factors under the dual system in China, which is different from the assumption of full employment of labor in neoclassical theory, therefore, when setting the macro closure of the CGE model, it cannot be based on the traditional CGE practice of labor supply determining demand, but on the effective demand of labor (here referring to rural agricultural labor) determining employment. For the capital element of land, this paper assumes that arable land is fully utilized, meeting the assumptions of neoclassical theory; for non-land capital, based on its strong liquidity, it is allowed to flow between all sectors and is fully utilized; for production workers, professional technical personnel, and rural migrant workers, this paper assumes that the supply is sufficient, determined by demand. Other aspects of closure include: in terms of investment and savings, it is assumed that the savings rate is fixed, and investment is determined by demand. Surpluses and deficits are allowed in finance, with government spending as an exogenous variable and government savings as an endogenous variable.

In this paper, according to the different methods of determining parameter values, the parameters in the model are divided into three categories: the first category is the ratio parameter and the transfer and share parameter in the CES and CET functions, which are calibrated by using the base period equilibrium data to determine; the second category is the substitution elasticity of the LES function and the CES function, which are determined by the method of econometric estimation in order to obtain a more accurate elasticity, where the LES function parameter is determined by the least-squares method, and the LES function parameter is determined by the least-squares method, in order to obtain a more accurate elasticity. The parameters of the LES function are determined by the least squares estimation method, while the elasticity of substitution in the CES function is estimated by the Bayesian method and the GME method, respectively, and is comprehensively determined by comparing the statistical results of the estimation and referring to the relevant literature; the third category includes the elasticity of the Armington elasticity and the elasticity value of the CET function, which are difficult to obtain due to the difficulty in obtaining data, and are determined according to the relevant literature (Hans et al. The third category includes Armington's elasticity and the elasticity value of CET function, which are difficult to obtain data and are determined according to the relevant literature (Hans et al, 2002[11]; Zhang, 2009[12]; Zhang, 2010[13]; Zheng YuXin et al, 1999[14]). On this basis, this paper utilizes GAMS23.0 software to simulate the policy of the above model.

4. Analysis of Simulated Results of Agricultural Financial Subsidy Policy

Based on the model and data set in the previous section, this article simulates price subsidy policy and direct subsidy policy respectively. This section will examine the effects of the policy from the perspectives of macroeconomics, labor employment, and urban and rural residents' income, and compare and analyze the two policy measures.

4.1. Impact of Policy Implementation on Macroeconomics

As shown in Table 1, overall, due to the small subsidy amount, the policy has a relatively small impact on macroeconomics. With a subsidy amount of 15 billion yuan, it will only cause a change of a few thousandths in macroeconomic variables. Price subsidy policy has a positive promoting effect on GDP, imports, exports, government consumption, and household consumption, but it will reduce total social investment. The policy has the most obvious promoting effect on household consumption, with a greater impact on exports than imports, and a significant reduction in investment. From the perspective of stimulating GDP growth, the implementation of this policy has a certain promoting effect on China's transition from investment-driven growth to expanding domestic demand and promoting trade. Direct subsidy policy increases the total level of household consumption while reducing the amounts of GDP, government consumption, investment, imports, exports, and other macroeconomic variables, indicating that the implementation of this policy will have a weak inhibitory effect on China's trade, investment, and government consumption. In absolute terms, the increase in household consumption is not enough to offset the decrease in various economic variables, indicating that the cost of obtaining the growth in household consumption is relatively high.

By comparing the implementation effects of these two policies, it can be seen that in stimulating consumer spending, the promoting effect of price subsidy policy is more obvious, but of course, it also

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

has a greater hindrance effect on investment. Compared to direct subsidy policy which has hindered other economic variables, the price subsidy policy that promotes these variables performs better.

Table 1: Macroeconomic impacts of the two subsidy policies Unit: billions of yuan, %,

Macro variables	base period	price subsidies		direct subsidies	
		Analog values	rate of change	Analog values	rate of change
GDP	26604.38	26607.85	0.0130	26603.55	-0.0031
Export	11282.17	11284.16	0.0176	11280.09	-0.0185
Imports	8395.73	8397.57	0.0219	8393.88	-0.0220
Investment	10543.59	10538.49	-0.0484	10542.43	-0.0110
Government consumption	3519.09	3519.82	0.0205	3518.98	-0.0032
Consumers	9655.26	9663.08	0.0810	9655.52	0.0027

4.2. Impact of policy implementation on urban and rural residents' income

Residents' income mainly comes from factor remuneration and transfer income from the government and enterprises. Urban residents' factor remuneration comes from the returns of production workers, professional technical personnel, and capital factors they invest in; while rural residents' factor remuneration comes from the returns of rural agricultural labor, rural migrant workers, land, and capital factors they invest in. The impact of policy implementation on residents' income is shown in Table 2. Table 3 demonstrates the comparison of the Gini coefficient and per capita disposable income between urban and rural areas before and after policy implementation, to reflect the impact of policy implementation on the income disparity within rural residents, urban residents, and between urban and rural areas.

4.2.1. The Impact of Price Subsidy Policy on Residents' Income

The results show that, first of all, the implementation of price subsidy policy will increase the income of urban and rural residents in each income group. Among all urban and rural resident groups, the urban lowest income group has the smallest increase, with total income increasing from 494.11 billion yuan to 494.26 billion yuan, an increase of 1.5 billion yuan. On the other hand, the rural high income group has the largest increase, from 1,962.23 billion yuan to 1,966.85 billion yuan, an increase of 46.2 billion yuan. It can be seen that the price subsidy policy has a significant effect on promoting income growth for urban and rural residents. Secondly, in terms of comparing urban and rural residents' income, the growth rate of rural residents' income (around 0.23%) is much higher than that of urban residents' income (around 0.027%), about 9 times that of urban residents. The per capita disposable income ratio of urban and rural residents has decreased from the base period of 2.9988:1 to 2.9925:1, indicating that this policy has performed well in narrowing the income gap between urban and rural areas. Furthermore, looking at rural residents internally, although the growth rates of each income group are very similar, it can still be seen that the policy has different effects on different income groups, with the greatest promotion effect on the middle income group (growth of 0.245%) and the lowest promotion effect on the low income group (growth of 0.230%). Considering that the income base of the low income group itself is very small, this is unfavorable for narrowing the income gap between rural low-income residents and the middle to higher income groups. However, by comparing the Gini coefficient before and after the implementation of the policy, there has been a decrease within rural residents, indicating that, overall, this policy can increase the income levels of each income group while narrowing the income gap within rural residents. Finally, looking at the impact of the price subsidy policy on the income groups of urban residents, the rate of change among the income groups is not significant, and the amount of increase in each income group is relatively small. Slightly different from rural residents, the growth rates of each group of urban residents show that the growth rates of the low income group and high income group (0.0289% and 0.0281% respectively) are slightly higher, while the growth rate of the middle income groups (for example, the upper middle group is 0.0275%) is slightly lower. This indicates that the implementation of the price subsidy policy is beneficial in narrowing the gap between low income and middle income urban residents, but it may widen the gap between high income and middle income residents. Overall, although the impact of the price subsidy policy on urban residents' income is relatively small, it still promotes income growth for all groups of residents. Additionally, the policy helps to narrow the wealth gap among urban residents and has a greater promoting effect on increasing the income level of the low income group.

ISSN 2616-5902 Vol. 6, Issue 8: 1-11, DOI: 10.25236/AJBM.2024.060801

Table 2: Impact of policy implementation on urban and rural residents' income Unit: Billions of yuan, %.

Income of the population		base period	price subsidies		direct subsidies	
			Analog values	rate of change	Analog values	rate of change
Urban residents	The lowest income group	494.11	494.26	0.0289	494.07	-0.0081
	Low-income group	595.22	595.39	0.0276	595.17	-0.0081
	Lower middle income group	1487.67	1488.08	0.0278	1487.55	-0.0081
	middle-income group	1826.41	1826.92	0.0278	1826.27	-0.0082
	Upper middle income group	2417.08	2417.75	0.0275	2416.89	-0.0082
	High-income groups	1810.85	1811.35	0.0273	1810.70	-0.0082
	Highest income group	3508.01	3509.00	0.0281	3507.72	-0.0082
Rural dwellers	Low-income group	373.80	374.65	0.2295	374.16	0.0982
	Lower middle income group	648.67	650.24	0.2411	649.63	0.1474
	middle-income group	845.91	847.98	0.2452	847.23	0.1566
	Upper middle income group	1128.98	1131.73	0.2441	1130.21	0.1092
	High-income groups	1962.23	1966.85	0.2356	1959.63	-0.1323

Note: Urban residents are classified into groups based on per capita disposable income, with proportions of 10%, 10%, 20%, 20%, 20%, 10%, 10%. Rural residents are divided into groups based on a 20% proportion.

Table 3: Impact of policy implementation on Gini coefficient and urban-rural disposable income ratio

		base period	price subsidies	direct subsidies
Gini coefficient	Rural dwellers	0.330647	0.330643	0.330148
	Urban residents	0.324171	0.324169	0.324170
Urban/rural ratio of disposable income per capita		2.9988:1	2.9925:1	2.9978:1

4.2.2. The impact of direct subsidy policy on residents' income

First of all, from the perspective of urban residents, under the direct subsidy policy, the income of the seven groups of urban residents has all decreased to a certain extent, although the decrease rates are relatively small and not significantly different. This indicates that this policy has a certain adverse impact on urban residents. Secondly, looking at the impact on rural residents' income, except for the high-income group which experienced a decrease (-0.1323%), the income of the other four groups of residents has increased significantly. In addition, the middle-income group is more sensitive to the policy, with the largest increase in income level (0.1566%), while the low-income group has the smallest increase (0.0982%). This shows that the implementation of the policy can effectively narrow the gap between middle and low-income residents and high-income residents, but it will widen the income gap between low-income residents and middle-income residents. However, despite this, the Gini coefficient of rural residents has decreased from 0.3306 before the policy implementation to 0.3301, indicating that this policy can significantly reduce the income gap within rural areas. Since this policy can significantly increase the income of rural residents while reducing the income level of urban residents, from this perspective, the policy still plays a certain role in narrowing the income gap between urban and rural areas.

From the comparison of the impact of two policies on residents' income, the obvious difference lies in the fact that, first, the price subsidy policy increases the income level of all residents in urban and rural areas, while the direct subsidy policy increases the income of residents in all rural groups (except the high-income group) while reducing the income of urban residents. Second, under the same subsidy amount, the proportion of income increase for rural residents under the price subsidy policy is higher than the proportion of income increase for the same group of residents under the direct subsidy policy. This indicates that the price subsidy policy is more effective in promoting farmers' income growth. Third, from the perspective of narrowing the income gap between urban and rural areas, although both policies can achieve the goal of narrowing the urban-rural income gap, the per capita disposable income ratio

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between urban and rural areas after the implementation of the price subsidy policy is significantly smaller at 2.9925:1 compared to 2.9978:1 for the direct subsidy policy, indicating that the price subsidy policy performs better in narrowing the urban-rural income gap. Fourth, the contribution of the two policies to narrowing the internal gap among urban residents is not very significant (the Gini coefficient of urban residents changes little before and after policy implementation), but in terms of narrowing the income gap among rural residents, the direct subsidy policy has a more prominent effect on reducing the Gini coefficient among rural residents internally (from 0.330647 before policy implementation to 0.3301, while the price subsidy policy only decreases to 0.330643), indicating that the direct subsidy policy is more effective in narrowing the income gap among rural residents internally. Overall, both policies have their advantages. In increasing the income levels of urban and rural residents and narrowing the urban-rural income gap, the price subsidy policy performs more prominently. In reducing the income gap among rural residents, the direct subsidy policy is more effective, but considering that the implementation of this policy will reduce the income level of urban residents, the advantage of the price subsidy policy is more apparent.

5. Research Conclusion and Policy Suggestions

Based on the construction of China's dual social accounting matrix, this paper uses computable general equilibrium methods to analyze the impact of China's agricultural subsidy policies, especially grain price subsidy policies and direct grain subsidy policies, on residents' income, employment of various types of labor, and macroeconomic variables such as industry, trade, and investment. The general equilibrium analysis simulates the implementation effects of the two policies under the same subsidy amount. The results show that the grain price subsidy policy has a certain promoting effect on the macroeconomy, is more favorable for the upgrading of China's industries, and promotes the employment of rural migrant workers, although it may have a negative impact on China's investment, it helps adjust the country's economic growth pattern. At the same time, this policy significantly increases the income of urban and rural residents, which is beneficial for narrowing the income gap between urban and rural areas. The direct grain subsidy policy increases the consumption level of urban and rural residents, but has certain adverse effects on other macroeconomic variables. The increase in residents' consumption level squeezes out other sectors of the economy, leading to a rapid transition from investment and export-driven growth to a domestic demand-driven development model. Without other policies in place, this may slow down economic growth. Meanwhile, the implementation of this policy significantly increases the income of rural residents, but causes a slight decrease in urban residents' household income. Therefore, although it achieves the goal of narrowing the income gap between urban and rural residents, it comes at a cost.

There are advantages and disadvantages to both grain price subsidy policies and direct subsidy policies. In a comprehensive comparison, the advantages of price subsidy policies are more prominent. Compared to direct subsidy policies, grain price subsidy policies are more effective in promoting economic balance and stable development, and they also lead to a more significant increase in income for rural residents. Therefore, under the same subsidy amount, the grain price subsidy policy is more worth choosing. It is worth noting that grain price policies belong to the "Amber Box" policies restricted for use in the WTO's "Agreement on Agriculture," and they do not directly support the implementation of this policy. There may also be pressure from other foreign countries internationally. However, China has made relatively strict commitments to the WTO, allowing for a significant policy space within the 8.5% margin. Therefore, this policy should be fully utilized to promote rural economic development and increase farmers' income levels to a greater extent.

From the research in this article, it can be seen that the implementation of agricultural subsidy policies will have a certain promoting effect on the economy. Considering the fundamental position of agriculture in our country, the huge differences in urban and rural development, and the arduous task of solving the issues related to agriculture, with the increasing financial capacity and continuous economic growth, the country should continue to increase its investment in agriculture. At the same time, it is worth noting that whether it is price subsidy policies or direct subsidy policies, the increase in income for urban and rural residents is minimal on an individual level. The significance of policy implementation is more reflected in the country's determination to solve the issues related to agriculture, and in the initial investment in agricultural and rural economic growth. The long-term and sustained increase in income for urban and rural residents, especially rural residents, cannot rely solely on the country's financial investment. It should follow the deepening reform of the "dual economy" to fully mobilize the endogenous power of agricultural development and form a long-term growth mechanism. This is of great significance for the balanced development of our economy and the transformation of the economic mode to expand domestic

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