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An Analysis of Policy Optimization concerning Sustainable Agricultural Development in China Based on 2014 US Farm Bill

Zhongxing LI¹, Joseph J. Molnar², Shunqiang SUN^{1*}

1. College of Economics and Management, Southwest University, Chongqing 400715, China; 2. College of Agriculture, Auburn University, AL 36849, US

Abstract On the basis of ensuring farmers' income, the US 2014 Farm Bill emphasizes resources and environmental protection, and some policies and measures to promote rural development, sustainable agricultural development and agricultural science and technology, which provides a good lesson for China's agricultural policy on how to ensure sustainable agricultural development. Finally, we set forth the following recommendations: speeding up the establishment of a legal system of modern agriculture; optimizing agricultural safety net and strengthening agricultural risk management and control; establishing agricultural science and technology extension system and adjusting agricultural planting structure; establishing farmers' associations, nurturing new farmers and protecting the legitimate rights and interests of farmers; increasing environmental remediation investment and efforts.

Key words Sustainable agricultural development, US Farm Bill, Recommendations

1 Introduction

In the Fifth Plenum of the 18th Central Committee of the Communist Party of China, Chinese President Xi Jinping pointed out that we will promote harmony between man and nature, build a scientific and rational development pattern of agriculture and an ecological security pattern, and establish green low-carbon circular industrial system, so as to achieve green sustainable development of agriculture. How can we achieve sustainable development of agriculture and establish environment-friendly and resource-saving society? How can we shift the previous extensive growth pattern at the expense of resources and environment to sustainable development pattern focusing on ecological protection and harmony between man and nature? It has been a problem difficult to overcome in China's agricultural development and reform. In the US 2014 Farm Bill, the support policies and funding efforts are increased for sustainable agricultural development, and studying the adjustment of the new bill will provide an important reference for improving China's policies concerning sustainable agricultural development.

2 Adjustment of the US 2014 Farm Bill

After more than two years of negotiation, the Senate and the House of Representatives finally agreed on the content of the new Farm Bill, and it was signed by President Obama to take effect on February 7, 2014. The new bill includes twelve chapters (commodity plan; environmental protection; agricultural trade; nutrition assistance; credit; rural development; crop insurance; forestry; horticulture; energy; research and development; other miscellaneous items). The budget given by Congressional Budget Office (CBO) is shown in Table 1. The implementation of 2014 Farm Bill will

need a total expenditure of \$956.4 billion, decreasing by 1.7% when compared with 2008 Farm Bill, which is a good thing for the federal government beset with accumulated debt approaching the upper limit. The nutrition assistance is the main item of expenditure in 2014 US Farm Bill, a total expenditure of \$754.4 billion, accounting for 79%, followed by crop insurance and environmental protection with expenditure of \$89.55 billion and \$57.6 billion, respectively, accounting for 9.4% and 6%, respectively. Further, the spending on commodity plan, nutrition assistance and environmental protection falls by \$14.3 billion, \$8 billion and \$3.967 billion, respectively, a decrease of 24.3%, 6.4% and 1%, respectively. The spending on crop insurance, research and development, energy, horticulture and agricultural trade increases by \$5.722 billion, \$1.145 billion, \$879 million and \$694 million, respectively. The spending on agricultural credit projects maintains the original scale (see Table 2).

2.1 Optimizing agricultural subsidies

(i) For price loss compensation, the fixed reference price is preset based on different types of crop, then the reference price is compared with the market price, and if the market price is lower than the reference price, the price difference will be subsidized for farmers. The amount of subsidies is 85% of the product of crop yields, area and price difference. (ii) The agricultural income risk subsidy is divided into county-level agricultural income risk subsidy and personal income risk subsidy. The operational mode of county-level agricultural income risk subsidy is to use the five-year yield and price data at the county level to calculate the mean, respectively, and 86% of the product of both is the county-level agricultural risk guarantee income. If the actual crop income is less than this value, the government will give subsidies. The operational mode of personal agricultural income risk subsidy is similar to that of county-level agricultural income risk subsidy, but the reference standard of personal agricultural income risk subsidy is no longer for a specific type of crop but all crops of farmers.

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* Corresponding author. E-mail: youxiangshijie@126.com

2.2 New crop insurance

(i) The progressive income insurance plan is that when the cotton planting income within a county is 10% lower than the expected income, the insurance companies compensate the farms and the compensation proportion varies based on the expected farm income and insurance coverage, with the maximum payment of not more than 30% (Han Yijun *et al.*, 2015). (ii) The supplementary insurance option plan is to mainly provide protection to crops except cotton, and it can be found from the name that it provides the extra protection outside security standards of insurance products. Suppose the farmers buy the income insurance which guarantees 70% of normal income and supplementary insurance option which guarantees 86% of income. If the final actual income is at 80% of coverage level, the income insurance does not work, and the sup-

plementary insurance option is responsible for the remaining 6% (86% -80%); if the final actual income is at 60% of coverage level, the income insurance is responsible for payment of 10% (70% -60%), and the supplementary insurance option is responsible for payment of 16% (86% -70%). (iii) The new uninsured item assistance in the bill is directed at the farmers who do not buy crop insurance and suffer the production losses caused by extreme weather in the agricultural production process. The government provides catastrophe risk subsidies, but the annual compensation received from such insurance will not exceed \$ 125000 per person. The dateless livestock disaster assistance is to protect the benefits of farmers who can not be paid due to expiry of corresponding disaster assistance programs in the bill.

Table 1 Various kinds of expenditure in 2014 US Farm Bill (2014-2023) (Unit: \$ 10⁶)

Items	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Nutrition assistance	77937	78779	78670	77376	75888	74618	73614	72871	72417	72262	754432
Crop insurance	6382	8399	8472	8834	9063	9279	9552	9714	9873	9988	89556
Environmental protection	5430	5590	5654	5677	5814	5817	6098	5817	5762	5941	57600
Commodity plan	6382	2540	4802	5004	4828	4256	4116	4224	4082	4225	44459
Agricultural trade	347	360	359	359	359	359	359	359	359	359	3579
Horticulture	163	167	175	179	191	168	173	176	181	182	1755
Research and development	341	103	116	120	120	113	99	84	80	80	1256
Energy	35	103	155	168	164	129	105	92	86	85	1122
Rural development	19	57	65	52	25	16	7	0	0	0	241
Forestry	3	2	1	1	1	1	1	1	1	1	13
Credit	-178	-197	-205	-211	-220	-228	-237	-246	-255	-263	-2240
Others	711	197	208	213	214	193	163	154	154	154	2361

Data source: Congressional Budget Office (2014).

Table 2 Increase or decrease in various kinds of expenditure in 2014 US Farm Bill (2014-2023) (Unit: \$ 10⁶)

	Items	Sum
Decreasing expenditure	Commodity plan	14308
	Nutrition assistance	8000
	Environmental protection	3967
Increasing expenditure	Research and development	1145
	Crop insurance	5751
	Energy	879
	Horticulture	694
	Rural development	358
	Agricultural trade	139
	Forestry	10
	Others	951
Constant expenditure	Credit	0

Data source: The paper of Carl Zulauf *et al.* (2014).

2.3 Strengthening the rural infrastructure construction

Based on continuation of the previous bill projects, the rural development item in New Farm Bill makes some adjustments, and pays more attention to the construction of agricultural infrastructure and supporting systems. It provides \$ 150 million for water supply and wastewater treatment infrastructure construction while improving rural electricity and transport conditions. It plans to establish

a sound rural housing project applicant certification system before 2020 and give the affordable housing to the people who need most. It improves the network in rural areas to increase Internet speed and facilitate farmers' network marketing, annually arranges \$ 65 million per year for rural small and micro enterprises, and offers \$ 75 million for energy-saving projects in rural areas to save cost of rural small and micro enterprises while ensuring the efficient operation.

2.4 Developing new measures to assist the new and older farmers For new farmers, 2014 Farm Bill increases the assistance, and the funding for new farmers' development projects rose from \$ 78 million in 2008 to \$ 100 million. It simplifies the new farmers' application procedures and provides appropriate preferential premium policies. For the experienced farmers engaged in agricultural production, the bill provides market development projects of high value-added agricultural products for their choice, and the new bill adds \$ 48 million of annual investment to the original investment of \$ 15 million per year.

2.5 Expanding the agricultural science and technology extension projects On the basis of agricultural science and technology extension, the new bill increases the funding and allocates \$ 200 million to support the government, public research institutions and private research institutions to carry out joint technology

research and promotion activities on food and agriculture and establish food and agricultural research fund for non-profit research and technology transformation projects. It allocates \$5 million per year for the research of food and agricultural law, and lowers the supporting funding application standards of advanced agricultural science and technology research projects.

2.6 Integrating the environmental protection project 2014 Farm Bill increases efforts to support the protection of ecological environment and development of renewable energy. It integrates the previous 23 environmental protection projects to 13 projects, and implements agricultural resource conservation easement project, comprising two kinds of easement (one is wetland protection easement and the other is agricultural land conservation easement). In addition, it retains the fallow land reserve project that can guarantee land restoration and the environmental quality stimulus project that can promote agricultural production while improving environmental quality, and establishes new regional cooperation and protection project to encourage the government, local people and rural cooperatives within certain areas to work together to protect local wildlife resources.

2.7 Increasing bioenergy support 2014 Farm Bill adds \$879 million to the bioenergy project investment of \$243 million stipulated in 2008 Farm Bill, and the final total investment is up to \$1.122 billion. It adds new bioenergy education project, rural bioenergy project, bioenergy facility research project and renewable fertilizer research project, and encourages investment in alternative energy technologies and renewable energy technology products. In addition, the bill also establishes the USDA agency energy efficiency program report to analyze the energy use of the projects managed by agricultural departments, in order to identify potential energy-saving projects. At the same time, it broadens the scope of biomass energy project, incorporates forestry products, and requires the relevant departments to examine and verify whether forestry operators' products can obtain the relevant "biomass energy product" certification. It also implements more stringent approval procedures for rural energy projects, and requires that the related project applicants obtain certification after passing three rounds of review.

2.8 Expanding organic agricultural products and characteristic agricultural products The bill also mentions the support to organic agriculture in terms of environmental protection, research and insurance. In terms of environmental protection, it increases the funding for the organic producers and operators in applying for certification; in terms of research, it establishes the research and promotion incentive programs for organic agriculture, and increases funding for research on organic agriculture; in terms of insurance, it establishes the organic agriculture insurance programs, in order to improve the ability of organic agricultural products to withstand natural risks (Qian Jingfei *et al.*, 2014). According to statistics, 2014 Farm Bill offers mandatory spending of \$168 million on organic agriculture. The bill arranges \$7.25 million per year as financial incentives to the farmers who plant characteristic

agricultural products. Meanwhile, it establishes new subsidy classification plans concerning characteristic agricultural products, in order to encourage farmers to develop the agricultural products with local characteristics. The subsidy amount will increase from \$50 million in 2013 to \$72.5 million per year during 2014-2017; it will be \$85 million per year after 2018. It sets up the pest control and disaster mitigation funds for characteristic agricultural products (\$62.5 million per year during 2014-2018 and \$75 million per year after 2018).

3 The impact of 2014 US Farm Bill adjustment on sustainable agricultural development

3.1 Strengthening agricultural safety net and highlighting the risk management role of agricultural insurance Income subsidies and agricultural insurance constitute an agricultural safety net to ensure American farmers' income. 2014 New Farm Bill substantially slashes agricultural subsidies, so that farmers' income is reduced. However, it highlights the role of agricultural insurance, and adds a new agricultural insurance budget of \$5.7 billion. And the agricultural insurance subsidies within the next ten years will be up to \$89.827 billion, accounting for 67% of the entire safety net budget, which strengthens the ability of farmers to withstand agricultural natural risks and market risks. From the overall situation, the security effect of agricultural insurance on farmers' income would be not less than the income reduction effect caused by subsidy policy abolition. Such changes can make the US agricultural subsidies shift from price support to income support, thereby greatly enhancing the agricultural risk management.

3.2 Adjusting environmental protection projects based on local conditions and enhancing policy flexibility 2014 Farm Bill reduces the previous 23 environmental protection projects to 13 projects, and integrates the possibly repeated projects. In accordance with the geographical type, it establishes the corresponding conservation projects, emphasizes regional characteristics, and uses the financial funds saved for strengthening testing and evaluation projects of environmental quality as well as bioenergy aid and agricultural scientific and technological research and extension projects, which can optimize the agricultural policy system, improve policy implementation efficiency and enhance policy flexibility.

3.3 Improving grain planting structure and enhancing the competitiveness of agriculture 2014 Farm Bill substantially increases the support to bioenergy, special agricultural products and organic agricultural products, which will help to improve the grain planting structure; increases the use of bioenergy based on regional specialties and strengthens organic green food product cultivation; reduces the planting of food products that consume considerable energy and cause environmental pollution. Meanwhile, the new bill constantly focuses on environmental protection, rural infrastructure construction, new farmer fostering and other goals of sustainable agricultural development, which will effectively enhance the competitiveness of US agriculture.

4 Lessons from the US farm bill adjustment for the sustainable development of China's agriculture

4.1 Speeding up the establishment of a legal system of modern agriculture

2014 US Farm Bill optimizes agricultural support policies, improves the efficiency of policy implementation, and pays more attention to agricultural sustainable development. As for China's agricultural policy legislation, it can not keep up with the agricultural policy plan. In a very long period of time, the agricultural policy plan mainly depends on the policy documents such as Central Document No. 1, with weak binding force and operability, and there is lag in the agricultural policy legislation. In addition, a number of agricultural management measures are dispersed in various laws, and most of them are principled explanations, never forming a complete legal system, resulting in messy and incomplete agricultural legislation in China, which makes it more difficult to implement agricultural development plan. Therefore, China should establish a set of modern agriculture legal systems with Agricultural Law as the core as soon as possible, pin down the support for agriculture in the legal form, incorporate various effective agricultural support policies into them, and perfect all aspects of agricultural management to obtain certain practicality and operability.

4.2 Optimizing agricultural safety net and strengthening agricultural risk management and control

The new US bill curtails agricultural subsidies, strengthens the role of agricultural insurance in the agricultural safety net, and optimizes the agricultural safety net's management of agricultural risk. In China, the agricultural subsidy policy is still the "market-holding policy" dominated by direct food subsidies, and excessive government intervention distorts the market price mechanism. Therefore, China should optimize and upgrade the agricultural subsidy policy, improve agricultural price formation mechanism, carry out the pilot work on agricultural subsidy and target price system, actively play the regulating role of market, and abolish the government's unreasonable market intervention. In addition, the agricultural insurance should learn from the US "government + insurance companies + market" model. It is necessary to establish large agricultural insurance data, design multi-level and multi-style agricultural insurance products to meet the insurance needs of different agricultural entities, and shift from laying sole emphasis on agricultural natural risk management to laying equal stress on agricultural natural risk and agricultural market risk management so as to improve management of agricultural risk.

4.3 Establishing agricultural science and technology extension system and adjusting agricultural planting structure

2014 Farm Bill increases capital investment in agricultural science and technology extension while relaxing the supporting funding application standard for agricultural science and technology research projects, suggesting that the US government does not diminish the support to agricultural science and technology extension. In 2012, China's Central Document No. 1 emphasized the prominent position of agricultural science and technology, but the current situa-

tion of underdeveloped agricultural science and technology has not changed, *let alone* extension. Therefore, China should strengthen cooperation between private enterprises and governments, universities or research institutions in promotion of agricultural science and technology, build a "trinity" agricultural science and technology extension system (government responsible for providing policy support; scientific research institutions responsible for training technical personnel and developing new technology; enterprises responsible for the extension task), carry out the planting of special agricultural products in specific regions, and strengthen the certification system of green products and organic agricultural products.

4.4 Establishing farmers' associations, nurturing new farmers and protecting the legitimate rights and interests of farmers

The new bill pays special attention to the cultivation of new farmers, and issues a series of measures to protect the interests of farmers. In China's poor and backward areas, farmers receive little education and know little about the relevant national measures to benefit farmers, so they are at a disadvantage in touch with the relevant departments of the local government. Therefore, we should establish farmers' associations to improve the political participation of farmers, ensure farmers' political voice in decision-making process, and enhance the role of farmers in supervising and feeding back the implementation of policy. Meanwhile, it is necessary to sign orientation training protocol with the relevant universities and scientific research institutes to cultivate a number of high quality farmers and improve their professional level and ability to innovate. There is also a need to encourage the establishment of famous agricultural product brands, and government should offer support and preferential policy in taxation and extension.

4.5 Increasing environmental remediation investment and efforts

The US agricultural legislation has always been concerned about resource conservation and sustainable development. The new bill incorporates some outdated land conservation projects, but its coverage does not decrease, and the integration makes the environmental protection policy targeted. China's agricultural and environmental pollution has become a chronic illness, and excrement from animal industry has exacerbated pollution of the water environment. The abuse of chemical fertilizers and pesticides in order to increase production in farming leads to contamination of the land environment. To improve this situation, China should increase the funding of environmental governance, rationally develop the regional standards of environmental protection, develop scientific and reasonable pollution prevention and emission reduction plan, improve the existing environmental pollution monitoring mechanism, and establish a strict effective environmental pollution control system.

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5.3 Labor division and specialization Although cooperatives established by farmers can effectively solve the problem of pricing power of agricultural products in theory, the "collective action dilemma" and "fake cooperative" bring about new problems. Without proper treatment, these will harm the solution to problem of pricing power of agricultural products and may take the development of specialized farmers cooperatives to a wrong road.

In view of these, we recommend implementing internal and external labor division and specialization of cooperatives. Firstly, farmers join in cooperatives with their land contractual management right, all farmland is delivered to cooperatives for unified management, forming the principal agent relationship based on the land contractual management right. In accordance with willingness and comparative management advantage of farmers joining in cooperatives, we divide farmers into professional managers, cooperative employees, and principals. Their labor will be divided as per the internal management mechanism of the cooperative. Therefore, the pricing of agricultural products between farmers and buyers completely changes the pricing of commodities between enterprises, inherent weaknesses of small peasant management expand their efficiency survival space because family management involves socialized labor division, and it further forms corresponding labor transaction and pricing mechanism^[9]. In addition, income of farmers also changes to property income and wage income from original operating income, and is not subject to the problem of pricing power of agricultural products. Secondly, after internal and external labor division and specialization, agricultural cooperatives improve their special purpose of assets, but it also raises industrial threshold, increases access cost and action cost of "false cooperatives" and "fake cooperatives", and effectively restricts appearance of "lemon market".

6 Conclusions

(i) The transaction scale has positive influence on farmers' pricing power of agricultural products. The larger transaction scale brings the greater farmers' pricing power of agricultural products; the transaction scale of competitors has reverse influence on farmers' pricing power of agricultural products; information search cost has reverse influence on farmers' pricing power of agricultural products. When the information is asymmetry, farmers grasping more

information will be favorable for raising their bargaining ability.

(ii) Under the condition of small peasant management system, farmer is in a relatively weak position in the distribution of pricing power of agricultural products, due to factors such as small transaction scale, information asymmetry and farmer's weak negotiation ability.

(iii) The middle profit sharing model makes it possible for win-win of farmers and buyers. Through cooperative game, farmers and buyers can share cooperative surplus at the agreed ratio.

(iv) The introduction of self-organizing specialized farmers cooperatives is favorable for solving the problem of pricing power of agricultural products, and possible problems, such as "collective action dilemma" and "fake cooperatives" in the cooperative development process can be solved by internal and external division of labor and specialization of cooperatives.

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