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Economic Analysis of Diesel Fuel Subsidy Policy in China's Fishery

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Abstract In this paper, on the basis of an overview of the evolution of diesel fuel subsidy policy in China's fishery, we perform an economic analysis of the existing diesel fuel subsidy policy, and believe that it is fishing shareholders rather than fishermen who benefit most from the diesel fuel subsidy policy. The diesel fuel subsidy policy is not conducive to fishery resources protection, it will cause no fluctuation in the supply price of aquatic products, and it can not effectively increase the income of all fishermen. It is necessary to focus on subsidy method, subsidy links and subsidy level to improve diesel fuel subsidy efficiency, lower production costs, stabilize fishery production, and increase the income of fishermen.

Key words China's fishery policy, Diesel fuel subsidies, Economic analysis

1 Introduction

The countries in the world have long subsidized fishery. The United States, Japan and other countries consider that domestic subsidy is a part of national economic policy, and the EU widely regards subsidy policy as one of the foundations of fishery. At early stage, the major fishing nations heavily subsidized fishery to enhance marine fishing capacity, or provided production subsidies in order to reduce investment risk and production costs. In recent years, they consider perfecting the subsidy policy under the WTO framework. China's policy of diesel fuel subsidy in fishery has been implemented for years, going through five stages. Stage I (1954–1956): unified supply. From 1954, the supply and marketing cooperatives were responsible for unified supply of diesel fuel and other fishery materials; from 1956, the state-owned oil companies and other companies were responsible for unified supply. Stage II (1957–1980): planned supply. From 1957, the state implemented "unified planning, hierarchical management, independent operation" management system for major fishery materials, and diesel fuel and other 9 kinds of fishery products were listed as the materials to be allocated according to plan for fishing production teams based on tonnage and power level of fishing vessels. Stage III (1981–1984): mutual exchange between fish and materials. With the dwindling economic fish resources, the planned material distribution was combined with purchase of catch, operation and allocation-based sale, and the fish is linked with materials. Stage IV (1985–2005): market regulation. From 1985, the operation of diesel fuel and other fishery materials was unblocked, and the planned materials decreased year by year; the form of "mutual exchange between fish and materials" was greatly changed, and the shortfall of diesel fuel and other fishery materials

was covered by multi-channel transactions. Stage V (2006–now): direct diesel fuel subsidies. In March 2006, for the reform of refined oil pricing mechanism, the state decided to offer subsidies to some disadvantaged groups and public welfare industry, and timely implemented fishery diesel fuel subsidy policy and fiscal transfer payment. The diesel fuel subsidy policy has been implemented for eight years, and it is necessary to perform a theoretical analysis of this policy, fully summarize the experience and lessons learned in the actual operation, and make reasonable and scientific policy recommendations, so that the use of fishery resources and the supply of aquatic product market are improved.

2 Economic analysis of policy of diesel fuel subsidy in fishery

Crude oil prices have a certain impact on any industry, but have an extremely significant impact on the marine fishery production. According to the FAO survey, the fuel cost in developed countries accounted for about 10% of fishery income at the end of 2003, and it increased to 20% in 2005; the fuel cost in developing countries accounted for 50% of fishery income. In recent years, the global crude oil prices have been rapidly soaring (see Table 1). Compared with August 2006, TFO 380 (heavy oil), TFO 180 (heavy oil), MGO (marine light diesel fuel) and MDO (mixed oil) increased by 85.4%, 84.2%, 42.0% and 114.4% respectively in July 2013, making various countries to restart the fishery oil price subsidy. This is determined by the massive consumption of energy in fishery, higher than the consumption of other industries. Thus, the rapidly rising crude oil prices have not only a major impact on fishery production and management, but also an adverse impact on stable supply of aquatic products. China's implementation of the fishery diesel fuel subsidy policy is a major leap in the history of fishery policy. What is the impact of this measure on the aquatic product market? Who can get more profits between fishermen and fishing shareholders in the course of subsidizing diesel fuel? Can diesel fuel subsidies arrest the price fluctuations

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in aquatic products? These questions are worthy of study.

Table 1 Fuel prices in the world's major port (Unit: USD, t)

Port	TFO 380(heavy oil)		TFO 180(heavy oil)		MGO(marine light diesel fuel)		MDO(mixed oil)	
Singapore	314.3	592.5	328.5	611.5	642.0	896.5	429.1	911.0
Spain	339.0	629.5	358.6	672.5	685.0	–	460.1	1 007.5
Panama	341.0	608.0	373.5	668.5	690.0	–	463.2	1 011.0
Dalian	367.0	695.0	383.5	718.5	697.0	–	482.5	1 072.5
Peru	367.5	697.5	405.0	773.5	765.0	–	506.6	1 306.5
Tokyo	359.0	632.0	363.5	642.0	619.0	930.0	450.0	–
Busan	324.0	615.0	352.0	639.0	666.6	908.0	443.5	930.5

Note: The left column data are about August 2006; the right column data are about July 2013; the port in Spain is Algeciras; the port in Peru is Callao; Peru data are about 2011.

2.1 The biggest beneficiary after the implementation of diesel fuel subsidy policy

The government gives money in the hands of the fishermen, and the beneficiaries are certainly the fishermen. However, from the survey results of marine operating system in Zhejiang Province, it is found that in the marine fishery ownership structure of 6 coastal cities and 31 counties, the all-crew joint stock cooperative system occupies 12.2% of total fishing boats; the part-crew cooperative system occupies 39.7% of total fishing boats; the shares and labor cooperative system occupies 15.7% of total fishing boats; personal operating system occupies 32.3% of total fishing boats. As for the current diesel fuel subsidy policy, due to changes in fishery ownership structure, the fishing income is distributed between the shareholders, according to the capital contribution, while the fishing income is distributed between the shareholders and employees, according to fixed wages and extra payment. Therefore, a large number of employees and fishermen do not get any benefit, and the biggest beneficiary is fishing boat owner rather than fishermen, so it can not play the role in continuously increasing fisherman's income. Since diesel fuel subsidies are special funds which must be earmarked, the fishermen, who can not engage in fishery production or become employees due to a variety of reasons, are difficult to enjoy the preferential policies, thereby increasing social burden.

2.2 The impact of diesel fuel subsidy policy on resource protection

To alleviate excessive pressure of fishing on marine resources, since the implementation of summer fishing moratorium in East China Sea, Yellow Sea and Bohai Sea in 1995, the hairtail and other economic fish resources have been effectively protected. According to the FAO report, the analysis of marine fishery productivity shows that each fisherman's production volume is 1.3 t in China, 25.1 t in Europe, 17 t in Oceania, 16.3 t in North America, 6.8 t in Latin America, 2 t in Africa and 1.5 t in Asia, 43.5% lower than the global average. These obvious gaps mean that the focus of development of marine fishery should be placed on improving product quality, price, productivity and production efficiency, rather than simple and endless increase of fishing vessels and fishing intensity. Due to the further decline of fishery resources, the amount of catch in summer and winter fishing season is drastically reduced, and the diesel fuel cost and other fishery production costs is sharply increased, making fishermen minimize

sea production time, which plays a certain role in extending summer fishing moratorium period and protecting fishery resources. The implementation of diesel fuel subsidy policy extends the time of fishing production and operation having a damaging effect on resources, and causes fishermen to unscrupulously catch all in one draft beyond the capacity of renewable resources, leading to over-fishing and "tragedy of the commons", so it becomes an "accelerator" of fishery resource damage.

2.3 The impact of diesel fuel subsidy policy on aquatic product price

Aquatic product is a fully competitive market product, and its supply and demand as well as equilibrium price and quantity are determined by the market. In economics, the vertical axis is generally price, denoted by P , and the horizontal axis is quantity, denoted by Q . The supply is price to the market and the production of aquatic products is quantity. As shown in Fig. 1, the supply curve and demand curve of domestic aquatic products are S and D , respectively; the equilibrium price and equilibrium yield of aquatic products are represented by P_0 and Q_0 , respectively. After directly subsidizing fishery diesel fuel price, fishermen are willing to continue sea production, thereby stabilizing fishery production, so the supply curve of aquatic products may move rightward to S diesel subsidy. Assuming that the demand of aquatic products remains unchanged, the equilibrium production of aquatic products is Q diesel subsidy, and Q diesel subsidy is greater than Q_0 . That is, after subsidizing, the production of aquatic products will be close to or greater than the market demand, and supply will exceed demand in the aquatic product market. Assuming that the equilibrium price is P diesel subsidy, P diesel subsidy is smaller than P_0 , that is, the market price of aquatic products after subsidizing is lower than the market price of aquatic products before subsidizing. The diesel fuel subsidies play a role in stimulating fisherman's enthusiasm for production and stabilizing fishery production, but due to the constraints of marine fishery resource stock and production environment, combined with improvement of consumers' spending standards, the demand will continue to grow, and the supply exceeding demand regarding aquatic products will not appear. And due to many alternative aquaculture products, the price will not be so high.

2.4 Diesel subsidy policy can not ensure fisherman's income growth

In a perfectly competitive market, the direct subsidies

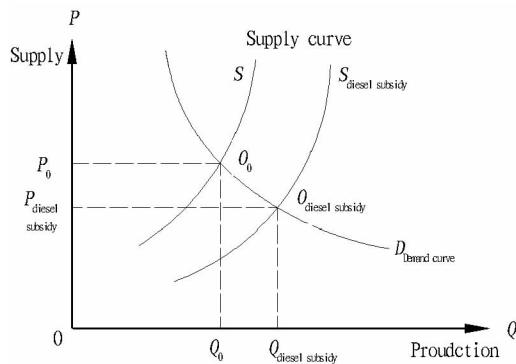


Fig.1 The impact of diesel fuel subsidy policy on aquatic product price

for fishery diesel aim to ensure the supply of aquatic products and fisherman's income growth. However, in the implementation process, due to changes in operation system of the fishing area with changing economic law, technology and business environment, the class differentiation of fishermen is obvious, operating capital accumulates, and labor relations become outstanding; the traditional fishermen with no capital and technology are reduced to employees. First, the absolute number of traditional and non-traditional fishermen is large. In 2012, there were 10871 fishing shareholders and 11721 employees out of the traditional fishermen in a city of Zhejiang, accounting for 48.1% and 51.9%, respectively, and the number of employees was 850 more than the number of shareholders; there were 4402 shareholders and 24920 employees out of the non-traditional fishermen, accounting for 12.1% and 87.9%, respectively, and the number of employees was 20518 more than the number of shareholders. Second, one of the diesel subsidy allotment bases is fishing boat power. Taking a professional fishing village in Zhejiang for example, it has a population of more than 1500. There are about 300 fishermen and their families who having shares, only accounting for 20%; the remaining fishermen and their families depend on the working income to live. It has 56 production boats, and each fishing boat has 2 to 3 shareholders. If there are 3 shareholders for every fishing boat with power of 396 kilowatts, each shareholder can obtain annual income of 400000 yuan, while the annual income of fishing employees is only 70000 to 80000 yuan, less than half of each shareholder's diesel subsidy transfer payment. Therefore, the fishery diesel fuel subsidies can not ensure that each fisherman's income is increased, which deviates from the starting point of policy, thereby further widening the gap between the rich and the poor in the fishing area and causing disharmony in fishing community.

3 Conclusions and recommendations

3.1 Conclusions In this paper, on the basis of an overview of the evolution of diesel fuel subsidy policy in China's fishery, we perform an economic analysis of the existing diesel fuel subsidy policy, and believe that it is fishing shareholders rather than fishermen who benefit most from the diesel fuel subsidy policy. The diesel fuel subsidy policy is not conducive to fishery resources pro-

tection, it will cause no fluctuation in the supply price of aquatic products, and it can not effectively increase the income of all fishermen. Currently, there are new problems in the implementation process of diesel fuel subsidy policy. First, the subsidy does not benefit all production fishermen, so it is difficult to promote the income for all fishermen. Second, it is difficult to achieve the policy objective of reducing production costs and stabilizing marine fishing production. How to scientifically and rationally establish diesel fuel subsidy policy is a very important theoretical and practical issue. The weaknesses of marine fishing industry require the government to redress and remedy defects in the market, so it is necessary to focus on subsidy method, subsidy links and subsidy level to improve diesel fuel subsidy efficiency, lower production costs, stabilize fishery production, and increase the income of fishermen.

3.2 Recommendations

3.2.1 Learning from foreign fishery diesel subsidy methods. From the evolution of fishery subsidy policy in various countries, it is found that the developed countries always provide the financial support for fishery, focus on general services, and reform the subsidy structure. Controlling fishing capacity, strengthening resource management, promoting energy reduction and raising the level of scientific management becomes the new trend of fishery subsidies. In terms of the fishery diesel price subsidies, few of the fishery departments in the United States and Canada subsidize the fuel, but the United States exempts fishery diesel consumption tax; Europe, Japan, South Korea and other countries subsidize fuel. EU fishery fuel subsidies have two forms. One is the direct payment type, such as the EU's fuel subsidies in 2008; the other is tax relief type, such as the related policies implemented in Norway. The fishery fuel subsidies in EU, Japan and South Korea are mainly used for researching energy-saving device in fishing boat, subsidizing the purchase of energy-saving equipment, making up for the loss of fishing income, and compensate for oil price difference. The relevant measures implemented in various countries can help to improve fishery productivity, save energy, reduce costs, protect fishery resources and ensure the income of fishermen.

3.2.2 Improving the fishery diesel subsidy links. China's current fishery diesel fuel subsidy is the direct subsidy for production processes. It is prohibitive fishery subsidy, namely the subsidy that can help to increase fishing capacity or catch. In accordance with the WTO Agreement on Agriculture, it should be reduced and banned. For the subsidy that can reduce environmental and catch pressure, it is the permissive subsidy. Thus, China's fishery diesel subsidy policy should be combined with "dual control" of fishing boats, resource conservation, fisherman's production shift, energy conservation of fishing boats, standardization of fishing boats and working environment improvement. It is necessary to develop reasonable subsidy standards and allotment methods for fishing boats and fishermen.

3.2.3 Reasonably using subsidies. Since the diesel subsidy poli-

agricultural disaster reduction public goods in village community, and timely understand farmer's demand and village community condition, to avoid causing that agricultural disaster reduction public goods exists but can not be used, thereby causing resource idle and waste. In addition, it should understand farmer's demand and use "an antidote against the disease", and design different excitation mechanisms to promote cooperation. Secondly, it should enhance the construction of social network in the cooperative supply process of disaster reduction public goods. It is suggested that village committee should organize farmers joining in community activity. Via these channels, it could enhance connection among farmers and villages, thereby forming a kind of atmosphere of positive communication between internal and external. Finally, it should enhance standard construction power of community, actively maintain and steady social trust, and strengthen creating win-win value concept. It is crucial to improve farmer's cooperation consciousness and enhance rural community's system and norm. It could call out village elite, farming household or intellect in rural community to set an example by personally taking part, extensively participate, and drive other farmers joining in the stream of cooperative supply of agricultural disaster reduction public goods, thereby establishing systemic, normal, harmonious and reciprocal rural community.

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cy is not well publicized, the fishermen do not know the content of the policy, leading to disharmony between the fishermen in the fishing village caused by subsidies. The fishery diesel fuel subsidies must not be directly allotted to fishing vessels or shareholders in full amount. Based on the goal of stabilizing fishery production and increasing fisherman's income, it is necessary to use the diesel fuel subsidies for all the traditional fishermen in order to effectively improve the real income of the fishermen. At the same time, it is necessary to consider the operation system change in China's fishing areas and new fishing village construction needs, establish the minimum income guarantee system, pension and unemployment insurance and other social security systems covering fishermen, and provide certain pension and unemployment insur-

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ance for retired fishermen and some unemployed fishermen to maintain social stability in fishing areas.

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