

Assessment of Agri-environmental Scheme in Europe using AFI and its Implications on China's Sustainable Development of Agriculture

Abstract

The concept of agri-environmental policy and its evaluation have not been extended in China, however, it is the essential part of developing sustainable agriculture and complying with international standards, which are consistent with the direction of China's overall development in the future.

The agri-environmental scheme in Europe is the product of Common Agricultural Policy (CAP), which strictly requires environmental standards and creatively encourages environmental-friendly agricultural activities such as Agri-environmental Measures (AEM). The paper uses data from Agri-environmental Indicators (AEI) and multi-criteria assessment method AFI to evaluate agri-environmental schemes in Europe. The result shows the improvement of environmental conditions collectively, but also reflects the unbalance of different environmental issues within the policy's consideration, as well as that of farmers' different level of agricultural activities. However, it provides with good policy implications and directions in the future.

The result of European agri-environmental scheme's evaluation also sheds some light on China's relative measures in this area. With a serious situation of agri-environmental pollutions and lack of specific policy guidance, China faces with an austere status of developing sustainable agriculture. Using AFI and Chinese data

resource to roughly estimate China's agri-environmental conditions, the paper came to the conclusion that China has the potential to improve. If effectively learning from the successful experience of Europe, speeding up in building agri-environmental scheme with an assessment mechanism, while trying to increase farmers' voluntary participation and enthusiasm with incentives, it would be optimistic to achieve agri-environmental goals, as well as the goals of harmonious development between population, resource, environment and the economy.

Key Words: agri-environmental scheme Europe China

1 Introduction

Sustainable development has become the main theme for worldwide development. It is affecting people's awareness and attitude toward economic development, especially to balance the relationship between the growth and environmental protection, which is a good aspect, but also putting a serious and difficult responsibility on everyone's shoulder. Efforts from governments of different countries, industries, non-profit organizations, and everyone else have been made to move forward with this guide to make a difference to the nature, and more precisely to people's life. However, sustainable development is not as easy as a slogan, when it comes to the issue of how to make it happen, it needs not only the efforts that people have been and will be putting into it, but also the courage to carry on after facing with failure or ineffectiveness of practical implementation. Improvement could only be made based on the assessment, which is main idea of composing this paper.

Sustainable development is critical to economy, especially to the sectors that contribute most to our economy. Agriculture is the main sector which relates to people's life, and at the same time it contributes a lot in both Europe and China. With similar economic contributions from agriculture, China and Europe varies a lot in the aspect of sustainable development in this crucial sector. The agricultural sustainable development in China is absent and not well developed as Europe in some ways, which provokes the initiative to learn from proved experience of Europe.

Agricultural sustainable development in China

China has experienced a long history of environmental recognition until the level

nowadays which covers more aspects than before. In 1994, the first national strategy for sustainable development <China's Agenda 21- White book for Chinese population, environment and development in the 21st Century> was published. In 2003, the Third Plenary Sessions of its Sixteenth Central Committee raised the concept of "scientific thought of development", whose core idea is to coordinate economic development and resource and ecological environment protection, which not only fulfill the needs of current generation, but also the next generation. However, what have been done is far more enough to achieve the overall environmental-friendly development goal of China, let alone environmental problems happened every moment. There are a lot of reasons for that, one might be the rare implementation of environmental-friendly concept into the process of policy-making, and the other could be the emphasis on economic growth which will in a way ignore the natural conditions.

In the context of that, the sustainable development of agriculture is especially slow. China is a country with large agricultural concentration. Agriculture, for its important role in national economy, should have been put more emphasis on its environmental side, because both of its input and output are part of the nature and its environmental problems could severely threaten the health of human beings directly. Due to the high needs of economic growth, agriculture and industries still stay on the point of making money without considering environmental cost, which is an important part of social cost. So the externality of Chinese growth not only exists, but also very high.

The paper selects China's agriculture sector as the main analysis object to reflect this unbalanced development of China, especially for agri-environmental development.

Though sustainable development in Agricultural sector was mentioned in <China's Agenda 21> in 1994, "make the proper and continuous use of natural resource, especially ecological resource and renewable resource, with the goal of meeting the increasing needs of national economic growth and people's living", no practical solutions or measures were taken afterwards. Environmental protection and economic growth are separated and never be thought combined. All of the above reasons require the balanced development of environmental protection system in agriculture.

Research on the Agri-environmental policy of China still stays on the earlier stage, mainly due to policy-absence. One direction of existing research is exactly about this issue. There are quite a lot of studies on agricultural pollutions (Li Haipeng, et al, 2009) and agricultural "ecological compensation" (Liu Pingyang, 2010; Qu Zhenhui, 2011). The severe situation of agricultural pollutions in China requires harmony between people and the environment, which is urgently in need of a standard that could be set as benchmark. Therefore, some argue that it is the job of the government to take this responsibility by using compulsory administrative measures if necessary. "To satisfy people's needs, and to keep the goal of environmental integrity of ecological environment and public health, government measures are indispensable." (Chen Yuanquan, Gao Wangsheng, 2007) On the other hand, "ecological compensation" is more related to environmental assessment of agricultural policy, because ecological compensation uses economic payment as the core method to improve current policies, which is fairly close to agri-environmental policy. Actually, some scholars argue that the agri-environmental measures in Common Agricultural

Policy are included in the scope of ecological compensation (Yang Xiaomeng, 2008; Liu Ping yang 2010). However, there is still no uniform standard in this area in China to evaluate and account the values. Above two are the main contents of the first research direction, the other direction focuses on the choice of specific policies. Some scholars support direct subsidy (Xia Zhihong, 2011), and think that setting standard meanwhile could be a win-win situation. There are also suggestions that environmental factors should be widely synthesized into policy-making process instead of being isolated from rural development, which will facilitate economic benefit and public participation (Wan Jinbo, 2000). It could be concluded that government-initiated and proper policy assessment are necessary for the agri-environmental development in China.

Agri-environmental development in EU

Compared with China, Europe is also an economic entity with large production of agriculture; while according to the achievement it has made, it has indeed set a good example for China in combining the economic development and environmental protection. Europe and China are both listed as the top entities for agriculture output, while the agricultural policy of Europe seems rather consistent and uniform, as well as region-tailored than the other. The Common Agricultural Policy (CAP) in Europe is well-known for its several reforms recent years, though doubts and questions were also raised in 1990s. The real effect of CAP's reforms caught the eyes of the world, including agricultural countries like China. It has done a fairly good job in taking the environmental factors into the consideration of agricultural policy, as a result of which,

breeds the birth of agri-environmental policy. CAP has an obvious tendency of taking the nature into consideration, which could be seen from a series of reforms, from the reform in 1992, in 2000 and in 2003.

After the reform of 1992, CAP gives up the inclination of trade protection, and turns to internalize environmental factors. Up until 2003, the agri-environmental policy system of Europe has been formed and started to show its real effect. The three categories identified as the aspects with core implementations activities by the EU Committee are: the sustainment and development of natural agricultural, forestry and traditional agricultural landscape diversity; management and use of water resource; climate change.¹ After 2003, agri-environmental policies were implemented thoroughly. It is mainly built by two principles: polluter-pays-principle and provider-gets-principle, both of which apply externality theory in environmental economics and therefore form the two main measure of agri-environmental development in EU: cross-compliance and Agri-environmental Scheme (AES).

The discussion of CAP had never stopped since it started, while luckily the focus of environment also attracts more and more researchers and scholars to pay attention to this field. Researches concerning about the policy assessment of CAP are quite abundant. Microscopically speaking, some detect the amount of fertilizer that have been used, output, or other factors; while some study how farmers' positivity or planting methods changed over time from a macroscopically perspective. J. Primdahl's research proves that AES is quite effective in keeping the usage of

¹Website of European Commission: http://ec.europa.eu/agriculture/envir/index_en.htm

inorganic Nitrogen fertilizer, lowest livestock density and management of fertilizer usage. Coordinated effect of environmental improvement and environmental protection could also be proved (J. Primdahl, B. Peco, et al.).² Thomas and Jules analyzed the application of ESA (Environmentally Sensitive Areas, earliest AES in Europe, 1986) and CSS (Countryside Stewardship Scheme) and suggest direct support to farm management instead of production-led policy.³ Erwin and Franz use data from OECD to see how reforms of CAP suit the product environmental standard in agriculture. They conclude that the reforms reduce agricultural output, farm input and Nitrogen surplus, and make environmental managements more attractive to farmers.⁴ Mark Brady et al. prove that cross-compliance is regionally different because of homogenization.⁵ Andrea's paper proves that cross-compliance releases the over exploitation of the land, which is consistent with others, and also shows that reduction of direct subsidy does not have the positive environmental effect as much as cross-compliance, because many farmers with low ability have to reorient their production directions.⁶ There are also researches that do not support the agri-environmental reform in CAP. Agricultural output and environmental influence are location-specific, and lower price may lead to a more centralized way of tillage

² J. Primdahl, B. Peco, J. Schramek, E. Andersen, J.J. Oñate, Environmental effects of agri-environmental schemes in Western Europe, *Journal of Environmental Management*, Volume 67, Issue 2, February 2003, Pages 129-138

³ Thomas L. Dobbs, Jules Pretty, Case study of agri-environmental payments: The United Kingdom, *Ecological Economics* 65(2008) 765-775

⁴ Erwin Schmid, Franz Sinabell, On the choice of farm management practices after the reform of the Common Agricultural Policy in 2003, *Journal of Environmental Management* 82 (2007) 332-340

⁵ Mark Brady, Sone Ekman, Ewa Rabinowicz, Impact of decoupling and modulation in the European Union: A sectoral and farm level assessment, Paper presented to OECD Workshop on the Disaggregated Impacts of CAP Reform 10-11 March 2010, Paris, France

⁶ Andrea Bonfiglio, A neutral network for evaluating environmental impact of decoupling in rural systems, *Computers, Environment and Urban Systems* 35 (2011)65-76

method (Brouwer and van Berkum, 1998)⁷; sudden reduction of subsidy may not bring positive environmental changes either (Porter, 2000).⁸

Chinese studies have not shown a lot of concentration on agri-environmental schemes of CAP, while focus on CAP itself. Most of the studies are about the summary and comments of CAP' several reforms (Li Zhong, 2011; Xu Yi, 2004; Wang Yamei, 2009)⁹ and the experience China could learn from EU (Li Ting, 2006; Xu Lu, 2008; Peng Jie, 2009). However, the research about agri-environmental policies is far more less, with only introductions of the environment-related reforms of CAP (Chen Bin, 2008).

2 Methods and Materials

2.1 Method

Agricultural-environmental Footprint Index

Several methods of evaluating the environmental performance of CAP have been mentioned above, which are designed for different research purposes. Generally speaking, the methods of environmental policy assessment could be summarized as social investigation method, quantification technology method, comparison analysis method, logical framework method and economic evaluation method.¹⁰ This paper aims at assessing the environmental performance of agricultural policy, which will

⁷ Brouwer F., van Berkum S., Effects of CAP Reform on the Environment in the EU, Agriculture, Trade and the Environment: The Impact of Liberalisation on Sustainable Development, 1998

⁸ Clive Porter, Agricultural Liberalisation and the "Double Divident", Agricultural and World Trade Liberalisation—Socio-environmental Perspectives on the Common Agricultural Policy, Chapter 5, CABI Publishing, ISBN 0851992978

⁹Luo Lihong, Zhang Zheng, Several Thoughts about Environmental Policy Assessment, Journals of Beijing Forestry University (Social Science), 2010 March

definitely involve complicated agricultural activities. Meanwhile, it is difficult to measure the environmental performance of agriculture because of incomplete data materials. With all above in mind, this paper aims at focusing on the human-factor—farmers, whether they have high intention of taking part in the process and get a better policy effect. The more involvement of farmers, the more practical changes they may make within agricultural activities, the better effect agri-environmental policies will generate. As a result, Agricultural-environmental Footprint Index (AFI) has most potential in addressing this concern. AFI was created by multidisciplinary EU-funded project ('AE-Footprint') to point at agri-environmental policies directly, and its flexible index structure could meet various needs. ; AFI is tolerant with data, which lessens the special pressure of collecting field data; while emphasizes on the environmental influence of farmers' decisions.¹¹

AFI Calculating Process

AFI has two representative dimensions: AE issues and farmers' management, and each have three categories, which constitute a matrix with nine units with universal and flexible structure. This matrix is called ACM (Assessment Criteria Matrix) and was designed to have horizontal and vertical dimension. AE issues dimension includes Natural Resources (NR), Biodiversity (B) and Landscape Quality (L); farmers' management dimension includes Crop and Animal Husbandry (CAH), Physical Farm

¹¹ Gordon Purvis, Geertrui Louwagie, et, Conceptual development of a harmonized method for tracking change and evaluating policy in the agri-environment: The Agri-environmental Footprint Index, *Environmental Science & Policy* 12 (2009) 321-337

Infrastructure (PFI), and Natural and Cultural Heritage (NCH).

When every selected data is input into the corresponding unit, researchers could allocate the weights of each unit according to the research purpose, and then calculate the final result. It is notable that the same index might probably be categorized into two or more units; researchers could also reach the purpose by giving different weights or substituting the index.

The calculating process of AFI was detailed stated in Gordon Purvis' paper. Basically, after every unit has been distributed weight and put into corresponding data as required by the research purpose, the final "score" of a specific AFI will be calculated. Since AFI is a system of 0-10 scores, so all the data input has to be process properly to meet this requirement. However, there are also some unavoidable problems in using AFI in this paper. First, the ideal scenario would be to compare farmers who joined and did not join the Agri-environmental Scheme, in which way the effect of implementing environmental measures could be proved. The main method of that is to interview farmers in these two groups and collect the first hand information. Due to the special limitations and the insufficient knowledge of AES in every European country, and the policy-absence in China, this paper chooses to avoid the complicatedness and difference, as well as the absence, while look for a general picture of agri-environmental policies by using AFI. Agri-environmental Indicators are used as data for Europe and data from China's Rural Development Yearbook for China. On the other hand, AFI could not be used as an inter-regional comparison. With this fact in mind, this paper is not an assessment for the actual level of

environmental performance, but an assessment for detecting the trend of environmental improvement over years.

2.2 Materials

Data for Selected 15 countries in EU

In January 2000, the European Union Committee published the policy document Indicator for the Integration of Environmental Concerns into the Common Agricultural Policy to officially establish Agri-environmental indicators (AEI) database,¹² to understand and monitor the relationship between agricultural practices and its related environmental effect, and to report the whole process of agricultural sustainability as well. AEI covers the content from three aspects currently: Farm Management Practices, Agricultural Production System, and Pressures & Risks to Environment, fourteen indicators in total. See Table.1. EU is considering enlarging the scope of AEI by increasing indicators to 28. Although AEI has some limitations, it could still be a good resource to find data on AES, with a special focus on farmers.

¹² Agri-environmental Indicators:
http://epp.eurostat.ec.europa.eu/portal/page/portal/agri_environmental_indicators/introduction

Table.1-Agri-environmental Indicators

Agri-environmental Indicators	Farm Management	Farmers Training Level (1) Manure Storage Facilities (2) Consumption estimate of manufacture fertilizers (3) Use of inorganic fertilizers (4) Sale of pesticides (5)
	Agricultural Production Systems	Main agricultural land types(6) Major livestock categories(7) Livestock density (8) Irrigable and irrigated areas(9) Irrigation method(10) Specialized and mixed farming(11) Farm input consumption(12)
	Pressures and Risks	Greenhouse gas emissions from agriculture (13) Gross Nutrient Balance (14)

Notes: European Commission's website:

http://epp.eurostat.ec.europa.eu/portal/page/portal/agri_environmental_indicators/introduction

For the purpose of reflecting the effect of reform since the 2000 reform of CAP, this paper selects 15 countries that have already joined the European Union before 2000, including Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxemburg, Netherland, Austria, Portugal, Finland, Sweden and United Kingdom. Based on the accessibility of data, year of 2003, 2005 and 2007 were selected to compare the situation two years after the 2003 reform and four years after the 2003 reform. It has been mentioned above that, this paper will observe the vibration of average AFI value by taking these fifteen countries as one, reflect the trend of policy

performance, and roughly estimate the influence it has been caused by AES.

AEI are distributed to each unit as shown in Table.2.

Table.2- ACM for Selected 15 countries in EU

	NR	B	L
	NR×CAH	B×CAH	L×CAH
CAH	I1=use of Nitrogen in (4)	I1=(7)	I1=basic training in (1)
	I2= use of Phosphorus in (4)	I2=(8)	
	I3=(5)	I3=(11)	
	NR×PFI	B×PFI	L×PFI
PFI	I1=(10)	I1=(2)	I1=practical experience only in (1)
	NR×NCH	B×NCH	L×NCH
NCH	I1=(9)	I1=(6)	I1=full agricultural training in (1)
		I2=N in (14)	I2=(9)
		I3=P in (14)	I3=(13)

The weight within each unit is easy to distribute, while the weight of horizontal categories and vertical categories needs to be decided under the purpose of the research. This paper continues using the weight chosen by Purvis in his research, $W_{NR}=0.5$, $W_B=0.3$, $W_L=0.2$, $W_{CAH}=0.6$, $W_{PFI}=0.3$, $W_{NCH}=0.1$. Due to the fact that AFI only requires data from 1-10, the data was processed to meet this requirement.

Data for China

On the other side, the data for China is mainly from 2010 Rural Statistical Yearbook of China. It has been mentioned that there is no consistent agri-environmental policies

in China currently, rare database dedicated to this kind of evaluation could be found. As a result, collecting data from Yearbook of Rural China could be a possible way to know the actual situation of agriculture and farmers in rural China. Unavoidably, the ACM for China could not be the same as Europe, for there are overlaps and blankness of data between the two, therefore the selected data for China is decided by the former ACM as well as the practical situation in China. The final ACM for China is shown in Table.3:

Table.3- ACM for China

	NR	B	L
	NR×CAH	B×CAH	L×CAH
CAH	I1=use of N fertilizer I2=use of P fertilizer I3=use of pesticides I4=use of agricultural film	<i>I1=total output of meat</i>	I1=graduates of farmers' middle school + farmers' primary school
	NR×PFI	B×PFI	L×PFI
PFI	<i>I1=installed capacity of hydropower stations in villages</i>	<i>I1=machinery of Agriculture, forestry, animal husbandry and fishery</i>	I1=graduates of farmers' technical training school
	NR×NCH	B×NCH	L×NCH
NCH	I1=effective irrigated area	<i>I1=agricultural output value constitution in total output value of agriculture, forestry, animal husbandry and fishery</i>	I1=graduates of farmers' higher education I2=effective irrigated area

Note: data from 2010 Rural Statistical Yearbook of China

3 Results

Based on the calculating process above, the result of EU is listed in Table.4:

Table.4- AFI Calculation Process in Selected 15 Countries in EU

Year	Sum of weighted Dimension Scores :									Sum of Weighted Issue Scores:		
	TotalNR Score:			Total B Score:			Total L Score:			Total AFI Score:		
	2003	2005	2007	2003	2005	2007	2003	2005	2007	2003	2005	2007
Belgium	4.9	4.8	5.2	7.0	7.5	7.5	3.3	3.2	3.1	5.2	5.3	5.4
Denmark	6.5	6.4	6.6	6.3	7.3	7.3	2.9	4.2	4.2	5.7	6.2	6.3
Germany (n	1.7	1.8	2.0	6.9	6.1	6.0	2.8	2.6	2.6	3.5	3.3	3.3
Ireland	2.1	2.2	2.7	5.9	7.1	7.0	3.0	3.1	3.1	3.4	3.8	4.0
Greece	3.2	3.3	3.7	2.6	3.2	3.3	4.1	4.0	4.0	3.2	3.4	3.6
Spain	2.6	2.6	3.2	4.2	4.1	4.0	3.6	3.5	3.5	3.3	3.2	3.5
France	3.4	3.3	3.4	5.4	4.3	4.2	2.2	2.2	2.2	3.8	3.4	3.4
Italy	2.3	2.3	2.3	4.1	4.1	4.1	3.7	3.6	3.6	3.1	3.1	3.1
Luxembourg	1.3	1.0	1.4	5.1	5.3	5.1	2.6	2.6	2.5	2.7	2.6	2.8
Netherlands	5.3	5.3	5.7	7.0	8.4	8.4	4.8	5.1	5.1	5.7	6.2	6.4
Austria	5.9	6.1	6.0	5.2	5.9	6.0	3.7	2.9	2.8	5.2	5.4	5.4
Portugal	3.9	4.0	4.0	2.4	3.0	2.9	3.6	3.4	3.4	3.4	3.6	3.6
Finland	2.8	3.1	3.3	5.3	6.0	5.9	3.8	3.8	3.8	3.8	4.1	4.2
Sweden	6.5	6.7	6.8	5.2	5.5	5.5	3.0	3.0	3.0	5.4	5.6	5.6
United King	2.2	2.4	2.8	5.2	4.4	4.4	3.0	3.1	3.1	3.3	3.1	3.3

Fig.1 shows the AFI value of every country in the selected 15 countries:

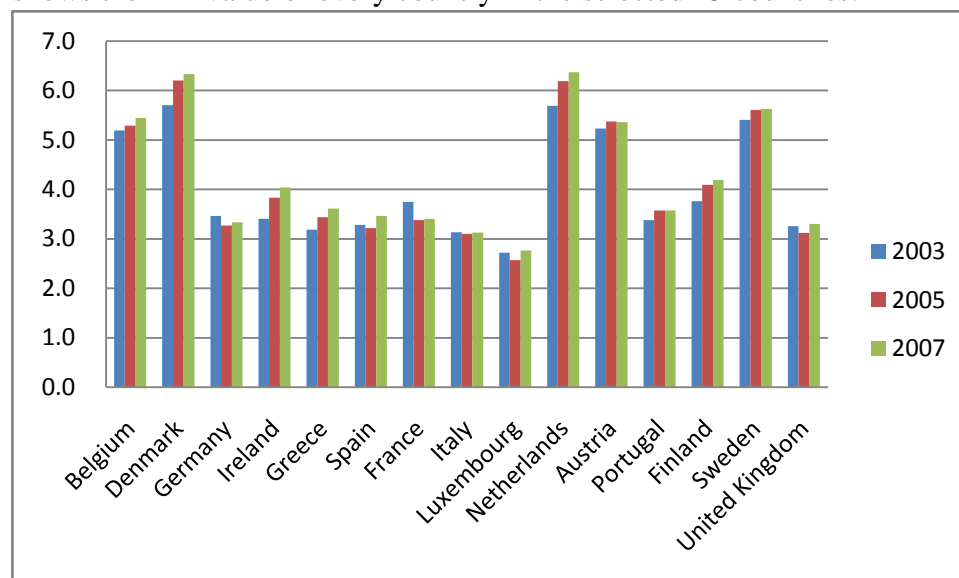


Fig.1- AFI values for Selected 15 Countries in EU

As a result, the average AFI value for fifteen countries is:

$$AFI_{2003}=4.0$$

$$AFI_{2005}=4.2$$

$$AFI_{2007}=4.3$$

The result shows that the average value of AFI among 15 countries keeps growing from 2003 to 2005 and from 2005 to 2007. It increased by 5% and 7.5% in two years and four years, therefore the result could be seen as positive.

According to the distributed weight in this situation, under the condition that AES concerns more on Natural Resource ($W_{NR}=0.5$), as well as the environmental effect of farmers' fundamental production activities ($W_{CAH}=0.6$), the result shows that it has indeed accomplished the coordinated development of agriculture and environment and created the trend to improve.

One of the advantages of AFI is the possibility to weaken the influence of single index by changing the weight, and at the same time testify the result in different scenarios. Sensitivity Test is made from both horizontal and vertical perspectives.

Change Horizontal Weights

When horizontal weights are redistributed as $W_B=0.3$ (same), while $W_{NR}=0.2$ and $W_L=0.5$. The variation between new AFI values and the former values are:

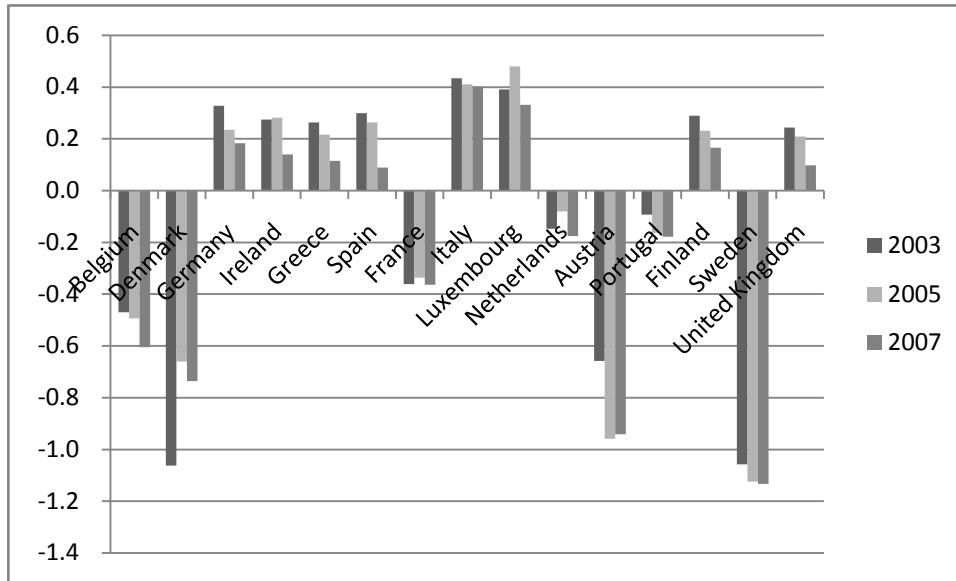


Fig.2- Sensitivity Test for changing horizontal weights

The change of horizontal weight reflects the change of policy emphasis of among different policies. In this case, the weight of NR is no longer 0.5 but 0.2, which indicates that the policy emphasis is on L. The new AFI values for 2003, 2005 and 2007 is 3.9, 4.1 and 4.1, with a slightly drop from the former values.

This result not only proves the sensitivity, but also reflects the real effect of AES. The change of weight is an overall change of the policy consideration with more emphasis on Landscape Quality, which is on a higher level than merely Natural Resource. NR improvement is relatively the prior stage of agri-environmental policy, which is the stage AES is aiming at. The AFI values still show a rising trend with the weight change, which on one hand proves that the current agri-environmental measures in EU has realized the effect of improving NR, and on the other hand has done more than expected.

Change Vertical Weights

When vertical weights are redistributed as $W_{PFI}=0.3(\text{same})$, while $W_{CAH}=0.1$ and $W_{NCH}=0.6$. The variation between new AFI values and the former values are:

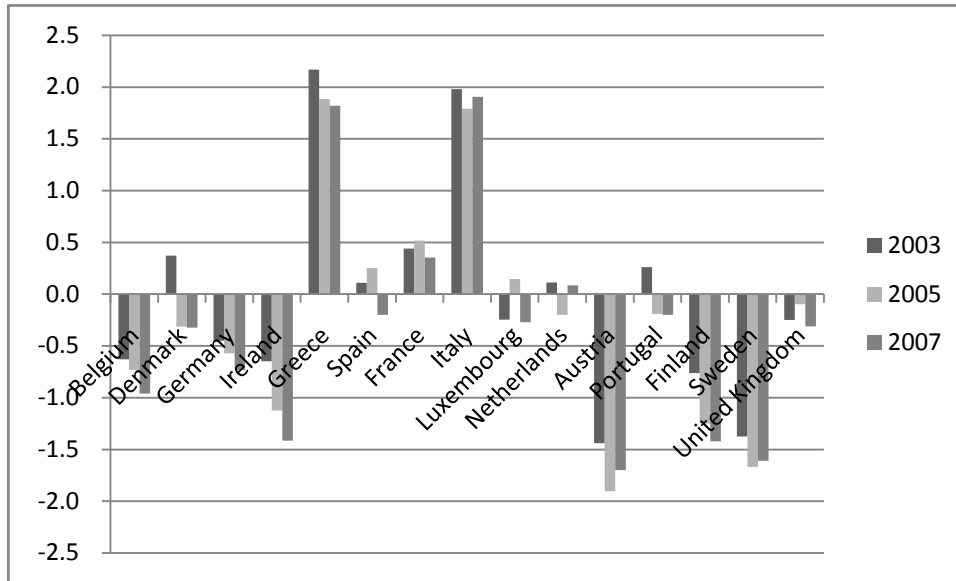


Fig.3- Sensitivity Test for changing vertical weights

Similar to above, the change of vertical weight reflects the emphasis of human dimension. The concentration of farmers' fundamental production activity has been turned to the protection of nature and cultural heritage, under which assumption the average AFI value is 4.0, 3.9 and 3.9.

This indicates that when it comes to the higher level of farmers' participation in agri-environmental policies, the result is not as positive as the situation when the policy goal was only to focus on the fundamental participations. It shows the sensitivity test result as well as the future policy direction.

With exactly the same weight distribution in China and data from 2010 Rural Statistical Yearbook of China, the calculation result for China is:

$$AFI_{1995}=3.0$$

$$AFI_{2000}=2.7$$

$$AFI_{2008}=4.2$$

$$AFI_{2009}=4.5$$

Due to the limitation of data collection, this paper could only evaluate the AFI values

in 1995, 2000, 2008 and 2009, but even like this, the difference between China and Europe could be presently significantly. First, during the ninth five year plan (from 1995 to 2000), AFI value dropped from 3.0 to 2.7 by 10%, which reflects the neglected environmental protection in economy; secondly, from 2000 to 2008, AFI increased significantly and kept the growth trend from 2008 to 2009. A stable trend of AFI values' growing could be seen from 2000, which indicates that even though China has not established a consistent and official agri-environmental policy, the attribute of agriculture has the potential to improve, and with a possible policy in place, the situation would be much better. EU's assessment result has shown a good example for the policy-making in this field, and what China could learn from it mainly include: value agri-environmental problems and increase financial support; guide agri-environmental development to marketing mechanism; create a good legal environment, respect the participants' willingness, and to establish an ample data support system.

4 Conclusion

The application of AFI method in evaluating agri-environmental policies in both EU and China is proved to have positive results. For the selected fifteen countries in EU, the result shows that from 2003 to 2007, AES as one of the main measures taken by CAP and practices the provider-gets-principle, has indeed improved the environmental conditions. Average AFI values in the three years keeps a steady growth, which indicates that the 2003 reform of CAP with more concerns on the

environment is effective. Furthermore, by comparing different AE issues including Natural Resource, Biodiversity and Landscape Quality, it could be seen that almost all of the issues keep a tendency of improving or steady, with only exceptional country decreasing. However, the sensibility test result also shows that, the basic level of AE issues and farmers' participations have already been tested improved by AES, while higher level of AE issues and farmers' participation still require further attention.

The positive conclusion for EU also provides a good example for the agricultural sustainable development in China. By using the data from Rural China Yearbook 2011, this paper also roughly estimated the AFI value of China in 1995, 2000, 2008 and 2009. The Statistic caliber could not be fully uniformed, but the calculation of China's situation could at least provide a direction for future development. China should widely learn from the successful experience of EU, strengthen financial measures for agri-environmental development, be clear of the direction of policy, perfect legal mechanism, and establish an assessment database by encouraging the participation of farmers to assist realizing the goal of sustainable agri-environmental policies.