An Empirical Study on China’s Regional Carbon Emissions of Agriculture

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ABSTRACT

Based on China’s carbon emissions of agriculture, the authors appraise the area differentiation of carbon emissions of agriculture; examine the influential factors of agricultural carbon emissions in China. The results show that the performance of China’s agricultural carbon emissions is on the rise. The agricultural carbon emissions in the west of China increase rapidly. The area differentiation of agricultural carbon emissions in China decreases. In general, the major driver of carbon emissions is agricultural development level. Industrial structure, energy efficiency and labor transfer have significant effects on the performance of agricultural carbon emissions.

Keywords: Agricultural Carbon Emissions, Agricultural Development Level, Area Differentiation, Influential Factors, Policies

1. INTRODUCTION

Global warming is a indisputable fact. It has a serious impact on the survival of the human environment and the development of human society. Climate warming is caused by human activities to a larger extent, besides the natural factors. Especially for man-made greenhouse gas emissions from fossil fuel use (IPCC, 2007), carbon dioxide is one of the most important greenhouse gases. Therefore, realizing the reduction of carbon dioxide emission is an important task to cope with climate change.

At present, China’s GDP is in the second place in the world, while it is a carbon emissions country in the world, not only reflected in the industry, but also in modern agricultural production. Along with the fast development of China’s rural economy and agricultural modernization, by using large quantities of fertilizer, pesticide, agricultural machinery and other carbon-based productive materials, agricultural production of energy consumption is more and more rising, currently accounting for 25% of the total energy consumption of national commodity. Rural energy consumption is expected to become one of the main sources of carbon emissions growth in China. When
the greenhouse gas emissions in the process of agricultural production is increasing, how to reduce the growing greenhouse gas emissions from agricultural source arouses attention of Chinese and international scholars. Therefore, to study the factors impacting agricultural carbon emissions in China is of great significance to in-depth study on China’s agricultural development path of low carbon economy.

2. LITERATURE REVIEW

Carbon emissions have received wide attentions and researches in academic field. The carbon dioxide emissions of a country are closely related to the technological level, industrial structure, energy utilization structure, urbanization and economic development level, but the effects of these factors on carbon dioxide emissions are different. With the increase of human wealth, the growing energy consumption is the main factor of carbon dioxide emissions growth. Some researchers believe that the population, economy, technology and energy are the main factors to determine the carbon dioxide emissions. How does the population economic and technological level impact on carbon emissions for all the countries in the world? Are the decisive factors on carbon emissions contribution the same in the different countries?

In order to solve the above problems, Chinese and international scholars have launched a lot of research work. At present, some international scholars have studied the influence of population size on carbon emissions. Shi (2003) tests the relationship between population change and carbon emissions in 96 countries from 1975 to 1996 and finds that the impact on carbon emissions caused by the size of the population increasing is more serious in low income countries than in high low income countries. Hamilton and Turton (2002) find that the per capita income and population size are the main factors which increase carbon emissions in OECD. David (2009) analyzes the relationship among carbon emissions, population growth and urbanization from 1980 to 2005 in the world. The results show that the population urbanization has a very significant effect on carbon emissions. Thus we cannot achieve the goal of carbon emission reduction only by controlling population growth. York (2003) analyzes the relationship between carbon dioxide emissions and population, and finds that the elastic coefficient of population on carbon dioxide emissions is near to 1. Shi (2003) finds that the elastic coefficient of population on carbon dioxide emissions is between 1.41 and 1.65.

Some international scholars have studied the influence of economic growth on carbon emissions. Friedlls (2003) finds that a cubic relationship between the real per capita GDP and the carbon dioxide emissions by using the data from 1960 to 1999. Cole (2003) finds that a Kuznets curve relationship between carbon emissions and per capita income, but at present the highest income per capita income has not reached the turning point of the income level. Moreover, Condo (2002) analyzes the causal relationship between carbon dioxide emissions and per capita income, and finds that a causal relationship exists between different countries. Neumayer (2002) and Dinda (2006) regard the per capita GDP as a variable and analyze its influence on carbon emissions. Martínez-Zarzoso (2007) tests the relationship between urbanization and carbon emission in 86 countries from 1975 to 1998. The results show that the urbanization of developing countries has a significantly positive impact on carbon emissions, and it is equally important as the size of the population or income scale. Carbon emissions and economic growth have been carried on. Li Bo (2011) calculates China’s agricultural carbon emission load from 1993 to 2008 on the basis of six kinds of main carbon sources from agricultural production.

Some international scholars have studied the impact of energy intensity and the input-output structure on carbon emissions. Stern (2002) finds that the changes in input and output structure have little effect on carbon emissions, and the impact of changes on energy intensity structure to increase carbon emis-
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