Carbon emissions influence factors and peak forecast study of China

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Abstract. Global warming is one of the most serious challenges facing mankind in the sustainable development of twenty-first Century. Related studies have shown that 90% of the probability of global warming may be caused by excessive emissions of greenhouse gases (GHG), which will pose a serious threat to the survival and development of human beings. To actively respond to the climate change, The Chinese Government promised that the carbon emissions will peak around 2030 in Paris Climate Change Conference. In order to realize the smooth progress of carbon emission reduction, it is necessary to understand China's carbon emission reduction factors, make clear the time of carbon emission and explore the potential of carbon emission reduction, and finally find a way of carbon emission reduction in accordance with China's national conditions.

1. Research on the influencing factors of carbon emission
Up to now, according to the research results of scholars in various countries on the influencing factors of carbon emissions, the influencing factors can be roughly divided into three categories: economic growth, industrial structure and energy consumption structure.

1.1. Economic growth
EKC hypothesis means that when the economic development level is relatively low, the environmental quality will decline along with the economic growth. However, when the economic development reaches a certain level, there will be an inflection point. With the further increase of per capita income, the environmental pollution will turn from high to low.

Based on the related theory of EKC curve and data, some Chinese scholars study the presence of EKC curve of wei the sea (2011) to detect the estimates of China's carbon emissions EKC stability, still show the inverted U type characteristic, at present, China is at the left side of the curve segment but also have a different point of view of scholars believe that there is no inverted U type or inverted U type is not the only relationship between economic development and environment quality. He Hongbing (2012), using the data from 1978-2008, combined with the environmental kuznets curve method, China's per capita GDP and per capita carbon emissions, according to the results of the relationship between China's per capita carbon emissions and per capita output in addition, there are no inverted U relationship between also added in the model of per capita carbon emissions of first-order lag and the proportion of secondary industry structure effect, reaction results show that the
history of carbon emissions in the next issue of carbon emissions has a significant effect. Liu Xiping (2013) to build carbon dioxide emissions intensity and GDP per capita of EKC curve, and adding different variables in this model, energy consumption structure on the basis of the research on carbon emissions intensity level of economic development relationship between energy consumption structure of three different variable results show that the carbon intensity with the change of the real per capita GDP, presents the comparison of N type characteristics.

1.2. Industrial structure
On industrial structure impacts on carbon emissions, many domestic scholars have roughly the same conclusion, that is: the three major industries with the greatest impact on carbon emissions is the second industry, the least is the first industry, and the second industry for its effect is not obvious, but in the end all think that optimize the industrial structure can effectively reduce carbon emissions Xu Guangyue (2011) using the panel data to study related factors that influence the carbon emissions after analyzing all the data are decomposed, can affect the carbon emissions in the production and living of all the factors affecting output scale Industrial structure and energy consumption structure of the three most important influencing factors, and the effect of cleaning technology for reducing carbon emissions in 70 also pointed out that different parts of the influence factors of carbon emissions are not the same as hedy Wang Zheng (2013) by 1980 to 2010 in chongqing during the 31 years of energy consumption data of STIRPAT model is set up, using the method of the ridge regression fitting got a six influencing factors on carbon emissions and the multivariate linear model shi-jin wang Zhou min (2013) by distinguishing characteristics in different areas of the east Midwest in China, the construction of provincial GMM dynamic panel data model, the per capita GDP, urbanization level of industrial structure of foreign trade dependency factors such as the energy consumption structure has carried on the empirical analysis of the final out: in a different place or area, can effectively reduce carbon emissions factor is different

1.3. Energy consumption structure
Effects on the study of the energy structure of carbon emissions, for it is very important to study the utilization ratio of energy intensity of energy Zhu Qin after (2009), using the extension of the Kayak identity, economic output is established about population size 5 factors such as industrial structure influence on carbon emissions, analysis the main influence factors in the 5 factors and contribution Li Weibing (2011) using the STIRPAT model, study the influence of the energy intensity of carbon emissions, research has shown that there is a positive correlation between energy intensity and carbon, i.e., if change the energy in the energy consumption structure, can be effective in reducing carbon emissions, in a timely manner in different regions or different areas which is an effective method of reducing carbon emissions, will have a positive impact on the development of the economy.

1.4. Other factor
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2. Research on peak carbon emission prediction
Scholars at home and abroad on carbon emissions peak prediction research mainly focus on energy consumption carbon emissions peak, main methods are: scenario prediction methods, linear regression
prediction method and GM (1, 1) method, using the environmental kuznets curve (EKC curve), Kaya model, the STIRPAT model, etc., according to the energy consumption calculation of carbon emissions, according to the research of the carbon intensity of carbon emissions peak, etc.

2.1. Scenario prediction method
Scenario prediction is a method that assumes that a certain phenomenon or state will last for a long time, and then makes corresponding prediction of all the consequences that the phenomenon or state to be predicted may cause at a certain time in the future. Yue chao et al. (2010) mainly predicted the peak time of China's GDP and carbon emission intensity in 2050. The base year was 2005. In the low carbon scenario, is the best carbon emissions in China, the peak appears in 2035. Liu chao et al. (2011), using scenario prediction analysis method, based on key obstacles and China's national conditions, set a scenario prediction method based on basic, low-carbon and frustration scenarios to study how much energy China needs and how much carbon dioxide it will eventually emit into the air by 2050. Liu junjie et al. (2012) used scenario prediction method to forecast the energy demand and carbon emission from 2011 to 2020 with jiangyin county as an example to illustrate the energy demand and carbon emission trend of economically developed counties and cities in China.

2.2. Linear regression prediction method
Linear regression prediction method is to analyze whether there is a correlation between the number of objective things. If there is a one-to-one correspondence between independent variables and dependent variables, the equation can be further established for regression and further prediction. Using the linear regression method, liu jiancui (2011) predicted the energy consumption and carbon emission of China's transportation sector in the next few years based on the historical data of transportation products and its economic growth data, and calculated the potential energy saving capacity. The prediction results show that the continuous progress of technology can reduce the carbon emission and energy consumption in the transportation sector.

2.3. GM (1,1)
GM (1,1) refers to grey prediction, which is the systematic prediction of the equation with uncertain factors. This prediction methods mainly through system identification, to determine the size of the correlation between various factors, and to automatically generate the processing results of raw data, thus found changes or correlation between original data and based on this, the raw data to generate strong regularity of data, the final data before it is passed as a result, the corresponding equation, thus to predict the future trend of development. Zhao aiwen et al. (2012) made a short-term prediction of China's carbon emissions (2002-2009) by using grey prediction. The final prediction results show that the prediction accuracy is level 2, in which the mean variance ratio of correlation degree and error probability are both level 1. The error between the prediction results and the actual value is relatively small. It is predicted that China's carbon emissions will exceed 3.2 billion tons in 2015, indicating that China's carbon dioxide emission reduction target during the 12th five-year plan period is relatively severe. Lily, etc (2012) with shandong province from 2004 to 2010 the total energy consumption and energy of the structure of the related data, and combined with the grey system theory prediction model is established, the prediction results show that the shandong province in the next 10 years, once the total energy consumption is still a trend of steadily rising, average annual growth rate of 7.21%, but compared with the annual growth rate during the period of "11th five-year plan", the rising speed is slow; Shandong province still takes coal as the main energy consumption, but the consumption ratio of coal is decreasing year by year, and the consumption ratio of oil and natural gas is increasing, which also shows that Shandong province has greatly improved its energy consumption structure.

3. Conclusion
As a large developing country, China's carbon emission has become a common concern of the world. Therefore, when predicting China's future carbon emissions, corresponding policies should be adopted,
such as developing a low-carbon economy and improving energy efficiency, which will help to achieve the carbon emission reduction target in 2020.

References
[1] Xiahai Wei, Lingzheng Yu. Spatial dependence, carbon emissions and economic growth -- a reinterpretation of China's EKC hypothesis [J]. Explore, 2011, (1).
[2] Hongbing He. Empirical study on China's carbon emission kuznets curve [J]. Contemporary Economics, 2012, 11: 148-149.
[3] Xiping Liu. China's energy consumption structure, economic development level and carbon emission intensity [J]. Journal of Shijiazhuang University of Economics, 2013, 03: 43-49.
[4] Xu Guagn-yue. China’s Carbon Emission Factors and Regional Comparative Studies: Based on Provincial Panel Data [J]. Collected Essays on Finance and Economics. 2011, 02: 14-18.
[5] Rui Huang, Zheng Huang. Influencing factors of carbon emissions from energy consumptions in Chongqing based on STIRPAT model. Acta Scientiae Circumstantiae, 2013, 02: 602-608.
[6] Shijin Wang, Min Zhou. Study on regional differences of influencing factors of carbon emission in China [J]. Statistics & Decision, 2013, 12: 102-104.
[7] Qin Zhu, Xizhe Peng, Zhiming Lu, Kaiye Wu. Factors Decomposition and Empirical Analysis of Variations in Energy Carbon Emission in China [J]. Resources Science. 2009, 12: 2072-2079.