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The Hidden Strength of GGDP

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Abstract: As the only planet where human beings thrive, the earth is rich in natural resources. As countries in the world compete for development, problems such as environmental degradation and waste of resources have arisen. The purpose of this paper is to develop a grey prediction model to predict climate impacts. We look forward to providing strategies for countries and countries can develop policies to mitigate climate issues. Try not to reduce their original GDP. The calculation methods used in this study: Method I: Balanced extrapolation based on the System of Environmental-Economic Ac-counting (SEEA); Method II: Analytic hierarchy and entropy weight method predict the index of global temperature rise. Two models were built: Model I: CO_2 Emission Prediction Model; Model II: Land-Ocean Temperature Regression Analysis Model.

Keywords: Hidden; Strength; GGDP

1. Background

In recent years, the global climate is warming, the ecological environment degradation is serious and the sustainable development of all countries is also facing a great threat. If only measure a country's economic health based on algorithms that calculate current production and do not consider the sustainable development of resources and the health of the ecological environment, continue to arbitrarily deprive natural resources and break the ecological environment, the living environment of human beings will eventually be seriously damaged. It can be seen that it is more important for countries to establish the concept of green development.

2. Solution of Problem 1

2.1 The Problem Background

GGDP is an indicator of the total amount of newly created real national wealth after deducting the loss of natural assets including resources and environment. It refers to the total value of all final products and services produced by all permanent resident units in a country or region in a certain period a time without reducing the existing capital and asset level, or the sum of the added value of all permanent residential units without reducing the existing capital and asset level. So far, GGDP accounting has only covered sustainable development in the natural sense, including the cost of environmental damage and the net consumption of natural resources.

2.2 Accounting Method of GGDP

2.2.1 Method I: Balanced Extrapolation Based on the System of Environmental-Economic Accounting (SEEA)

The method of accounting for GGDP through the asset-liability accounting method is as follows:

GNDP = NDP - Non-productive Natural Assets used in Production

NDP = Gross Output - Intermediate Inputs - Loss of Fixed Assets

GGDP = GNDP + Loss of Fixed Assets

GNDP = (NE + Final Consumption + Net Capital Formation) - Net Consumption of Non-Productive Economic Assets - Downgrading and Reduction of Natural Assets

This means deducting the environmental cost from GDP. So:

GGDP = Traditional GDP - Environmental Cost

Environmental cost include resource consumption cost, environmental degradation cost and environmental maintenance cost, but the cost of environmental degradation is mainly the cost of economic losses caused by environmental pollution caused by untreated and non-compliant discharges, but this part of the data cannot be found, therefore, it is ignored.

2.3 Results

The specific calculation method is to deduct the cost of environmental resources and the cost of environmental resources protection services for the total current GDP, namely:

GGDP = Traditional GDP – Cost of Resource Reduction – Cost of Environmental Maintenance

3. Solution of Problem 2

3.1 Method II: Analytic hierarchy and entropy weight method

● Collected from the A-AO and A-BP websites to 2009 worldwide, CH_4, CO_2, CO, N_2O, SF_6 five greenhouse gas data.

● Averaging--Fill in the judgment matrix--Build a subjective evaluation matrix.

● The weights of these greenhouse gases were analyzed using analytic hierarchy and entropy weights.

The weight calculation results of the analytic hierarchy method (square root method) show that the weight of SF_6 is 3.429%, the weight of CO is 6.865%, the weight of N_2O is 12.796%, the weight of CO_2 is 18.059%, and the weight of CH_4 is 58.851%.

● Use the consistency test to determine whether the constructed judgment matrix has logic errors, and if it fails, the judgment matrix needs to be reconstructed.

The calculation results of the analytic hierarchy method show that the maximum feature root is 5.294, and the corresponding RI value is 1.11 according to the RI table, so $CR = CI / RI = 0.066 < 0.1$, which passes the one-time test.

Further define the predictors

Through analytic hierarchy, methane is the most influential greenhouse gas, but according to data published by the IPCC, CH_4 GWP is 21 times that of CO_2, making it the second largest greenhouse gas after CO_2.

a) The total amount of CH_4 is not as high as CO_2 emissions even if converted into 21 times that of CO_2.

b) CH_4 does not last as long in the atmosphere as CO_2.

c) The production of CH_4 mainly comes from coal, oil and gas systems, ruminants, etc., which is relatively scattered, difficult to centrally treat, and the cost of treatment is high.

However, countries are working very CH_4 governance, the United States has proposed a CH_4 control plan, and China is also following up with China's CH_4 control goals.

In summary, CO_2 is the most controllable factor affecting greenhouse gases, so CO_2 is used as a predictor of climate change.

3.2 Model I: Gray Predictive Model

In order to explore the trend of global carbon dioxide emissions and the trend of global warming before the adoption of GGDP, a forecast model is adopted [2][3]:

● The grey prediction is made through the global carbon dioxide emissions during 1959-2022 [4]:

Before establishing the gray prediction model GM (1,1), the time series is tested for the time series (because there are too many data and the table is too long, it will not be specifically shown in the article), if all the rank ratio values are located in the interval $(e^{(-2/(n+1)}, e^{(2/n+1)})$, the data is suitable for model construction. If the cascade test is not passed, the sequence is "translated transformed" so that the sequence after the translation transformation satisfies the cascade ratio test. From the data analysis in the table, it can be found that all the step ratios of the translated series are located in the interval (0.997, 1.003), indicating that the series after the translation transformation is suitable for constructing a gray prediction model.

● Build a gray prediction model

If the posterior difference ratio C< 0.35, the model accuracy is high. The analysis in the above table 2 shows that C = 0.02, so the model accuracy is high.

● Fit the gray prediction model (there is more tabular data which is not shown in detail in this article)

Under normal circumstances, Normally, if the relative error value is less than 20%, the fitting is good. The average relative error of this model is 0.958%, which means that the model fitting effect is good.

It can be seen that carbon dioxide emissions continue to rise. If effective measures are not taken, CO_2 emissions will continue to rise in the coming year. A greenhouse effect will result, leading to higher temperatures and eventually changes in the global climate. This series of phenomena will have an unpredictable impact on the economy and the environment.

3.3 Model II: Exponential Regression Analysis Model

An exponential regression analysis was carried out on the changes of land and ocean temperature indexes for consecutive 30 years from 1992 to 2021. Plot the regression curve and find the regression equation: $y = 0.35e^{0.04x}$, y represents temperature, x false represents the growth of the year.

The global land and ocean temperature is still in a clear upward trend. Sum up, the climate problem is already a very serious problem in today's society and according to the forecast, GDP will continue to be used as a measurement indicator and the climate problem will further worsen in the future. Undoubtedly, this will inevitably bring unstable factors to society, hinder the positive development of society and break the healthy life of human beings.

4. Solution of Problem 3

4.1 The Value of GGDP

The biggest feature of GGDP is to reduce environmental damage and achieve sustainable development, but GGDP will have more costs, such as the cost of protection after environmental degradation, the cost of natural resource consumption, which will cause significant changes in the final GDP. So if want to achieve sustainable development and improve the economy as much as possible, there are some solutions. Figure 5 below, in the plan, industries with large consumption of natural resources and serious environmental degradation are appropriately reduced and then appropriate investment in other "green" industries to obtain benefits, such as the use of new energy to replace fossil energy. Of course, the economy is not only about counting money, just as the big family pursues a better and happy life, it also includes culture, fashion, spiritual life and many other aspects, and investing in the cultural tourism industry is also a good choice. Change policy and transform the economy so that the GGDP is eventually greater than, equal to or slightly below GDP. Then this is conducive to achieving sustainable development on the basis of stable economic development. Therefore, this transformation is worthwhile on a global scale.

4.2 Potential Strengths and Weaknesses

4.2.1 Potential strengths

Control the disruption of the environment. Because environmental damage can cause many serious problems, such as climate change, this problem will bring a lot of hidden dangers. Climate warming will have an impact on the layout and structure of agricultural production and planting system, resulting in shortened crop growth cycles, changes in pest and disease species, and increased agricultural water consumption and pesticide application rates, resulting in a significant increase in agricultural costs and investment. In addition, extreme weather events such as floods, droughts, storms and heat waves caused by climate warming may increase the mortality and disability rates of certain diseases and the incidence of infectious diseases. This series of problems will affect human health and normal life, and even endanger human life.

Achieve sustainable development. Sustainable development is originally for resources, ecology, environment, and the earth's natural resources are the material basis for human survival, only by saving resources, protecting the environment, and actively changing the concept of development and the mode of GDP growth , the path of sustainable development can be realized.

4.2.2 Potential weaknesses

The investment cost of new industries is high. If want to develop a new industry, e detailed planning and budgeting must be made2wq, which is not only time-consuming requires developed technology for research, but also requires large investment in the establishment of industrial projects.

5. Concluding words

Vigorously developing the green economy will not only help Chinese economy get out of the trough under the background of the international financial crisis, but also cultivate a number of new economic growth points and enhance the momentum of Chinese economic development. Under a series of constraints such as population, environmental capacity, and energy resources, only by developing a green economy can China solve the resource and environmental "bottleneck" of economic and social development. Therefore, the adoption of GGDP is very beneficial for China.

References:

[1]Shifu Cheng, Liu Qian. Green GDP accounting and authentication [J]. Journal of statistics and decision, 2010, No. 324 (24): 7-10. DOI: 10.13546 /j.cnki.tjyjc.2010.24.027.

[2]Julong Deng. Grey Prediction and Grey Decision [M]. Wuhan: Huazhong University of Science and Technology Press,2002.

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