

# Big Data Demonstration of "Lucid Waters and Lush Mountains are Invaluable Assets"

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**Abstract.** President Xi Jinping's "lucid waters and lush mountains are invaluable assets" theory has been scientifically demonstrated on the basis of the research method of big data in this paper. Since President Xi Jinping advanced this theory, academic circles have done a lot of studies. However, it is dominated by theoretical research and lacks data verification. Based on untangling the environmental role in promoting economic growth, this paper uses the 1044 sample data of the WDI database establish a panel data model for comprehensive research. It is concluded that the environment has a significant positive effect on economic growth in the long run. The scientific thesis of "lucid waters and lush mountains are invaluable assets" can obtain demonstration and support of big data.

**Keywords:** big data, lucid waters and lush mountains are invaluable assets.

## 1. Introduction

### 1.1 Research Background

Contemporary Chinese economy is developing rapidly, and people's living standards are getting higher and higher. As people's material life becomes more and more abundant, people's requirements for the environment are increasing. As a newly emerging market economy country, because China's ecological protection awareness was weak in the early stage, it causes serious environmental pollution problems at present. At present, China faces the same economic pollution problems as the old developed countries, such as Britain and the United States. How to improve the ecological environment while minimizing the loss of economic development and realize the situation of common development of economy and environment have become the main goal and challenge of China's development at present. As early as August 2005, Comrade Xi Jinping, the Secretary of the Guangdong Provincial Committee, advanced the scientific thesis: "lucid waters and lush mountains are invaluable assets" when investigated in Anji, Huzhou, Zhejiang. On October 18, 2017, Comrade Xi Jinping pointed out in the report of the 19th National Congress of the Communist Party of China, adhere to the harmonious coexistence of man and nature, we must establish and practice the idea: lucid waters and lush mountains are invaluable assets, and adhere to the basic national policy of saving resources and protecting environment. The "lucid waters and lush mountains are invaluable assets" this great thesis is an important idea that guides China's ecological civilization construction at present.

### 1.2 Literature Review

Many scholars have studied "lucid waters and lush mountains are invaluable assets". Wang Hui et al. advanced three types of relationships between "lucid waters and lush mountains" and "invaluable assets", and demonstrated them with economics theory, and demonstrated the four present situations of "lucid waters and lush mountains are invaluable assets"[1]. Qiu Xieying proposed that with the continuous development and progress of human society, human understanding for "lucid waters and lush mountains" and "invaluable assets" have relatively distinct stage characteristics in different stages, which can be divided into three stages:

First, excessive crushing destroys the ecological environment in exchange for economic benefits; second, protects the ecological environment while developing the economy; third, discovers the ecological environment's role in promoting the economy, so that "green mountains and green

mountains are golden mountains and silver mountains" [2]. Li Weijun proposed that reform and opening up have brought rapid economic development to China, but rapid industrialization has also caused China's ecological environment to deteriorate more seriously. China is facing the same environmental problems as in the early years of Britain, the United States, and Japan. Therefore, China should learn from other countries Lessons and experience, solve problems early and complete challenges [3]. Yu Jian proposed that because people not only demand the quality of the natural environment, but also the quality of the social environment, First, excessively exploiting and damaging the ecological environment in exchange for economic benefits; second, protecting the ecological environment while developing the economy; third, discovering the promotion role of ecological environment in the economy, so that obtain "lucid waters and lush mountains are invaluable assets"[2]. Li Weijun proposed that reform and opening up bring rapid economic development to China, but rapid industrialization has also caused China's ecological environment to be deteriorated more seriously, China is facing the same environmental problems as Britain, the United States, and Japan at early stage, therefore, China should learn from lessons and experiences of other countries, solve problems soon and complete challenges [3]. Yu Jian proposed that because people not only demand the quality of the natural environment, but also the quality of the social environment, therefore, the requirements in these two aspects are the basis for the analysis of environmental and economic benefits of governance measures, and people's requirements can be specifically expressed as economic benefits, environmental benefits, and social benefits, therefore, these three benefits should be used as criteria for analysis and evaluation when analyzing the economic development of enterprises[4]. Wu Xiao et al. proposed that facing increasingly serious ecological and environmental pollution problems, improving the production process of enterprises can alleviate the pressure of economic production on the environment while taking into account enterprise value and social benefits. Therefore, China should improve the production process, integrate environmental protection idea into the production process of the enterprise, and reduce the "three wastes" produced by factory production by improving the production process, so as to achieve the balance between enterprise value and environmental benefits [5].

Although there are many researches in academia at present, there is a common shortcoming; it is the lack of data support and demonstration. This paper aims at make up for this shortcoming and uses big data analysis method prove the scientific of this thesis. The concept of "big data" originated in this century; it requires a new processing model to have stronger decision-making power, insight and process optimization capabilities to adapt to massive, high-growth and diverse information assets, it doesn't use shortcuts like random analysis, and all data are analyzed and processed, it is a data processing method that integrates a large amount of data information for centralized processing. This paper uses big data processing method demonstrates the positive effects of environmental factors on economic growth, and provides evidence and support for the scientific thesis of "lucid waters and lush mountains are invaluable assets."

## **2. Theoretical Basis for Big Data Demonstration**

It is necessary to establish data model for demonstrating "lucid waters and lush mountains are invaluable assets," first of all, the theoretical relationship between environmental factors and economic growth needs to be sorted out in theory. Environmental factors have a negative impact on economic growth in the short term, but environmental factors have a positive effect on economic growth in the long term.

### **2.1 Short-term Negative Impact of Environmental Factors on Economic Growth**

Environmental factors have a negative impact on economic growth in the short term, it is because environmental governance need to pay economic price, namely there is cost for environmental governance. The first is public cost; it is mainly the infrastructure construction and labor input by the government in order to govern the environment, mainly cleaning staff and environmental governance researchers. The second is production costs, environmental protection

requires investment for enterprises, on the one hand, they need purchase and construct pollution treatment equipment, on the other hand, they need to hire experts and developers to improve green and low-carbon production technology and check on strictly production. The last is the cost of living, it mainly means that in order to govern the environment, residents have to use new energy with low environmental consumption and face energy equipment upgrades; they have to change their travel styles, and even become ecological immigrants, result in economic and non-economic cost.

## **2.2 Long-term Positive Promotion of Environmental Factors on Economic Growth**

In the long run, the positive effects of environmental governance will gradually appear, and it will have many direct and indirect effects on the economy.

### **2.2.1 Direct Economic Benefits.**

First of all, the quality improvement of various environmental factors will greatly increase the output of corresponding natural resources and thus increasing its benefits: the improvement of soil quality will promote the increase of crop yields; the improvement of water quality will increase the output of fishery industries; a good ecological environment will promote the development of tourism service industry, thus providing a large number of jobs, thereby accelerating the process of industrial upgrading and transformation; the quality improvement of environmental resources will attract more foreign investment, increase local production scale, and promote local economic development. These items are directly related to the GDP level, so the benefits brought by environmental governance have a huge contribution to GDP growth.

### **2.2.2 Indirect Economic Benefits.**

The benefits of controlling pollution will be reflected in the improvement of atmosphere, water, soil and vegetation, as well as the use of urban regenerative water, the harmless treatment of urban domestic waste, and the improvement of rural water treatment. These will provide indirect support for economic development. The ecological improvement brought by environmental governance will also bring social benefits; it is reflected in the significant improvement in the quality of life and social welfare of residents, it is reflected in the reduction of infectious disease incidence and mortality. The improvement of human capital will undoubtedly provide indirect guarantees for economic development.

## **3. Big Data Demonstration of Relationship between Environmental Factors and Economic Growth**

### **3.1 The Selection of Database**

This paper establishes a big data model and intends to use big data samples of developed capitalist countries. Because China's economic development and environmental governance started relatively late, while developed capitalist countries have gone through decades or even hundreds of years of related development, their historical data is relatively stable, and it has good prediction and enlightenment effect for the development of China's future data. In view of this, this paper selects WDI international database data.

Data URL: <http://datatopics.worldbank.org/world-development-indicators/>.

### **3.2 The Selection of Variables and Samples**

This model selects the general variable of economic growth GDP as the explanatory variable. Two explanatory variables of environmental factors are selected, one is CO<sub>2</sub> emissions and the other is forest coverage. In order to exclude the influence of other factors, the model also needs to select control variables. According to the Cobb-Douglas production function, the three factors affecting the economy are mainly capital, labor and technology. Therefore, this model uses three control variables: the non-financial investment, the quantity of labor force, and the scientific and

technological research and development investment. The dimension unit of each variable and the code in the model are shown in the following table.

Table 1. The dimension unit of each variable and the code in the model

variable	Unit	code
GDP	USD, price in 2019	gdp
CO <sub>2</sub> emission	ton	co2
forest coverage	%	fore
non-financial investment	USD, price in 2019	cap
quantity of labor force	Human	lab
scientific and technological research and development investment	USD, price in 2019	rd

In sample selection, the horizontal samples select six representative developed countries: the United States, the United Kingdom, Japan, France, Germany, and Canada. Vertically, totally 29 years of data from 1990 to 2018 are selected, and data nearly 30 years are selected, because they have modern significance, and the sample size is also large enough, which meets the basic assumptions of long-term impact and also meets the conditions for large sample estimation.

Overall speaking, this data model uses a total of 1044 ( $1044 = 6 \times 6 \times 29$ ) sample data from the WDI database.

### 3.3 Data Processing and Model Estimation of Panel Data

#### 3.3.1 Data Processing

First, the missing data of individual countries and years are supplemented, because the macro variables have typical trends, the way of 5-year movement average is used for calculation and supplementation. Second, the data is standardized. Because the units and dimension gap of each explanatory variable, explained variable and the control variable are large, the data is slightly variable, and therefore, the variable data removes dimensional standard, the processing method is: standardized variable = (raw variable – mean) / standard deviation.

#### 3.3.2 Model Estimation of Panel Data

Because the data structure belongs to two-dimensional panel data, the regression model of panel data is established with year and country two dimensions, and estimates the impact of environmental factors on economic growth. The estimation results of panel model are as follows:

Table 2. The estimation results of panel model

Source	SS	df	MS	Number of obs	=	126
Model	124.78471	5	24.9569419	F(5, 120)	=	594.46
Residual	5.03787983	120	.041982332	Prob > F	=	0.0000
				R-squared	=	0.9612
				Adj R-squared	=	0.9596
Total	129.822589	125	1.03858071	Root MSE	=	.2049
gdp_std	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
cap_std	-.5137138	.0577846	-8.89	0.000	-.6281234	-.3993043
lab_std	2.88987	.1973551	14.64	0.000	2.499121	3.280619
rd_std	-.3486091	.0541155	-6.44	0.000	-.4557541	-.2414641
fore_std	.4399524	.0647547	6.79	0.000	.3117426	.5681623
co2_std	-1.805044	.1824354	-9.89	0.000	-2.166253	-1.443834
_cons	.0542747	.0183622	2.96	0.004	.0179187	.0906306

## 4. Test and Explanation of Data Model

### 4.1 Model Test

The P value of the F test is 0.0000, it shows that the model linearity test passed.

The t-test, the p-value of the t-test for the two key variables (fore\_std and co2\_std) are both 0.0000, it shows that the two variables "CO<sub>2</sub> emissions" and "forest coverage" have significant effects on economic growth.

The model  $R^2 = 96.12\%$ , it shows that the model's interpretability to reality is as high as 96.12%.

### 4.2 Data Model Explanation

According to the estimation results of the model, the source of economic growth can be expressed by the following formula:

$$\text{GDP} = 0.05 + 0.44 \times \text{forest coverage} - 1.81 \times \text{CO}_2 \text{ emissions} - 0.51 \times \text{non-financial investment} + 2.88 \times \text{quantity of labor force} - 0.35 \times \text{science and technology R\&D investment} + \text{accident}$$

The key explanatory variables can be explained as follows:

(1) When forest coverage increases by a standardized unit, economic GDP will increase by 0.44 standardized units.

(2) When CO<sub>2</sub> emissions decrease by one standardized unit, economic GDP will increase by 1.81 standardized units.

The results of big data model strongly prove that the improvements of environmental factors (increased forest coverage and decreased CO<sub>2</sub> emissions) are conducive to GDP growth. Therefore, the improvement of environmental factors has a significant role in promoting economic growth, so the thesis "lucid waters and lush mountains are invaluable assets" can be supported by big data.

## 5. Conclusion

From the economic and environmental ecological perspective, "lucid waters and lush mountains are invaluable assets" is an important idea guiding the construction of ecological civilization in China. Through the demonstration of big data panel model, this paper can conclude that although there are economic costs in the short term, environmental governance will play a role in promoting economic growth in the long term. The historical data of the developed capitalist countries tell us: the environment and economic growth, the two are interrelated and interdependent, mutually beneficial and win-win. Facing "lucid waters and lush mountains" and "invaluable assets", what we need to do is not to choose, but make progress together, because we can conclude that: lucid waters and lush mountains are invaluable assets.

As a developing country, China still has a long way to walk in the process of environmental protection and governance. However, under the guidance of President Xi Jinping's idea "lucid waters and lush mountains are invaluable assets," as long as we reasonably use every social resource, every citizen bears his own responsibility, the environmental problems that persecute our country will certainly be rationally solved.

## References

- [1]. Wang Hui, Chen Jiancheng, Jiang Lei, Jiang Xuemei. Research on the Economic Interpretation and Practical Modes of "Green Hills are just Golden Hills"[J]. Forestry Economics, 2018, 40 (01): 3-8 +43.
- [2]. Qiu Xieying. Lead New Action with "Lucid Waters and Lush Mountains Are Invaluable Assets" Idea[J]. Environmental Protection 2017, 45 (23): 7.

- [3]. Li Weijun. Comparative Study of Environmental Governance in the United States, Japan and Britain and Its Implications for China[D]. Fudan University, 2008.
- [4]. Yu Jian. Exploration of Environmental and Economic Benefit Analysis Methods of Pollution Treatment Facilities[J]. Environmental Protection of Chemical Industry, 1986 (05): 297-299 + 302.
- [5]. Wu Xiao, Xu Jing. Improved Process Make Environmental Governance Has Both Social Benefits And Enterprise Value[J]. 2015 Coking Industry Energy Conservation And Emission Reduction and CDQ Technology Exchange Meeting, 2015, 7.
- [6]. Haifeng Tian, Kai Li, Guangsheng Sun. Research on the Operation Model of Environmental Value Chain Based on Transaction Cost Theory, E-Business and E-Government (ICEE), 2011 International Conference on.
- [7]. British Council. Integrated Control Implemented by UNEP[J]. World Environment, 1997 (01): 12.
- [8]. Derek M. Elsom. Development and Implementation of Strategic Frameworks for Air Quality Management in the UK and the European Community[J]. Journal of Environmental Planning and Management, 1999, 42 (1).