

# Research on Development Strategy of Heilongjiang Real Economy Based on Big Data and Game Theory

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**Abstract.** The real economy is a solid economic foundation on which social progress depends. The research on the strategy of developing the real economy has become a hot topic nowadays. This paper first analyzes the present situation of macroeconomic data in Heilongjiang Province, explains the game relationship between government, colleges and universities and enterprises in detail, and makes use of big data and game theory to make strategic choices to revitalize the real economy. Taking the research on the development strategy of the real economy in Heilongjiang Province as an example, we should give full play to the pioneering role of scientific research pioneers in higher education institutions in Heilongjiang Province to improve the overall university level in Heilongjiang Province, promote the coordinated and steady development of higher education, enhance the transformation of scientific and technological achievements, create new economic growth points and create Heilongjiang new trend of real economy.

## Introduction

The real economy refers to the economic activities that people create on Earth through the use of tools of thought, including the production and circulation of material and spiritual products and services. Including the production and service sectors of agriculture, industry, transportation and communications, commercial services, construction and cultural industries, as well as the production and service sectors of spiritual products such as education, culture, knowledge, information, arts and sports [1].

In recent years, there are many documents published by some researchers on how to show the real economy. For example, based on the macroeconomic data of Heilongjiang Province from 1985 to 2013, Zhang Yunhui et al. [2] adopted the extended Cobb-Douglas production function and the Educational Composite Index, Analyzes the contribution of education to the national income growth of Heilongjiang Province. The study shows that the contribution rate of education to economic growth is much lower than the contribution rate of capital and labor to economic growth. The economic growth of Heilongjiang Province in these years mainly depends on the pulling of fixed capital investment. The foundation of internet finance is to support the real economy, develop inclusive finance and serve more small and micro enterprises. Ref.[3] perfected the access mechanism, credit system and supervision mechanism of Internet financial markets, rationally guided the flow of funds to the real economy and strengthened the deep cooperation with traditional banks. Ref.[4] analyzed the plight of the development of the real economy under the current "new normal" in China and explored the corresponding strategies for resolving the situation. Ref. [5] analyzed the dilemmas facing the real economy and gave some suggestions Measures, Ref. [6] conducted a strategic analysis of China's real economy and development issues, Ref. [7] for the real economy can not be separated from financial services, financial services for the development of the real economy is facing the dilemma given recommendations. Combined with the above research, this paper presents a strategy based on big data and game theory to study the development of real economy in Heilongjiang Province.

## Current Situation of Economic Data in Heilongjiang Province

At present, the economy of our country shows a trend of more advanced forms and more complicated division of labor. In the first half of 2017, the GDP of Heilongjiang Province hit 610.8 billion yuan, an increase of 6.3% over the same period of last year and an increase of 0.6 percentage points from the same period of last year. This is the best level since 2014. The growth rate of the primary and tertiary industries in Heilongjiang Province continued to be higher than the national average. The growth rate of the primary industry was 5.1%, 1.6 percentage points higher than the national average. The tertiary industry increased by 8.6%, 0.9 percentage points higher than the national average. The secondary industry increased by 2.4%, lower than the national 4.0 percentage point. In the first half of 2017, the total consumer price index (CPI) of Heilongjiang Province rose by 0.7% over the same period of previous year, an increase of 0.7 percentage point below the national average of 1.4% and a year-on-year decrease of 1.0 percentage point. Ex-factory prices of industrial producers in the province rose 11.9%, an increase of 21.0% over the same period of last year. Among them, the production of extractives went up by 44.8% and the means of production of raw materials went up by 16.3%.

## Game Analysis between Economic Entities

### 1、 the game participants and the external environment

In order to better transform the world, use knowledge and technology to better develop the economy and promote social progress, there is an inextricable link between external environmental factors and entities. First, we must consider the physical environment and the relationships among them, including the industries, industries, governments, universities and research institutes. The other side takes into account the social environment, including the economic, cultural, political and legal environments. When it comes to institutional mechanisms or technical standards, industry enterprises and universities, research institutes play a role in driving and promoting policies. The government is not just the policy maker, but also the system designer. A government needs to create and promote an enabling environment for technical support, including policies and procedures, financial systems and support systems. The government also provides standards and norms to enterprises, and it also supports the construction and development of universities and research institutes. This is a key part of the system. Industry enterprises and universities, research institutes to cooperate, through technical support and cooperation to promote industrial innovation. Universities and research institutes can also provide the society and enterprises with the necessary talent pool.

### 2、 the game between the government and enterprises

Assume that under the condition of complete information, both the government and the enterprise are rational. According to their own conditions, enterprises will choose whether to upgrade their technology and reduce production costs. Suppose the cost of enterprise upgrading is  $a$ , and the added value of revenue is  $b$ . When  $b > a$ , Upgrade; when the value added after the upgrade transformation is negative ( $b < a$ ), companies will give up upgrading. When the government support cost is  $c$ , the social welfare brought is  $d$ . When  $dc > 0$ , that is, the social welfare is greater than the cost, the government chooses to support the enterprises to upgrade. When the social welfare is less than the cost, the government will not support the enterprises Funding.

### 3、 the government and the game between universities

Assume that under the condition of complete information, the government and universities are all rational. According to social needs and research conditions, colleges and universities will choose whether to focus on the construction of certain subject specialty, assuming that the cost of professional construction in colleges and universities cost  $a$ , talent training and social services to increase the value of  $b$ ,  $b > a$ , After the professional construction, the income will increase, and the colleges and universities will choose to carry out the professional construction. When the value added of the specialized construction is negative ( $b < a$ ), the colleges and universities will abandon the professional construction. The government subsidizes colleges and universities for professional

construction when  $dc > 0$ , that is, the social welfare is greater than the subsidized cost. When the social welfare is less than the subsidized cost, the government will not be funded to support colleges and universities.

### **Strategy Analysis of Real Economy in Heilongjiang Province**

1. Optimize the industrial structure, innovation system and mechanism to enhance competitiveness. Give full attention to and utilize the resources of higher education, and actively carry out key technology research, new product development, construction of enterprise technical centers, industry-university-research cooperation, enterprise informatization and high-tech industrialization. As of September 2017, there are 2728 state-owned enterprises in Heilongjiang Province, mainly in the coal, pharmaceutical, machinery, forestry, construction, transportation, storage and social service industries. Among them, 71 large-scale state-owned enterprises, assets and revenues accounted for 60% of the province. The rest are 2657 small and medium-sized state-owned enterprises, with total assets and income accounting for about 40% of the province. In terms of the number of enterprises, 84% are small state-owned enterprises with 2291 households. They are widely distributed with less assets per household and many enterprises have existed in name only. As can be seen, 2.6% of large state-owned enterprises, assets and revenues accounted for 60%, prominent structural contradictions, heavy chemical industry obvious characteristics, the overall level of industry is not high. We should give full play to the radiation role of large state-owned enterprises, adjust and optimize the industrial structure, improve the quality of resource conversion, focus on marketing, strengthen cooperation with capital markets and enhance the core competitiveness of enterprises. With intelligent manufacturing as the main direction, vigorously rejuvenate the real economy, and building a system of advanced equipment manufacturing, resource intensive processing, strategic emerging industries and modern service industries as the backbone, small, medium and large-sized and micro enterprises coordinated development, integration of civil and military innovation and development, new technologies, New products, new formats and new models, and strive to build a strong industrial province, we must improve the quality of the supply system as the main direction, significantly enhance the economic advantages of our province, rejuvenate the old industrial bases and build a well-to-do society in an all-round way Society laid a solid foundation.

2. Focus on building first-class universities and first-class disciplines, continue to cultivate high-level innovative talents, to achieve technology accumulation and talent pool. The province has 81 colleges and universities, 724 research institutes, more than 800,000 professional and technical personnel, 41 academicians of the two academies, nearly 1 million technical workers and outstanding entrepreneurs supporting the development of the manufacturing industry, which can provide the province's manufacturing industry Provide important personnel protection. Optimizing the environment for innovation not only promotes the innovative investment of governments, universities, research institutions and enterprises, but also raises the innovative enthusiasm of R & D personnel. It also promotes the reform of higher education, fosters more innovative talents and shapes the new advantages of human resources in our country. On September 21, 2017, the Ministry of Education, the Ministry of Finance and the National Development and Reform Commission printed and dispatched a circular on the publication of a list of world-class universities and first-class disciplines for the construction of universities and construction disciplines. One university in Heilongjiang was selected as a top-tier university for the construction of universities and three universities Selected first-class discipline construction colleges and universities. During the construction of first-class universities and first-class disciplines, the government and the Department of Education should formulate subsidy and introduction policies to attract young innovative talents to stay and bring in. Give full play to the role of radiation to promote the overall level of colleges and universities in Heilongjiang Province, promote the coordinated and steady development of higher education. Enhance the transformation of scientific and technological achievements and form a new point of economic growth.

3. Deepen financial reform and enhance financial services to the real economy. In Heilongjiang Province, a total of more than 370 banks, including state-owned banks, small and medium-sized stock banks, rural banks and private banks, provided the necessary financial support for the real economy. For emerging industries should increase financial support, through the innovation of financial products, the use of big data, cloud computing, improve the overall financial services. The state-owned banks, small and medium-sized stock banks, rural banks and private banks should be given the full complementarity to enhance the supply efficiency of funds and reduce the supply costs. In the process of industrial restructuring, mergers and acquisitions should give full play to the capabilities and advantages of financial services in real economy, improve the efficiency of capital supply and resource allocation, optimize the supply structure, promote the transformation and upgrading of old kinetic energy, and promote the development of new industries. .

## Conclusions

Through the analysis of the economic status quo in our province, the game analysis of universities, enterprises and governments, the strategy for the dilemma of economic development in Heilongjiang Province is put forward to ensure the stable development of the real economy. We should effectively promote the long-term development of the real economy and further promote the effective development of our national economy by innovating the institutional mechanisms, enhancing the cooperation among industries, universities and research institutes, reforming financial institutions, building industrial clusters and developing high-tech industries.

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