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Influencing Factors and Dynamic Mechanism of Industrial Structure from the Perspective of Supply-side Reform

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Abstract The supply-side reform is an important measure for the high-quality development of China's economy in the new era. The purpose of this paper is to explore the mechanism and influence of technological progress, human capital, consumption demand, resource endowment and government intervention on the adjustment and upgrading of industrial structure, and to deepen the understanding of supply-side reform.

Key words Supply-side reform, Industrial structure, Influencing factors, Dynamic mechanism

1 Introduction

Since reform and opening up, China's economy has developed healthily and steadily over a long period of time, and its comprehensive national strength and people's living standards have improved significantly. However, with the sharp reduction of the demographic dividend, the accumulation of the risks of the "middle-income trap" and the profound adjustment of the international economic structure, since 2010, China's economic growth has gradually slowed down and entered the new normal of economic development. The growth rate of the economy as a whole has shown a downward trend. Since General Secretary Xi Jinping stressed the need to focus on supply-side structural reform at the 11th Meeting of the Central Leading Group on Financial and Economic Work in November 2015, "supply-side reform" has become a hot word in China's economy. The purpose of this paper is to analyze the five factors affecting the adjustment and upgrading of industrial structure, and to deepen the understanding of supply-side reform.

2 Five influencing factors

2.1 Mechanism and influence of technological progress

2.1.1 Mechanism. Cobb-Douglas function is as follows:

$$Y = AL^\alpha K^\beta, \alpha + \beta = 1 \quad (1)$$

It can be seen that the factors affecting economic growth are labor, capital input and so on. This formula is based on the assumption that the technical conditions remain the same. The time variable is introduced to measure the role of technological progress in economic growth, in the form of:

$$Y = AL^\alpha K^\beta e^{\delta t} \quad (2)$$

where Y is the output, L is the labor factor input, K is the capital factor input, t is the time variable, α and β are the parameters, A is the transformation coefficient, and δ is the annual technical progress rate.

Technological progress mainly affects the industrial structure from two aspects. First, it is to transform and optimize weak or

traditional industries through technological progress and innovation, so as to achieve industrial upgrading and the formation of new industries on this basis. Second, it makes use of technological progress and innovation to change the demand structure of the current market, the supply of labor force, the consumption structure of the market, and the current pattern of trade (Fig. 1).

2.1.2 The influence of technological progress on industrial structure. (i) Direct influence. Technological progress and innovation has changed the efficiency of producers, production technology, and production equipment, so that the original products have undergone earth-shaking changes, and are even replaced by new products. Taking agriculture as an example, the development of industry and modern science and technology has transformed the originally purely manual agriculture into mechanized agriculture, thus substantially changing the traditional agriculture. At the same time, there are also a growing number of genetically modified agricultural products. Technological progress and innovation does not blindly require us to study new technological industries so that the traditional industry will disappear, but both should be taken into account.

(ii) Indirect influence. If there is no market demand, then the industrial structure will disappear. The demand structure is largely restricted and promoted by technological progress, and there is an interaction between demand and technological progress. If the development of technology can not meet the needs of the public, then the relevant industries will not appear. On the contrary, the stimulation of demand is realized by the breakthrough of technology, which makes new industries come into being and develop. The updating of technology can improve labor productivity and the quality of human resources, and can also make the division of labor much finer and more professional. Then the surplus labor force will increase and its transfer will also become faster, thus acting on the industrial structure. Technological progress and innovation can also promote the development of trade. For example, with the development of information technology, the way of consumption has changed greatly, and the way of management has become more and more standardized and intensive. The industrial structure has also changed.

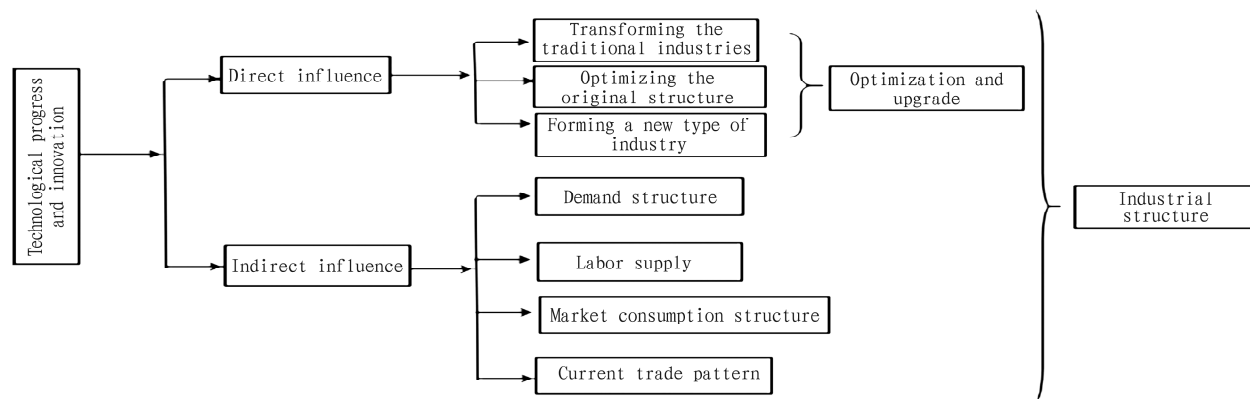


Fig. 1 Technological mechanism

2.2 Mechanism and influence of human capital

2.2.1 Mechanism. Humans are the foundation of all things, and the industrial structure is no exception. The development and optimization of industry can not be separated from the quantity and quality requirements of humans. The level of human capital plays an important role in every aspect of a country, especially in the development of economy. As a factor of production, human capital has its unique characteristics, such as substitutability, reproducibility, and cultivability. These characteristics determine that it plays a vital role in the upgrading of traditional industries, the development of existing industries and the germination of new industries. The adjustment of industrial structure has higher demand on the innovation of technology, management, system and organization. In this process, the level of human capital is not necessarily in line with it. Therefore, the readjustment of the industrial structure should be carried out on the basis of human, starting from the foundation.

2.2.2 The influence of human capital on industrial structure. China's investment in education is far from enough, especially in economically underdeveloped areas. In addition, China has a large population base, so the quality of our human capital will decline. The low quality of human capital will lead to the devia-

tion of policy decision, the lack of economic knowledge of the top management staff of the enterprise, and the lack of their own quality. They often fail to take a long-term view when allocating resources.

(i) Comparison of the ratio of public expenditure on education to gross national product (GNP) in the major countries of the world. The cultivation of human capital mainly depends on education, which is greatly influenced by a country's investment in education. From Table 1, we can see that there is a big gap between the investment of China in education and that of both developed and developing countries. The proportion of investment in education in China is relatively small. The vertical comparison shows that the investment in education in China is increasing year by year, but there is still a certain distance from the world average level. Public expenditure on education accounted for 3.5% of gross national product in 2013. In the developing countries, such as Thailand and Poland, it accounted for 7.1% and 5.2%, respectively; in the developed countries, it was 5.4% for the United States and 6.2% for the United Kingdom. Through the above analysis, it shows that the investment in education in China is still at a relatively low level in the case of rising year by year, which has a restricting effect on the cultivation of human capital.

Table 1 The ratio of public expenditure on education to gross national product in the major countries of the world (%)

Countries	2000	2005	2013	Countries	2000	2005	2013
China	3.93	4.46	5.36	Germany	4.5	4.5	5.1
Japan	3.70	3.50	3.90	Thailand	5.4	4.2	7.1
Britain	4.50	4.50	6.20	Turkey	2.6	3.1	-
America	5.00	5.10	5.40	India	4.4	3.1	3.3
Malaysia	6.00	7.50	5.90	Singapore	3.4	3.3	3.2
Poland	5.00	5.50	5.20	Argentina	4.6	3.8	6.3
Canada	5.60	4.90	5.40	Israel	6.5	6.1	5.6

Data source: *International Statistical Yearbook* 2016.

(ii) International comparison of level of education. The quality of a country's human capital depends on the level of education and the two are in direct proportion. Some data show that the level of education of employees in China is still mainly at the junior high school level, while in other developed countries, the proportion of people receiving higher education is large. As can be seen from Table 2, the gross enrollment rate of universities was 29.7% in 2013, the gross enrollment rate of secondary schools was 92.4% and

the gross enrollment rate of primary schools was 126.4%. This data shows that the universal access to basic education has reached a high level, and the ratio of higher education is also rising year by year, but there is still a large gap compared with other countries. The gross enrollment rate for higher education in developing countries is 71.6% in Poland, 89.1% in the United States and 66.5% in Israel. This indicator in our country is significantly different from that of other countries. From the above analysis, we can see that the

proportion of people receiving higher education in China is small, which will lead to the low overall quality of human resources in

China and low employment level, thus affecting the upgrading and optimization of industrial structure.

Table 2 International comparison of gross enrollment rate for higher education, secondary education and primary education in different years (%)

Countries	Gross enrollment rate for higher education		Gross enrollment rate for secondary education		Gross enrollment rate for primary education	
	2005	2013	2005	2013	2005	2013
China	18.3	29.7	60.2	92.4	111.8	126.4
Israel	58.1	66.5	104.8	102.2	103.6	104.4
Japan	55.0	61.5	101.0	101.8	101.9	102.3
South Korea	93.5	98.4	97.5	97.2	101.6	102.7
America	81.3	89.1	94.8	94.0	99.6	97.9
Argentina	64.0	80.3	84.9	107.3	113.1	123.8
Turkey	32.8	79.3	83.4	102.2	103.8	109.2
Poland	63.6	71.6	99.1	108.8	96.8	101.2

Data source: *International Statistical Yearbook 2016*; gross enrollment ratio = enrollment for primary education/school-age enrollment.

2.3 Mechanism and influence of consumer demand

2.3.1 Mechanism. Marx holds that social and economic life is divided into four stages: production-consumption-distribution-exchange, in which consumption plays a key and decisive role in production. It can also be said that production is consumption and consumption is production. Kuznets made an empirical analysis in his book *Modern Economic Growth* and derived a cycle: the growth of national income→the increase of per capita income→the change of consumption demand→the change of consumption structure→the adjustment of industrial structure→the rise of economic aggregate→the growth of national income. Consumer demand is one of the most important factors affecting the industrial structure (Fig. 2).

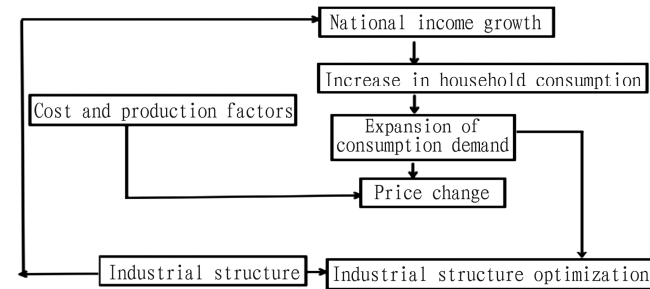


Fig. 2 The mechanism of consumption demand

2.3.2 Influence of consumer demand. If there is no consumption and demand in the market, then production will lose its meaning. Consumption patterns, current trends, consumer preferences, and so on, can stimulate the development of production and technological progress. The manufacturers in the market arrange production according to the development of the times and the current consumer demand, and guide the consumer to consume commodities that can be easily produced by them. Secondly, consumers have a variety of requirements for commodities, the most basic requirement is the quality and quantity requirement, which is the power to expand the scale of production, thus promoting the progress and update of technology. Moreover, with the progress of the times and the improvement of living standards, new consumption patterns are emerging in an endless stream, further making the division of labor much finer^[1]. Finally, the continuous upgrading of consumer demand can stimulate the ability of innovation and coordination, and then help to develop high-tech industries and new industries. At

the same time, it can also support traditional industries and the development of backward industries. The internal mechanism of the adjustment and upgrading of the industrial structure to the consumer demand is complex, and there is also the hindrance in the process.

2.4 Mechanism and influence of resource endowments

2.4.1 Mechanism. Resource endowment is the specific situation of the natural conditions and factors of production of a country or region, such as geographical location, natural conditions, land, labor, and technology. The natural resources and production factors of a country or region have a certain relationship with the adjustment and optimization of industrial structure^[2]. If a country is rich in natural resources, then it is easy for the country to form a characteristic industry with a national style, and the country will have a more complete industrial structure. On the contrary, if a country's resources are scarce, the industrial structure will be unbalanced. Natural resources are very difficult to change relying on the power of humans, and resources often have a variety of restrictions on us. Resources are the basis of industrial structure optimization and steady economic growth, we must maximize the use of existing resources, in order to achieve the adjustment and upgrading of the industrial structure.

2.4.2 Influence of resources on industrial structure. (i) Regional distribution of resources^[3]. Inner Mongolia's coal industry is the first in the country and there are more abundant other underground resources, helping to build Inner Mongolia's mining industry and manufacturing. However, to some extent, this phenomenon has restricted the long-term development of China's economy. (ii) Transfer of natural resources. Because of the different distribution of resources, there is a transfer of resources. In life, some resources are indispensable to us, then the transfer of resources is particularly important, such as the South-to-North Water Transfer Project in our country. (iii) Status of resources. Most of the factors needed for production are made up of natural resources themselves or processed resources, so raw materials, energy and other resources are the basic unit of industrial structure development and adjustment. (iv) In the current state of the market, the demand for resources varies from time to time. Resources are almost fixed, but the industrial structure will change with the changes of other factors, so it is necessary to make rational use of resources according to different periods. (v) Mobility of resources. Resource regionalism is certain, but everyone has the same needs for the same

kind of resources, so the mobility of factors is required in order to realize the rational allocation of resources and the upgrading of industrial structure. Due to the non-renewable nature of many factors of production, resource endowments can not promote the adjustment and upgrading of the industrial structure, and often limit the development of the industrial structure.

2.5 Mechanism and influence of government intervention

2.5.1 Mechanism. Government intervention refers to the use of appropriate policies and means to make necessary adjustments when the market is unable to operate normally through its own regulation. It is impossible to adjust and upgrade the industrial structure by government intervention alone. Asymmetric information and other factors will make the government fail to fully control the direction of industrial restructuring. Therefore, it must be considered in the light of market economy and other aspects (Fig. 3).

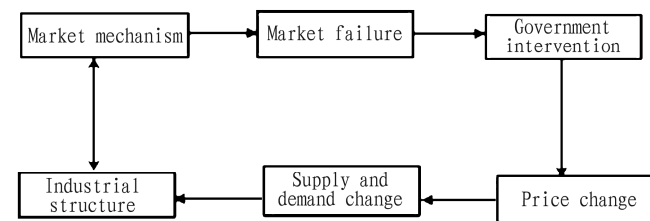


Fig. 3 Mechanism of government intervention

2.5.2 Influence of government intervention on industrial structure. As shown in Fig. 3, first of all, on the basis of not destroying the natural law of the market and the normal mechanism of the market, the government should make the correct decision when the market fails^[4]. Secondly, in the intervention, we should take into account the interests of the majority of enterprises and the public, as well as the enforceability and practicality of government intervention policies. Different problems will arise in the course of gov-

ernment intervention. When government agencies and managers make decisions, they first consider their own interests, rather than putting the overall interests first. Policy makers blindly pursue economic growth, with blind focus on short-term high-profit industries, leading to the failure of industrial structure adjustment. The decision-maker is not familiar with the current market, or can not receive the dynamic information on the market in time, so that the decision-making is not good enough.

3 Conclusions

The supply-side reform involves a wide range of areas and has a great influence. The purpose of this paper is to explore the mechanism and influence of technological progress, human capital, consumption demand, resource endowment and government intervention on the adjustment and upgrading of industrial structure, and to deepen the understanding of supply-side reform, in order to promote the adjustment and upgrading of industrial structure.

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ment. The links "variety → improving the environment → sense of comfort → psychological experience → fun and enjoyment" and "variety → improving the environment → fun and enjoyment" indicate that this brand can further increase the product varieties, improve the living environment of consumers, and improve their living standards, to make consumers have deeper feeling of fun and enjoyment. Besides, Hongyue Garden Maker can also grasp this target market with more interesting and life-related brand building activities. The "variety → sense of comfort → personal preferences → self-fulfillment" link indicates that Hongyue Garden Maker can satisfy personal preferences, to realize self-fulfillment of consumers.

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