

# Literature Review: Capital Deepening and Industrial Structure Transformation

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**Keywords:** capital deepening; industrial structure transformation; impact mechanism;

**Abstract:** Whether to get rid of the former low-income model into the middle income development model or to avoid economic growth stagnation then entering into smoothly the ranks of high-income countries, is the challenge that every the newly developed countries is facing at now. In the process of going through the middle income stage, whether to have the ability of deepening capital and spending power or not, is the two driving forces to achieve the catching up of economic success. However, when the society is in the capital deepening state, it will be accompanied by manufacturing (capital-intensive industries) to the service industry (non-capital-intensive industries) transformation, which is industrial structure transformation and upgrading. This article will start with the capital deepening related research, the transformation of industrial structure research and the capital deepening of the transformation of the industrial structure of the mechanism, these three aspects to sort out the literature.

## 1. Introduction

Capital deepening is the symmetry of capitalization that shows as the rate of capital accumulation in the economy is greater than the rate of labor accumulation, which is often defined as the increase in the number of workers' per capita capital meaning that the increase in labor productivity and income. Capital deepening and heavy industrialization are the inevitable stages of industrial upgrading, so the capital - labor ratio will increase with the accumulation of capital.

With the existence of large-scale investment and the development of capital-intensive industries, capital deepening is appearing and starting to have an important influence on the transformation and upgrading of industrial structure. However, the comparative advantage theory believes that for all the developing countries, if they develop blindly ahead with capital-intensive industries, it will cause a decline in employment rate and income gap widening problem that is not conducive to industrial sector output and profit improvement, so they should avoid the factor endowment changes Premature capital deepening. Chinese scholars have also carried out in-depth study on the deepening of capital in the process of China's economic development. Zhang Jun (2002)'s study shows that China's economy in the early 1990s, capital deepening is more obvious and mainly because the capital is taking over the place of the labor, but the capital is lacking energy of development at last. Yuan Fuhua et al. (2016) using international experience, they get the conclusion that is the problem of economic transformation is not about that investment continues to be the driving force of economic growth, but about whether developing countries have the ability to capital deepening or not. How to understand the deepening of capital correctly and clarify the important role of capital deepening in the transformation of industrial structure and even economic development is an important work in the process of sustainable economic development.

## 2. Summary of research on capital deepening

At present, the study of capital deepening is mainly about how to take capital deepening as an important factor in the economic life as well as explaining about labor productivity, employment, changes in capital returns, labor income and other aspects, and how to use the data for empirical. Gong Xuhong, Cao Yunxiang (2014) analyzes the capital deepening in the transitional period from the perspective of wage increase and government investment, and also further analyzes the impact

of capital deepening caused by different forces on the labor productivity of manufacturing industry. They pointed out that the role of government investment-led capital deepening is significantly greater than the effect of wage increase. With the increase of wage level in China, the effect of capital deepening on labor productivity has begun to get more and more important, while the influence of capital deepening, which is caused by the government investment, on labor productivity is decreasing. Zhou Delu (2012) introduced the capital deepening efficiency variable as the main research variable into the employment model of college students, and carried on the empirical analysis to the provincial panel data of China from 2001 to 2010. They came to a conclusion that realizing the efficiency of college students' employment is of great significance to capital deepening, but the effect of capital deepening on college students' employment is not significant.

### **3. Research on the Reformation of Industrial Structure Transformation**

Most of the literature about the transformation of industrial structure focuses on the transformation of industrial structure as the explanatory variables and discussing about the internal structure of industrial restructuring and mechanism. Baumol (1967) argues that the main factor influences the structural changes in the industry is the elasticity of substitution between different industries and the rate of output growth in each sector. When the output growth rate of the service sector is greater than the output growth rate of the manufacturing sector, the elements will flow from the manufacturing sector to the service sector. Xue Jiliang (2013) uses the Chinese statistical data from 2003 to 2011, on the basis of measuring the selection coefficient of technology, his paper studies the mechanism of technological selection and industrial structure transformation and upgrading, that is, with the continuous progress of China's technology, it brings capital deepening and increasing production value, then leading to the continuous transformation and upgrading of the industry. Furthermore, the transformation of China's industrial structure is getting faster and faster with the accuracy of technology selection. This shows that choosing the appropriate technical options will be a greater promotion of industrial transformation and upgrading. Some scholars start with the perspective that some industries' impact on the transformation of industrial structure, Deng Anqiu, Shi Zhongliang (2010) through the analysis about the relationship between cultural industries and the industrial structure of the transformation, they discovered that the development of cultural industry can not only quickly lead to the transformation of the entire industrial structure, but also can change the industrial structure of the industry as well as promote the transformation and development of other industries. And they suggest that putting forward the idea of establishing the cultural industry and the cultural industry to promote the transformation of industrial structure. But for the country's industrial structure transformation, it is inseparable from the international environment. Especially as for a developing country, they should grasp the trend of the times in the industrial transformation and open up a new transformation of the road. Zhang Xiaomeng, Yang Yufei (2016) use the data from US and UK to analyze the influence of opening up to China's industrial structure transformation path under a two countries, three departmental model framework. They get the conclusion that the decline of agricultural proportion in China from 1992 to 2014 is mainly driven by domestic factors, while the opening to the outside world has played an important role in explaining the rapid growth and sustained high proportion of China's manufacturing industry during this period. The transformation of industrial structure is one of the main reasons for the historical experience of developed countries. From the trend point of view, the importance of opening to the outside world is gradually weakened while the importance of the national effect gradually increased, so the long-term adjustment of China's industrial structure still need to be based on domestic demand.

#### **4. The review about the mechanism of capital deepening on the transformation of industrial structure**

There is relatively little literature on the mechanism of capital deepening and the transformation of industrial structure. Acemoglu, Guerrier (2008) explains the trend of manufacturing to service transformation by building a non-balanced two-sector economic growth model. The research shows that the determinants to the transformation of industrial structure are the differences between the factors that exist in the department, while the core variable is the capital labor ratio of the whole economy. Xu Zhaoyang (2010) has improved the model of Acemoglu and Guerrieri, and under the assumption of double-layer CES production function, constructs a model of changing industrial structure that includes three departments. And he uses the United States data from 1929 to 2007 for simulation analysis, he found that the technology progress of US agricultural sector and industrial sector is relatively faster than the service industry technological progress, but the output of the service industry growth is faster than the previous two departments. This is because the US service industry has a higher capital intensity and it is able to achieve faster output growth from the deepening of social capital. Wu Shengong (2005) reveals how the problem of capital deepening is generated from the theory of western economic growth from the theoretical origin, analyzes the new growth theory under the condition of perfect competition and the new growth theory under the condition of monopolistic competition, and uses the Lucas model that is one of the models theory of new growth, to make an analysis about the paradoxes which is the poor countries is always poorer, and he comes to an conclusion that is economic growth = capital deepening+technological progress+economic structure optimization. Under the framework of endogenous growth model, Yu Ze, Zhang Xiaomeng and Liu Fengliang (2014) divided the endogenous power of a country's industrial structure into two aspects: demand and supply, and they found that the main driving force for the transformation of China's industrial structure is the capital deepening in supply aspect as well as the demanding for per capita income levels. Li Cheng (2015) estimates the output elasticity of China's capital elements from 1978 to 2009 based on the time-dependent elasticity production function. Through empirical study, he studies the relationship between capital distortions and capital deepening and points out that the degree of capital deepening in different industries is different that is measured by the capital output ratio from large to small in order. Capital market distortions will promote the deepening of industrial capital, especially in the tertiary industry. As for the policy level, it will not only about developing the tertiary industry, but also be alert to its capital over-deepening and at last the fundamental way lies in the elements of market improvement and industrial structure adjustment of the market. Wang Dingxiang, Li Linli and Wu Daihong (2017) they discuss the internal mechanism of financial capital deepening and technological progress to promote the upgrading of industrial structure by using the neoclassical production function which is based on the endogenous perspective. And they use the inter-provincial panel data from 2000 to 2014, they figure out: technological progress on the rationalization of China's industrial structure is not significant, and it fails to become a positive factor in the high level of industrial structure either. The deepening of bank capital has promoted the rationalization and standardization of industrial structure while the deepening of securities capital only has a significant positive effect on the industrial structure.

#### **5. Conclusion**

This article starts with the capital deepening related research, the transformation of industrial structure research and the capital deepening of the industrial structure of the mechanism to sort out the literature. For the capital deepening, the research uses the capital deepening as a factor in the economic life and explains the labor productivity, employment, changes in capital returns, labor income and other aspects as well as using the data for empirical. The result shows that the deepening of capital has positive effect on every aspects, but there still are some differences. In the aspect of industrial structure transformation, most of the existing literatures focus on transforming the industrial structure as the explanatory variable and the internal incentive to the industrial

structure transformation. And the literature that discusses the impact of capital deepening on the upgrading of industrial structure mechanism is relatively fewer so the domestic scholars all focus on the empirical that uses the provincial panel data on the deepening of capital and industrial structure transformation and upgrading, but the research about the impact of capital deepening industrial structure transformation and upgrading, the existence of the characteristics of the study is not complete. In addition, about the heterogeneous capital deepening, the flow of capital and labor factors on the impact of capital deepening is also worthy of our in-depth exploration.

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