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Market-oriented Transformation, Government Support and Technological Progress

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Abstract

Has the Market-oriented transformation promoted technological progress? How can government support work better? This paper in the theoretical framework of Holmes and Schmitz (2010) based on the first analyzes the market transformation of technological progress mechanism, found that the reform of state-owned enterprises, non-public enterprises and the influx of foreign products led to the national monopoly power gradually weakened, market competition intensity gradually increased, redistribution effect and scale effect has made great contributions to the domestic technological progress. In low-end manufacturing, government support should try to let the market plays a decisive role in research and development resources allocation, avoid too much intervention, in high-end manufacturing, should pay attention to basic research of government support, ensure continuous investment in basic research, on technology research and development should focus on perfecting the risk investment system and patent protection system.

Keywords

Market Oriented; Market Transformation; Government Support; Technological Progress.

1. Introduction

The path of technological progress mainly includes technological innovation and technology introduction (Tang Weibing et al., 2014), which is the core driving force of China's sustained economic growth. Therefore, how to promote technological progress is a long-term problem around the academic circles.Schumpeter pointed out that the fundamental driving force of technological progress is the fierce competition of enterprises after marketization and the pursuit of technological monopoly profit. Some scholars also believe that the improvement of marketization level is conducive to improving the efficiency of resource allocation (Fan Gang et al., 2011; Liu Chong, et al., 2020), promoting efficient and fair competition (Qi Shaozhou et al., 2017), so as to promote technological progress.However, some scholars believe that the conclusion of whether marketization promotes technological progress is uncertain, and the role of marketization on technological progress is different under different technological gaps (JianZe et al., 2014; Ye Xiangsong and Liu Jing, 2020).

Market-oriented transformation is an important part of China's economic transformation. With the continuous promotion of economic transformation, the market plays an increasingly prominent role in resource allocation. The third Plenary Session of the 18th CPC Central Committee proposed that "the market plays a decisive role in resource allocation".So what impact does China's marketization process have on technological progress?What about the impact mechanism?

Different from the marketization process of other countries, China adopts gradual reform. At the same time, the official promotion mechanism leads to the local economic situation as the core assessment index of officials. Therefore, the government will often implement industrial policies, which will have an important impact on technological progress and economic

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development.The government mainly provides R & D support to enterprises through direct investment, tax and fee cuts, R & D subsidies, talent support, institutional guarantee, and industrial platforms.According to signal theory, government support can not only directly alleviate the financing constraints of enterprise research and development (Ren Shuming and Lu bracelet, 2014), but also guide the market to provide financial support to enterprises (Guo Yue, 2018), thus promoting technological progress.However, some scholars oppose it, believing that there is a certain disconnect between government support and market research and development activities (Xiao Wen and Lin Gaobang, 2014), and may squeeze out private investment (Xiao Xingzhi and Wang Ypan, 2014), which will distort resource allocation (Qian Xuesong, et al., 2018), so government support cannot promote technological progress.Some scholars believe that government support has different effects on heterogeneous research and development (Ye Xiangsong and Liu Jing, 2018), or government support has regulatory effects on technological progress (MAO Qilin and Xu Jiay, 2015).So, under the process of marketization, what impact will the Chinese government's support policies for the industry have on technological progress?What about the impact mechanism?

Based on this, this paper based on the theoretical framework of Holmes and Schmitz (2010) the first analyzes the market transformation of technological progress mechanism, found that the reform of state-owned enterprises, non-public enterprises and foreign products influx led to the national monopoly power gradually weakened, market competition strength gradually improve, redistribution effect and scale effect has made a great contribution to domestic technological progress.Further introduce government support, found that the government support in low-end manufacturing, should try to let the market plays a decisive role in research and development resources allocation, avoid too much intervention, in high-end manufacturing, should pay attention to basic research of government support, ensure continuous investment in basic research, on technology research and development should focus on perfecting the risk investment system and patent protection system.

The remaining part is: the theoretical mechanism of China's market transformation affecting technological progress; the third part is the theoretical mechanism of government support influencing technological progress under the market process; the final conclusion.

2. Market-oriented Transformation and Technological Progress

Due to the heterogeneity such as technological gap among different industries, this paper plans to analyze the influence mechanism of market transformation on technological progress from the industrial level.Based on the theoretical analysis framework proposed by Holmes and Schmitz (2010), the mechanism of China's market transformation affecting technological progress is analyzed below.The degree of marketization is measured by the cost of enterprise entry and trade cost.

$q^j = S^j d^j(p^j)\{1,2\}p^j S^j$Suppose an industry conducts production in two regions, and the demand function in each region is:, where j is the region, j, where j=1 is the domestic region, j=2 is the foreign region, the price of the product in region j, and the number of demands in region j.There are trade costs between the two regions, with trade costs T and tariff D.Potential entry enterprise i in each region faces entry costs, which include establishment costs and entry taxes.The production function of enterprise i is as follows, which is the technical level of enterprise i in area j and the number of labor force employed by enterprise i in area j.Suppose that the market is clear, and the enterprise entry and production decision results obey the ancient no equilibrium.$F_i^j E_i^j y_i^j = A_i^j f(n_i^j) A_i^j n_i^j$.

$S_j^e F_i^{j,e} E_i^{j,e} T^e D^e A_i^{j,e} d^i(\cdot) f(\cdot)$Under a certain market level e, the number of demands in region j, and, for the establishment cost and entry tax of the i enterprise in region j, respectively, and for the

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transportation cost and tariff, respectively, for the technical level of the i enterprise in region j, assumed and unchanged at any market level.Under the condition of market clearing and Go equilibrium, the number of potential entering enterprises in area j under the market level e is, the number of trade products in the two places is, the number of labor employed by enterprise i in region j, the output level of enterprise i in region j under the equilibrium condition, and the wage level per unit is assumed to be 1. The technical level for defining the industry is as follows:$B^{j,e}q^{e}_{ship}n^{j,e}_{i}y^{j,e}_{i} = A^{j,e}_{i}f(n^{j,e}_{i})$

$$A^{e} = \frac{\sum_{i\in B^{1,e}} A^{1,e}f(n^{1,e}_{i}) + \sum_{i\in B^{2,e}} A^{2,e}f(n^{2,e}_{i})}{\sum_{i\in B^{1,e}}(n^{1,e}_{i} + F^{1,e}_{i}) + \sum_{i\in B^{2,e}}(n^{2,e}_{i} + F^{2,e}_{i}) + q^{e}_{ship}T^{e}}$$

In the above formula, the molecule is the output level at the equilibrium level, and the denominator is the cost at the production level, including labor employment costs, enterprise establishment fixed costs and transportation costs, and not including entry tax and tariff.

Further define the technical level of domestic industry as follows:

$$A^{1,e} = \frac{\sum_{i\in B^{1,e}} A^{1,e}f(n^{1,e}_{i})}{\sum_{i\in B^{1,e}}(n^{1,e}_{i} + F^{1,e}_{i}) + q^{e}_{ship}T^{e}}$$

Under this theoretical framework, technological progress mainly comes from three aspects, namely, redistribution effect, scale effect and enterprise internal effect.As for the redistribution effect, it is assumed that the market level rises, and other parameters except the technical level remain unchanged. After the low technology level A enterprise is replaced by the high technology level, the industrial technology level rises, the molecules become larger, and the technology advances.For scale effect, assume marketization level rise, each enterprise marginal cost and entry cost, an enterprise technology level rise, production rose to market equivalent to the change of several enterprise production level, has a certain monopoly, but under the same production level, the enterprise cost is still a single enterprise cost, compared to the marketization level change before the sum of multiple enterprise cost decline, so the denominator reduction, technological progress.For the internal effect of an enterprise, its impact on technological progress is uncertain. Due to the change of market level, the technical level A and fixed cost F may change at the same time, so the direction of technical level change cannot be determined.

In the early stage of Market-oriented transformation, China's industrial organization was a "state monopoly" (Jianze, 2011).The state has full control over the domestic economy, which is established on the basis of national ownership and collective ownership, non-public enterprises are prohibited from entering, and foreign trade activities are strictly controlled. Therefore, in this form of industrial organization, private enterprises have huge entry costs and huge costs in foreign trade.

Market-oriented transformation is mainly reflected in the reform of state-owned enterprises, the liberalization of non-public enterprises to enter the market and reduce foreign trade barriers.In the process of marketization transformation, state-owned enterprises through shareholding reform introduce non-public components, or privatization, so improve the state-owned enterprises, state-owned enterprises and non-state enterprises market competition level, competition level, some enterprise technology level rise, replace low technology level, through redistribution effect promotes the technological progress, while the scale effect reduces the fixed cost of domestic industry, promote the technological progress.Reducing the

ISSN: 2688-9323

cost of non-public enterprises to enter the market further enhances the competition level of the market, and the redistribution effect and scale effect further promote the technological progress. at the same time, Reducing foreign trade barriers leads to foreign high-quality and low-cost goods entering the domestic market, On the one hand, reducing the market share of domestic products has a negative impact on technological progress, However, the competitive pressure leads to higher domestic technology levels and lower total costs to promote technological progress, Thus it may have uncertain effects on technological progress, But in the process of marketization in China, China has not fully liberalized its foreign trade, Instead, adopting a certain degree of trade protection policy, More inclined to introduce direct foreign investment, The establishment of sino-foreign joint ventures and higher import tax rates reduce the adverse impact of the declining market share of domestic products, At the same time, it also improves the technical level of domestic enterprises, Promoted technological progress.

In the process of marketization, the reform of state-owned enterprises, the entry of non-public enterprises and the influx of foreign products lead to the gradual weakening of national monopoly forces, the gradual improvement of market competition intensity, and the redistribution effect and scale effect have made great contributions to the domestic technological progress.

3. Market-oriented Transformation, Government Support and Technological Progress

The relationship between the government and the market has always been the focus of academic controversy.In the process of market transformation, the role of the market is gradually strengthened, from the basic role in the initial stage to the decisive role at present. The advantage of the market in resource allocation has been reached consensus in the academic circle.However, due to the positive externalities of technology research and development, there are also market failure, and government support is necessary for technological progress.The government's support for technology research and development is mainly reflected in financial support, talent support, institutional guarantee and industrial platform. Financial support mainly includes direct investment, fiscal and tax policies, talent support is mainly reflected in education and talent introduction, and institutional guarantee is mainly reflected in patent protection.

3.1. Heterogeneous Industries

There are some differences in the knowledge stock and research and development strength of different industries 'technology research and development, so the government's R & D support will have different effects.Although in the early stage of market transformation, there is a huge gap between China's various industries and foreign countries, but the government has adopted different opening policies and support policies for different industries.In middle and low-end manufacturing, market competition plays a bigger role than government support, while in high-end manufacturing, government support plays a bigger role than market competition. Compared with the middle-and low-end manufacturing industry, High-end manufacturing is mainly technology-intensive industries, High technical complexity, The threshold for imitation is higher, It determines that it is difficult to effectively achieve technological catch-up with its own scientific and technological level, Often need a long period of knowledge accumulation and high research and development strength to achieve technology beyond, Poor competitiveness, Weak profitability, Not only need a gradual opening policy and a strict patent protection system to ensure the survival of enterprises, Government financial support is also needed to ease the financing constraints on research and development, As well as appropriate talent policies and systematic research and development platform to ensure the rapid accumulation of knowledge

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stock, So the government plays an important role in high-end manufacturing (Ye Xiangsong and Liu Jing, 2020).

However in the labor-intensive low-end manufacturing, technology complexity is low, China's demographic dividend greatly improved the profitability and survival ability, enterprises can through the introduction of foreign technology, imitation and using existing technology processing assembly, improve performance and quality can get rich profits, enterprises unnecessary and unwilling to take the risk (Ye Xiangsong and Liu Jing, 2020), so as to quickly realize technology, so the market mechanism can effectively allocate technology research and development resources.However, government support is oriented, which may mismatch resources, thus adversely affecting technological progress (Dai Kuizao and Liu Youjin, 2016).Moreover, government support will have rent-seeking behavior, which will have a negative impact on technology research and development. Therefore, the government should try to let the market play a decisive role in the middle and low-end manufacturing allocation of technology research and development resources and avoid excessive intervention.

3.2. Heterogeneous Research and Development

High-end manufacturing technology progress not only depends on technology research and development, but also depends on basic research, basic research generally refers to the use of scientific research means and equipment, in order to understand the internal nature and law of objective things, research, experiment, and a series of activities, provide theoretical basis for creating new products and technologies, with exploratory, creative and continuous characteristics as the basis of technology research and development, plays an important role in technological progress, and technology research and development is using existing knowledge to develop new products, develop new materials and form new processes, promote production technology progress (Ye Xiangsong and Liu Jing, 2018).In the short term, due to the long time lag in basic research investment, it is difficult to promote technological progress.Basic research in the long term investment not only may make major theoretical breakthrough, may also be through the accumulation effect breakthrough major technology, significantly improve technical level, not only that, long-term basic research accumulation of scientific and technological knowledge stock level, reflects the technology ability, including learning, application, improvement, can reverse crack, digestion absorb imported technology, and on this basis with local demand, realize technology localization, even to secondary innovation, can also promote technological progress (Adams, 1990).

Since basic research needs high R & D strength, the revenue cannot be internalized, and some basic research is designed for national strategic security, the resource allocation of the market fails and the government support is needed to achieve the balance between short-term and long-term benefits.Moreover, the government should play a leading role in basic research, allocate corresponding R & D resources, provide corresponding financial support, talent support and institutional support, and ensure the continuous investment in basic research,

Then, the continuous accumulation of knowledge stock, and finally applied to technology research and development, break through the core key blockade technology, to achieve technology monopoly and industrial chain upgrading.

The benefits of technology research and development can be internalized, so the main body of research and development should be enterprises, which should rely on the market competition mechanism to rationally allocate R & D resources. However, due to the high intensity and high possibility of failure of high-end manufacturing industry, enterprises may have the problem of insufficient technology research and development based on the perspective of cost and benefit.Therefore, the government needs to improve the relevant venture capital system and patent protection system to improve the return rate of technology research and development.In the case of imperfect venture capital system, enterprises may face greater financing constraints.

ISSN: 2688-9323

In the short term, the government can play a direct role through financial support on the one hand, and on the other hand, guide market investors to invest according to the signal theory, which can indirectly alleviate the financing constraints of enterprises.But with the gradual advancement of market transformation, risk investment system gradually improve, the government financial support has a clear guiding role, may cause resource mismatch, private investment, so should focus on continue to improve the risk investment system and patent protection system, the government functions into the system of effective suppliers.

In the process of China's market transformation, government support should take into account not only the heterogeneity of industries, but also the heterogeneity of research and development.In the middle and low-end manufacturing industry, the market should try to play a decisive role in the allocation of R & D resources, and avoid excessive intervention. After completing the technology catch-up, the function should be gradually transformed into a system supplier, improve the relevant patent protection system, promote independent innovation, and achieve technology surpassing.In high-end manufacturing industry, we should pay attention to government support for basic research, ensure continuous investment in basic research, focus on improving the venture capital system and patent protection system in technology research and development, improve the market information transmission mechanism, so as to solve the financing difficulties of high-tech enterprises and avoid strategic innovation behavior and innovation quality decline caused by government support (Li Wenjing and Zheng Mani, 2016; Zhang Jie and Zheng Wenping, 2018).

4. Summary and Outlook

In the process of marketization transformation, the reform of state-owned enterprises, non-public enterprises and the influx of foreign products lead to state monopoly power gradually weakened, market competition intensity gradually increased, the overall technology level and fixed cost of the redistribution effect and scale effect lead to China's overall technical level.

On the basic research of high-end manufacturing, the government can configure the corresponding research and development resources, provide the corresponding financial support, talent support and system support, to ensure continuous investment in basic research, and constantly accumulate knowledge stock, eventually applied to technology research and development, break through the core key blockade technology, technology monopoly and industrial chain upgrade.In the technology research and development of high-end manufacturing and low-end manufacturing, the market should play a decisive role in the allocation of research and development resources. The government's venture capital system and patent system guarantee can effectively promote technological progress, achieve technological catch-up, and even technological catch-up.

Now China's market reform into the deep water, the competitiveness of the enterprise is inseparable from the improvement of technical level, and enterprise competitiveness comes from the pursuit of profits in the market, so deepen the reform of state-owned enterprises, optimize the market access negative list system, increase opening to the outside world is still the top priority of market transformation in the future.At the same time, we should also take into account the characteristics of China's high investment and low consumption, and the aging problem of China's population structure is becoming increasingly prominent. These two problems have an adverse impact on technological progress through market size and human capital, and they are also problems that need to be solved in the future.

According to China's economic data, although R & D staff and R & D funds increased year by year, but the total factor growth rate does not show the corresponding trend, this shows that simply increase R & D investment, can not provide continuous power for technological progress, not only that, R & D investment internal basic research and applied research mismatch, basic

research investment is too low, applied research investment is too high, which restricts the promotion of China's innovation ability (Yan Chengliang, 2020).This has also led to an obvious gap between China and developed countries in high-tech industries, such as computer chips, green technologies and so on.However, with the transformation and upgrading of global industrial structure and depth adjustment, China's economy after more than 30 years of rapid growth growth slowed, supported China's economy sustained rapid growth of demographic dividend, investment dividend and resource dividend is decreasing, China's high-tech industry as a representative of the new industrial economy, has become an important engine of manufacturing growth.So need to deepen the market reform at the same time, strengthen the government support in the field of high-tech industry basic research strength, improve the system of social investment, guide social capital, strengthen research and development platform and research and development system of systematization, strengthen human capital investment, accumulate knowledge stock, eventually applied to technology research and development, technology blockade and technology monopoly, finally realize technology catch up.

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