ISSN: 2688-9323

On Scientific and Technological Innovation in the New Normal to Promote China's Supply-side Structural Reform

-- Take Enterprise Data in Guangdong Province, China as an Example

Jing Feng[a], Qiaoweng Yang, Yonghong Yao

Guangzhou Huashang College, Guangzhou, Guangdong 511300, China

[a]2249845335@qq.com

Abstract

Since the "Twelfth Five-Year Plan" period, China's economic structural contradictions have become increasingly prominent. Therefore, while moderately expanding aggregate demand, efforts must be made to strengthen Supply-side structural reforms. Supply-side structural reforms cannot be separated from the promotion of scientific and technological innovation. It is of great practical significance to build a new economic development model based on scientific and technological innovation and promote the effective implementation of Supply-side structural reforms. This article will study the impact of technological innovation on Supply-side structural reforms under the background of the new normal, and select the data of listed companies in Guangdong Province from 2015 to 2019, construct a multiple linear regression model of R&D investment and corporate performance, and study technological investment and corporate performance And finally put forward relevant policy recommendations.

Keywords

New Normal; Supply-side Reform; Technological Innovation.

1. Introduction

As China's economy has entered a new normal, special attention should be paid to the quality of economic growth. The resource conditions and driving factors that support China's rapid economic growth are gradually changing. Economic development is facing a series of prominent contradictions and problems. On the surface, the economic growth rate is showing a downward trend, but the essence is a structural problem. Reform and foster new driving forces for development. In November 2015, the eleventh meeting of the Central Finance and Economics Leading Group put forward: "While expanding aggregate demand moderately, we should focus on strengthening Supply-side structural reforms, focusing on improving the quality and efficiency of the supply system, and enhancing the momentum for sustained economic growth." The proposal of "Supply-side structural reform" marks a major transformation of China's macro economy from demand management to supply management, and will build a new type of driving force for economic growth in the next stage. In December 2015, the Central Economic Work Conference made key arrangements for Supply-side structural reforms. The meeting emphasized that the promotion of Supply-side structural reforms is a major innovation to adapt to and lead the new normal of economic development, and to adapt to the comprehensive after the international financial crisis. Active choice in the new situation of national power competition is an inevitable requirement for adapting to the new normal of China's economic development.

ISSN: 2688-9323

China's economy has entered a new normal marked by medium-to-high-speed growth, which not only means a slowdown in economic growth, but also a transformation of the driving force of economic growth and the transformation of economic development patterns. Only by forming an economic structure led and supported by technological innovation, and effectively solving the problem of switching economic development momentum, can we effectively promote Supply-side structural reforms and realize new development under the new normal. The "13th Five-Year" national science and technology innovation plan has clarified the overall thinking, development goals, main tasks and major measures of China's science and technology innovation in the next five years. In its implementation process, it is necessary to focus on promoting the symbiosis of science and technology innovation and public and private science and technology innovation. Cooperation and the combination of point, line, and area promote regional innovation and development, and promote China to accelerate the formation of an innovative economic pattern. This article combines listed companies in Guangdong Province, China, and uses relevant data to conduct research on technological innovation leading Supply-side reforms.

2. Literature Review

Scholars at home and abroad have done a lot of research on the impact of scientific and technological innovation and Supply-side reform on the economy. Charles (1998) proposed that scientific and technological R&D investment has an important role in promoting Long-term economic growth. Chinese scholar Wu Yuming (2006) uses multiple models in spatial metrology (spatial difference coefficient spatial lag model, spatial error model, variable coefficient regression model, etc.) to measure the contribution rate of R&D and innovation and innovation capabilities in 31 provinces in China Analysis shows that regional innovation is closely related to regional human capital stock. Li Lin (2013) pointed out that technological innovation has a very important role in promoting regional economy. Wang Zichen (2016) analyzed the relationship between technological innovation and Supply-side reform, and proposed that technological innovation has become the driving force and breakthrough point of Supply-side structural reform, and it also faces the need for Supply-side reform. Peng Diyun (2017) studied the internal logic of the development of the new economy and the Supply-side structural reform under the new normal, and proposed that the development of the new economy is an important starting point and an effective way for the Supply-side structural reform. , Process, means, effects and other aspects have "symbiosis", mutual dependence, mutual promotion, and complement each other.

At present, there are few empirical literatures about the Supply-side structural reform led by technological innovation. This article combines the relevant data of listed companies in Guangdong Province to conduct an empirical analysis and conduct an empirical study on the Supply-side structural reform led by technological innovation.

3. Research Methods and Data Sources

This article takes the new normal as the background, uses the economic production function theory Y=AF(N,K) as a model reference, selects listed companies in Guangdong Province, China as a sample, establishes a panel model, and studies the new normal based on impulse response and variance analysis The impact of technological innovation on the development of enterprises in Guangdong Province; combined with sample data, construct a regression model of R&D investment and corporate performance, study the relationship between R&D investment and corporate performance, and analyze the status of technological innovation of listed companies in Guangdong Province under the background of the new normal. For possible problems, relevant suggestions are made to promote the further development of scientific and

ISSN: 2688-9323

technological innovation. This paper selects the listed companies in Guangdong Province from 2015 to 2019 as a sample to conduct research on their scientific and technological innovation issues; the original data collection and statistical research are carried out on the relevant financial report data of listed companies in Guangdong Province from 2015 to 2019. On the basis of statistics, unavailable, unreasonable, missing data and other related factors such as short time to market were removed, and 639 companies were retained as samples for empirical analysis of observational data. The data mainly comes from the Guotaian database and Wande database. The relevant data of the sample companies mainly come from the CSMAR and WIND databases. This article uses Excel 2007 for statistics and data processing, and uses STATA15.0 and Eviews software for the empirical research.

4. Empirical Research

4.1. Input-output Analysis

This paper conducts statistical analysis from three aspects of production function R&D investment, capital investment and labor investment. The relevant indicators used are: operating income, operating costs, operating profits, inventory, fixed assets, intangible assets, R&D expenses, etc., and statistics The above relevant indicators are related to the data of the consolidated financial report from 2015 to 2019. According to the production function theory, select representative listed companies in Guangdong Province as a sample to establish a panel model. Analyze the impact of R&D investment, capital investment and labor investment on corporate performance based on the regression results. The specific model is as follows:

$$Y=c+\lambda A+\alpha N+\beta L+e \quad (1)$$

In formula (1), Y represents operating income, A represents R&D investment, N represents capital investment, and L represents labor input. In order to determine whether to choose a fixed-effects model or a random-effects model, this paper performs Hausman test on the data, and the relevant results are shown in Table 1:

Table 1. Hausman test results

Test Summary	Chi-Sq. Statistic	Prob.
Cross-section random	20.3641	0.0000

Table 2. Empirical results of the impact of R&D investment of listed companies in Guangdong Province on corporate performance

variable	Non-standardized coefficient	Sig.
c	3915436794***	0.000
A	3.49***	0.000
N	2.03***	0.000
L	32.86***	0.000
F value	1979.77	0.000
R^2	0.6841	
R^2-Adjust	0.1653***	

Note: ***, **, and * are significant at 1%, 5%, and 10% respectively.

ISSN: 2688-9323

It can be seen from Table 1 that the Hausman test result shows that the P value is very small and rejects the null hypothesis. Therefore, a fixed-effect model should be established, and the results obtained after regression analysis are shown in Table 2.

It can be seen from the above results that each coefficient in the model is significant at the 1% level, and the R2 is higher, the F value is higher, and the model fits better.

According to Table 2, analyze the impact of each element on corporate performance. R&D input A, capital input N, and labor input L have positive influence coefficients on output. The coefficient before A is greater than the coefficient before N, which shows that compared with capital input N, the marginal effect of R&D input A on output Greater, the impact of labor input L on output is positive, indicating that as the number of personnel increases, operating income will increase, which is consistent with reality. Generally speaking, the input of manpower will increase output, and the economic development of China's Guangdong Province is relatively good, the scale of the enterprise is relatively large, and there are still vacancies in many positions, and more personnel are needed to promote the development of the enterprise. However, the R&D input coefficient A in the research results is smaller than the labor input coefficient L, which shows that the enterprises in Guangdong Province, China currently invest less in R&D, making R&D investment not fully play its due role.

4.2. Long-term Analysis based on PVAR

Since the impact of R&D investment on the company is not immediately apparent, it will take a certain period of time to settle before the effect of this indicator will appear. In order to observe this Long-term impact, this article reads relevant literature, refers to previous analysis methods, and establishes a PVAR model. Perform impulse response analysis on the model. In order to ensure the accuracy of the forecast, the forecast period is selected as 8 periods, and the empirical research results are shown in Figures 1, 2 and 3. By observing Figure 1, it is found that the impact of scientific research input on output is not obvious at the beginning, and a more obvious effect occurs after the third period. This shows that R&D investment is lagging and it takes a certain time to generate returns, and The return will gradually increase. Under the economic background, it is precisely because of the lag effect of this kind of R&D investment that many companies are reluctant to invest in R&D.

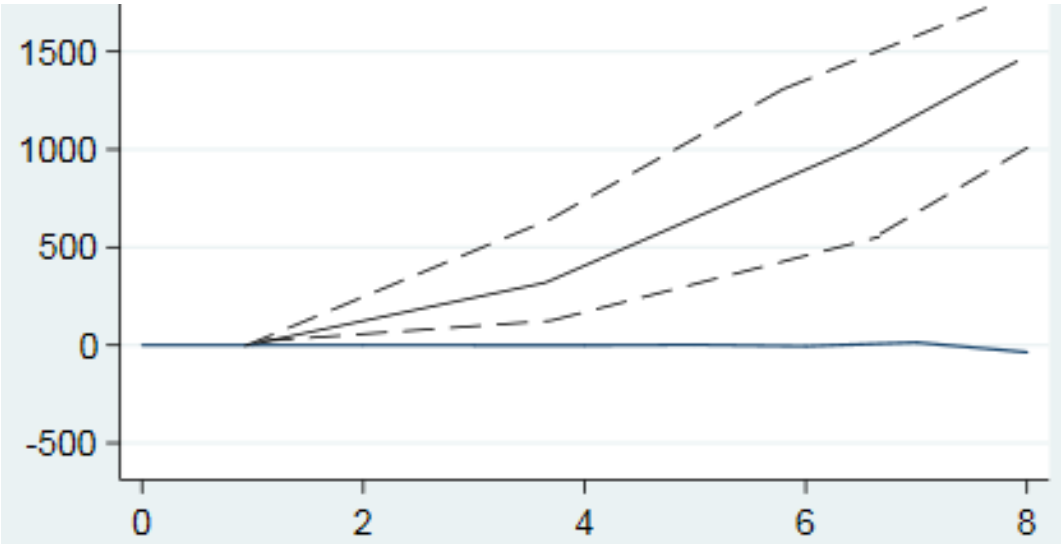

Figure 1. The impulse response of Y to A

By observing Figure 2, it is found that the current capital investment of a company generally takes a period of time before it has an impact on output. Therefore, capital investment, like R&D

ISSN: 2688-9323

investment, will also have a certain lagging effect on output, but by comparing Figure 1 As shown in Figure 2, the impact of the hysteresis effect is not as great as the impact of R&D investment.

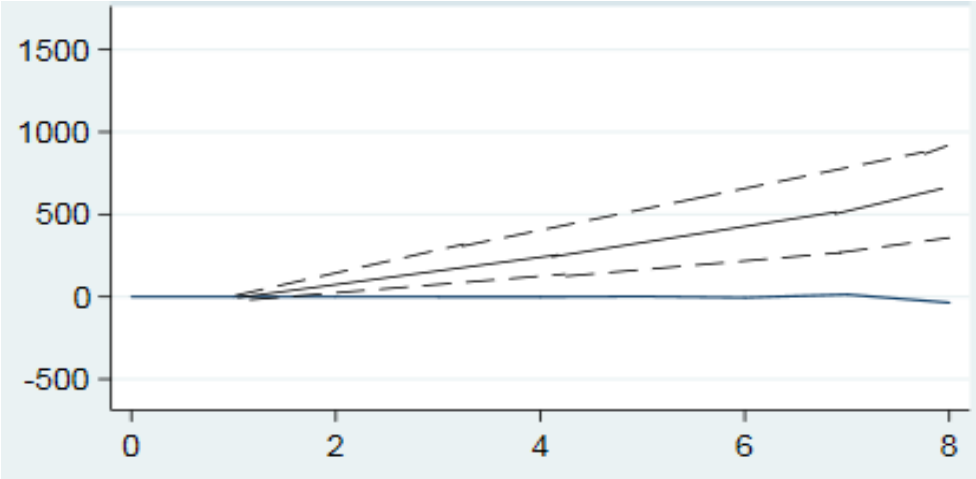

Figure 2. The impulse response of Y to N

By observing Figure 3, it is found that the lag effect of labor input is also more obvious, which also shows that labor input will have a learning effect in the later stage, and this learning effect is conducive to the increase of business income.

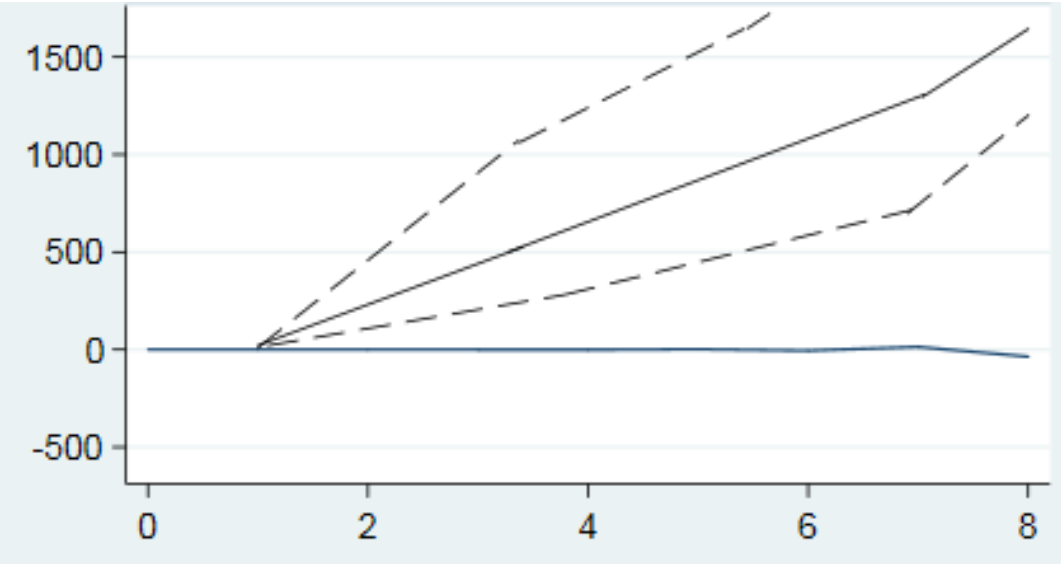

Figure 3. The impulse response of Y to L

To sum up, in the long term, the impact of R&D input on output has not stabilized over time during the forecast period from 1 to 8, but has become larger and larger, and the hysteresis effect is obvious. Moreover, R&D investment, capital investment, and labor input all have a positive impact on output. This is the same as the previous analysis. This means that increasing R&D investment, capital investment, and labor input not only affect current output, but also affect future output. The impact is also great.

ISSN: 2688-9323

4.3. Variance Analysis

In order to further analyze the contribution of each production factor to the output in the future, this paper conducts an analysis of variance on the relevant data, and the results are shown in Table 3.

Table 3. Analysis of variance table of output

t	Y	A	N	L
1	100.00	0.0000	0.0000	0.0000
2	95.45	0.1845	0.4532	0.2849
3	91.27	0.7959	1.2536	2.4598
4	90.76	1.7257	2.9621	5.3281
5	89.44	7.4324	4.3158	7.3412
6	85.45	8.2989	4.5269	8.2594
7	78.76	8.4671	5.7252	11.7263
8	76.23	9.1269	5.9223	13.9628

Through the analysis of Table 3, during the forecast period from 1 to 8, although most of the fluctuations in output can be explained by itself, and the degree of explanation can reach more than 75%, there is a trend of declining year by year, and the explanatory power of other factors is present. With the upward trend, the ability to explain output fluctuations has been increasing. Therefore, in the course of business operations, if you stand still, do not invest in production factors, and do not actively seek enterprise development, it will be extremely detrimental to the promotion of enterprise value.

5. Conclusion and Suggestion

5.1. Analysis Conclusion

5.1.1. At this Stage, Technological Innovation Plays an Important Role in Supply-side Reforms

Under the new normal, finding new economic growth points is the crux of the problem. Based on the production function theory, this paper selects representative listed companies in Guangdong Province as a sample, and establishes a panel model. According to the impulse response and variance analysis, the research finds: (1) The R&D investment index coefficient is 3.49, which is greater than the capital investment coefficient of 2.03. R&D investment The marginal effect on output is greater than capital input. (2) R&D investment and corporate performance are positively related to all companies. In this paper, a multiple linear regression model of R&D investment and corporate performance is constructed, and the research found that under the new normal, R&D investment and corporate performance are positively correlated for all companies. From the above two empirical analysis results, it is concluded that under the background of the new normal, technological innovation can promote the reform of the Supply-side structure.

5.1.2. There is a Lag Effect in R&D Investment

Through the above Long-term analysis based on the PVAR model and observing the relevant charts, it is found that the impact of R&D investment on output gradually increases in the eight

ISSN: 2688-9323

years after R&D investment. Therefore, from the enterprise level, it is not only necessary to focus on the short-term effects of R&D investment, and to increase R&D investment. Looking at the future, we must take a Long-term view of enterprise development; from the government level, we should improve the R&D incentive mechanism, property rights protection system, fiscal and tax preferential policies for enterprise technology innovation, standardize R&D expenses and information disclosure of technical personnel, etc. Create and create a good R&D environment for increasing R&D investment, improving R&D efficiency, and accelerating the transformation of scientific research results.

5.1.3. At this Stage, Companies Still Focus on Increasing Labor Input

Through research, it is found that the higher the labor input, the higher the effectiveness of the Supply-side structural reform, and both have a positive impact. However, if the labor input exceeds a certain range, it will result in low efficiency of employees, perfunctory work, and easy loss of initiative. Inertia and other behaviors. And with the increase of labor input, the corresponding increase in enterprise management costs will also affect the collective awareness of employees. Therefore, companies should optimize labor input, improve the quality of labor, and provide a platform for the development of labor. , Tilt toward the relevant policies of R&D investment, which is more conducive to the sustainable and healthy development of enterprises.

5.2. Policy Suggestion

5.2.1. Improve the Level of Technological Innovation

According to theoretical and empirical results, the Supply-side structural reform cannot be separated from the technological innovation level as the basic driving force. In fact, China has been emphasizing the role of technological innovation, and innovation investment has increased on a large scale, but the input efficiency is not very high. High, the level of technological innovation is insufficient, especially the level of high-end technology and developed countries still have a big gap. First, we must fully mobilize the enthusiasm of scientific research personnel for innovation. The main body of scientific research and innovation is talents, and outstanding talents are the core element of knowledge and technological progress. Therefore, it is necessary to improve the relevant talent incentive mechanism, further stimulate the innovation power and vitality of talents, establish a good social atmosphere in which knowledge changes destiny and talents first, and improve the working environment and welfare of scientific researchers. At the same time, it is necessary to speed up the reform of the scientific research management system and establish a sound mechanism for technological innovation projects, funding allocation and achievement evaluation. Improve the intellectual property protection system, form a patent work system and operating mechanism for patent management, review, research, education, law enforcement, and intermediary services, and use judicial and administrative law enforcement methods to protect the legitimate rights and interests of property owners. Secondly, companies must learn to use multiple subject innovation models. In economic globalization and the rapid development of information technology.

Under the wave of modern society, the life cycle of new products and new technologies is constantly shortening. Based on the company’s own resource endowment constraints, it is impossible for companies to contract from product design, development, production, and sales. The traditional vertical integration Chemical production methods cannot adapt to today's competitive environment. Enterprises must learn to use multiple subject innovation models and cooperate with enterprises in the same industrial chain to form a symbiotic community.

ISSN: 2688-9323

5.2.2. Further Regulate the Relationship between the Government and the Market

The role of the government should be adjusted in accordance with the law of market-oriented development, and the role of the government should be shifted from a more productive service type to a public service type, providing complete legal protection and infrastructure for economic operation, and creating a new environment for enterprise production innovation. A market-oriented environment with fair competition and orderly rules. Marketization contains many elements, such as financial marketization, land marketization, and labor marketization. Relevant laws and regulations must be improved to ensure the free flow of capital, land, labor and other production factors to create A market-oriented atmosphere of fair competition. At the same time, in order to prevent the government's offside and dislocation, it is necessary to improve the government's performance appraisal mechanism and increase the level of openness to the outside world.

5.2.3. Improve the Level of Opening up

Speeding up the process of opening up to the outside world and promoting technological exchanges between regions will be of substantial help to the improvement of China's technological innovation level, the transformation and upgrading of the industrial structure, and the digestion of excess capacity. Establish an international exchange and cooperation platform to deepen cooperation. Build a cooperation platform between countries, regions and regions, and actively organize world-level development exchange meetings to promote cooperation and exchanges between regions. Actively introduce foreign capital, rationally use and learn advanced technology brought by foreign capital, let domestic enterprises go out to explore the international market, integrate domestic and international resources to enhance their own industrial competitiveness, and achieve a win-win situation.

Acknowledgments

The 13th Five-Year Plan for the Development of Philosophy and Social Sciences in Guangzhou (2018GZGJ167): Research on deepening the Supply-side structural reform in Guangzhou and improving the quality of the supply system of listed companies.

Guangdong Provincial Youth Innovative Talents Project (2017WQNCX212): Research on Guangdong's economic structure under the coordinated growth of fiscal revenue and residents' deposits.

References

[1] Petra Ahrweiler. Agent-Based Simulation for Science,Technolo-gy,and Innovation Policy[J]. Scientometrics. 2017, 110(1): 391-415.

[2] Gran Roos.Design-Based Innovation for Manufacturing Firm Success in High-Cost Operating Environments [J]. She Ji: The Journa of Design,Economics,and Innovation,2016, 2(1):5-28.

[3] Gao Hongye. Western Economics (Micro Part)[M]. The fifth edition. Beijing: Renmin University of China Press, 2011.

[4] Schumpeter. Economic Development Theory [M]. Guo Wujun, Lu Yang, translated. Beijing: China Publishing House, 2015.

[5] Li Keqiang. 2017 State Council Government Work Report [R]. Beijing: The Fifth Session of the Twelfth National People's Congress, 2017.

[6] Zhou Zhitai, Zhang Xiaojiao. A review of research on Supply-side reform[J]. Journal of Wuyi University (Social Science Edition), 2016, 18 (4): 54-58.

[7] Wu Yuming. Research on the Application of Spatial Econometric Models in Provincial R&D and Innovation[J].Quantitative Economics and Technical Economics,2006(05):74-85+130.

ISSN: 2688-9323

[8] Li Lin. Research on the mechanism and empirical research of R&D investment, technological innovation and regional economy[D]. Jilin University, 2013.

[9] Wang Zichen, Guo Jiangjiang. Analysis of the interactive relationship between technological innovation and economic growth from the perspective of Supply-side structural reform[J]. Theory Construction, 2016, (5): 21-26.

[10] Peng Diyun. The internal logic and policy recommendations for the development of a new economy and Supply-side structural reforms under the new normal [J]. Enterprise Economy, 2017, (4): 5-11.