

Research on the Impact of Government Technical Expenditures on Regional Economic Growth in Fujian Province

Yingchao Bai^{1,2}, Haihong Guo^{2,*}

¹School of Business, Macao University of Science and Technology

²College of business administration, Heyuan Polytechnic

*Corresponding author. Email: guohaihong126@126.com

ABSTRACT

In recent years, many local governments have increased their financial expenditure on science and technology, hoping to promote the development of local economy by strengthening their support for science and technology. Taking the prefecture-level cities in Fujian Province as the research object, this paper empirically analyses the effect of government technical expenditure on the level of economic development from 2002 to 2018, and discusses the different effects of different types of patents on the level of economic development. The study found that the government technical expenditure of Fujian Province significantly promoted the regional economic development, the invention patent played the strongest role in promoting the economic development, followed by utility model patent and design patent is the weakest, and the corresponding development suggestions are put forward.

Keywords: Government Technical Expenditure; Innovation; Economic Growth; Fujian Province

1. INTRODUCTION AND LITERATURE REVIEW

Science and technology are the primary productive forces. Under this background, more and more local governments began to increase their financial support for science and technology, hoping to promote the development of local economy by strengthening government support for science and technology. In recent years, scholars have paid close attention to this problem and carried out a lot of research.

Pu Xiaosong (2019) takes 283 prefecture-level cities in China as the research object, used the quantile model to analyze the effect of government technical expenditure on economic growth, and found that government technical expenditure has obvious promoting effect on economic development; Among them, the expenditure on science and technology plays a greater positive role in promoting cities with lower economic development level [1]. Xu Saiyan (2019) studied the promotion effect of government technical expenditure on economic development in Zhejiang Province, and analyzed its spatial effect [2]. Xu Li and You Zilei (2018) analyzed the effect of government technical expenditure on regional economic growth in

Tibet province through static and dynamic regression models [3]. Chi Zixian and Wu Sha (2017) analyzed the promotion effect of government technical expenditure on economic development in Jiangxi Province, and put forward development suggestions that the proportion of government technical expenditure should be increased [4]. Zhang Weilin (2016) used panel data to analyze the role of government technical expenditure in Fujian Province through cointegration test [5]. Hu Xinran and Lei Liang (2014) analyzed the role of government technical expenditure in economic development from the national perspective, and discussed the specific contribution degree [6]. Wang Jingyuan (2014), taking Suzhou as the research object, found that the total financial expenditure in Suzhou was insufficient and the structure was unreasonable, which led to the insignificant effect of government technical expenditure on economic growth, and put forward corresponding development suggestions [7]. Li Nan, Deng Li (2019), by building a provincial dynamic panel model, revealed that the impact of government technical expenditure on the intensive level of economic growth has a promoting effect, and there are regional differences [8].

However, some scholars believe that the promotion of government technical expenditure to economic

development is not obvious. Yan Ting et al. (2020) found that the financial resources in Liaoning province gradually weakened their support for science and technology, which led to the insignificant effect of financial expenditure on economic development [9]. Wang Xiaofang (2016), through econometric model, found that government technical expenditure is a one-way causal relationship between technological innovation and economic development, but the positive effect of government technical expenditure on economic development is not obvious [10].

In order to analyze the effect of government technical expenditure on local economic development, this paper takes Fujian Province as the research object, empirically analyzes the promotion effect of government technical expenditure on local economic development based on the panel data from 2002 to 2018, further discusses the effect differences of different patent achievement types on the improvement of economic level, and puts forward corresponding development suggestions.

2. RESEARCH DESIGN

2.1. Model setting

The core explanatory variable of this paper is the support of government finance for scientific and technological innovation, and the explained variable is the level of economic development. The model is set as follows:

$$\lnpgdp_{it} = \alpha + \beta_1 \lnkjzc_{it} + \beta_2 Z_{it} + \varepsilon_{it} \quad (1)$$

Among them, \lnpgdp_{it} represents the economic development level of city i in t year, \lnkjzc_{it} represents the support of government finance for scientific and technological innovation, Z_{it} represents a series of control variables, and ε_{it} is a random disturbance term. If the empirical results show that β_1 is significantly positive, it means that financial support for science and technology promotes economic development; On the contrary, it means that financial support for science and technology has failed to effectively promote economic development.

2.2. Sample and data description

In order to better reflect the regional economic development, the economic development level (\lnpgdp) in this paper is represented by logarithm of per capita GDP. The support of government finance for scientific and technological innovation can improve local production efficiency through the production of scientific and technological achievements such as patent achievements, so as to promote the rapid development of local economy. Based on the research of Zhang

Weilin(2016) and Wang Jingyuan(2014), the support of government finance for scientific and technological innovation (\lnkjzc) is represented by the logarithm of local government technical expenditure.

In order to reduce the impact of other factors on economic development, this paper also selects some variables to control. The development of industrial structure($cyjg$), especially the development of secondary industry and tertiary industry, can effectively promote the improvement of local economic development level, which is represented by the ratio of GDP of secondary industry to tertiary industry in this paper. The level of financial development(fe) reflects the activity of local finance, and the loan level of financial industry provides financial support for economic development, so this paper is represented by the ratio of ending loan balance to ending deposit balance of financial institutions. Talents are the fundamental driving force of economic development, and the personnel receiving higher education are an important force for high-quality economic development, so this paper uses the logarithm of the number of students in Colleges and universities to represent the education level(\lnedu). The level of foreign investment(\lnfdi) can expand employment and bring new knowledge and technology, so this paper uses the logarithm of the actual amount of foreign investment to represent the level of foreign investment. The data sources of this paper are China Urban Statistical Yearbook and Chinese Research Data Services. The descriptive statistics of variables are shown in Table 1.

Table 1 The descriptive statistics of variables

variable	mean	p50	sd	min	max	N
\lnpgdp	10.448	10.546	0.715	8.92	11.94	153
\lnkjzc	9.443	9.605	1.675	4.654	12.562	153
$cyjg$	1.286	1.302	0.287	0.697	1.831	153
fe	0.814	0.809	0.149	0.312	1.223	153
\lnedu	10.382	10.091	1.219	7.849	12.679	153
\lnfdi	10.38	10.325	1.289	7.455	12.379	153

3. ANALYSIS OF EMPIRICAL RESULTS

3.1. Empirical regression analysis

In order to better control the impact of individual differences, this paper uses fixed effect for empirical analysis, and gradually adds control variables to the effect of Government technical expenditure on economic development. The empirical results are shown in Table 2. The regression results show that whether the control variable is added or not, the effect of government technical expenditure on economic development is significantly positive, indicating that government technical expenditure has significantly promoted regional economic development. Further

analysis shows that the coefficients of regional education level and financial development level are significantly positive, and other control variables are not significant on the whole, indicating that from the overall perspective of Fujian Province, the number of students

in local universities and the proportion of loans in the financial industry can effectively promote the improvement of economic development level, and other influencing factors are not obvious enough.

Table 2 The impact of government technical expenditure on regional economic development

	(1)	(2)	(3)	(4)	(5)
	lnpgdp	lnpgdp	lnpgdp	lnpgdp	lnpgdp
lnkzjc	0.396*** (13.15)	0.386*** (14.29)	0.358*** (12.94)	0.268*** (6.75)	0.268*** (6.47)
cyjg		0.320 (1.51)	0.340* (1.88)	0.263 (1.33)	0.263 (1.29)
fe			0.639** (2.78)	0.735** (2.97)	0.736** (2.96)
lnedu				0.324** (2.42)	0.323** (2.32)
lnfdi					-0.00132 (-0.03)
_cons	6.709*** (23.60)	6.390*** (28.13)	6.106*** (41.62)	3.621*** (3.40)	3.635** (2.74)
N	153	153	153	153	153
r2	0.840	0.849	0.861	0.871	0.871
r2_a	0.839	0.847	0.858	0.867	0.866

Remarks: *t* statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, the same below.

3.2. Robustness test

This paper uses alternative explanatory variables to test the robustness. The important output of financial investment in science and technology is patent achievements. Therefore, this paper takes the logarithm of total patent authorization (Intzl), the logarithm of total patent applications (Intzl2) as the explanatory variable, and the logarithm of per capita GDP as the explained variable to test the robustness of the impact of government technical expenditure on economic development. The test results are shown in Table 3.

The results show that after replacing the explanatory variable, whether the control variable is added or not,

Table 3 The test results of alternative explanatory variables

	(1)	(2)	(3)	(4)
	lnpgdp	lnpgdp	lnpgdp	lnpgdp
Intzl	0.506*** (23.77)	0.398*** (16.76)		
Intzl2			0.535*** (23.20)	0.421*** (16.42)

_cons	6.936*** (46.94)	4.491*** (5.99)	6.616*** (40.05)	4.595*** (5.86)
Control variable	no	yes	no	yes
N	153	153	153	153
r2	0.932	0.959	0.904	0.941
r2_a	0.932	0.957	0.903	0.939

the coefficient of economic development level is significantly positive, which shows that the previous empirical results are robust.

4. FURTHER RESEARCH AND ANALYSIS

The output of financial investment in science and technology is mainly patent achievements, which can be subdivided into invention patents, utility model patents and design patents. In order to deeply analyze the heterogeneity of different outputs of financial investment in science and technology, this paper takes the logarithm of total invention patents (lnfpapl), the logarithm of total design patents (lnwpapl) as explanatory variables, and takes the logarithm of per capita GDP as explained variables for further regression

analysis, The analysis results are shown in Table 4.

Table 4 The inspection results of further research and analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	lnpgdp	lnpgdp	lnpgdp	lnpgdp	lnpgdp	lnpgdp
lnspapl	0.519** * (58.15)	0.360*** (30.09)				
lnwpapl			0.458*** (48.82)	0.262*** (23.25)		
lnfpapl					0.416*** (47.92)	0.309*** (28.42)
Control variable	no	yes	no	yes	no	yes
_cons	7.170** * (143.03)	3.556*** (13.50)	7.920*** (177.88)	2.448*** (7.85)	8.019*** (185.68)	4.700*** (18.45)
N	4772	4653	4717	4611	4760	4645
r2	0.750	0.824	0.619	0.775	0.781	0.842
r2_a	0.750	0.824	0.619	0.774	0.781	0.842

The results show that after adding control variables, the invention patent has the strongest promoting effect on economic development, while the design patent has the weakest promoting effect.

5. CONCLUSIONS

This paper takes the financial investment in science and technology as the explanatory variable and the per capita GDP as the explained variable. The empirical analysis shows that the financial investment in science and technology in Fujian Province has significantly promoted the improvement of local economic development level. In addition, this paper tests the robustness of the transformed explanatory variables, and the test results show that the research conclusion is robust. In order to strengthen the role of financial investment in science and technology in promoting economic development, it is suggested that Fujian Province consider the following development measures.

First, local governments should attach great importance to the role of financial investment in science and technology in economic development, increase government support for science and technology industry, steadily increase the total financial expenditure on science and technology.

Second, local governments should optimize the structure of government technical expenditure and improve the use efficiency of funds. When arranging financial science and technology funds, local governments should improve the expenditure structure of science and technology funds, focus on enterprises and institutions focusing on invention, and strengthen the intensity of science and technology expenditure to

promote economic development. The government should be inclined to the scientific and technological activities dominated by practical new-type patent, so as to improve the possibility of the final transformation of scientific and technological expenditure into productivity. Finally, the government should appropriately reduce the financial support for design scientific research activities.

Third, the government should strengthen the training of scientific and technological talents. Local governments should pay more attention to the training and reward of scientific and technological talents, and set up special funds for the training of scientific and technological talents, so as to continuously improve the innovation level of local scientific and technological talents and further promote the improvement of regional economic development level.

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REFERENCES

[1] Pu Xiaosong. Panel quantile model calculation and analysis of the impact of science and technology expenditure on economic growth-the test of 283 prefecture-level cities [J]. Science and Technology

- Entrepreneurship Monthly, 2019,32(11):68-73.
- [2] Xu Saiyan. The spatial effect of government technical expenditure and economic growth-based on the perspective of prefecture-level cities in Zhejiang Province [J]. *China Business Theory*, 2019,(13):177-179.
- [3] Xu Li, You Zilei. An Empirical Study on the Relationship between Tibet's Government technical expenditure and Economic Growth [J]. *Journal of Tibet University for Nationalities (Philosophy and Social Sciences Edition)*, 2018,39(04):94-99.
- [4] Chi Zixian, Wu Sha. Empirical analysis of the impact of government technical expenditure on economic growth in Jiangxi[J]. *Economic Research Reference*, 2017,(17):33-39.
- [5] Zhang Weilin. Empirical analysis on the impact of Government technical expenditure on economic growth in Fujian Province [J]. *Modern commerce*, 2016 (08): 69-71
- [6] Hu Xinran, Lei LIANGHAI. Analysis on the contribution of Government technical expenditure to economic growth in China [J]. *Statistics and decision making*, 2014 (05): 135-137.
- [7] Wang Jingyuan. An empirical analysis of the relationship between government technical expenditure and economic growth in Suzhou [J]. *Journal of Chongqing University of Science and Technology*, 2014(02):81-82.
- [8] Li Nan, Deng Li. Does the government technical expenditure improve the intensive level of economic growth-an empirical test based on provincial panel data [J]. *Xinjiang Finance and Economics*, 2019,(06):5-15.
- [9] Yan Ting, Wang Jia, Wang Feng. Study on the economic growth effect of Government technical expenditure in Liaoning [J]. *Journal of Party and government cadres*, 2020 (08): 55-62.
- [10] Wang Xiaofang. An empirical study on government technical expenditure, technological innovation and economic growth-taking Guangdong Province as an example [J]. *Journal of Lanzhou University of Arts and Sciences*, 2016,32(05):78-82.