Advanced Materials Research
ISSN: 1662-8985, Vols. 403-408, pp 2354-2358
doi:10.4028/www.scientific.net/AMR.403-408.2354

Online: 2011-11-29

Empirical Analysis of Relationship between the Government Technical Investment and Economic Growth - Take Shaanxi Province as example

Wang Yan[1,a], Wu Jie[2,b]

[1]Economics and Management Faculty in Xi'an University of Technology, Shaanxi, Xi'an

[2]Teaching and Research Faculty of Ideological and Political of Xi'an University of Technology, Shaanxi, Xi'an

[a]nwuwanyan@163.com, bwujie1124@163.com

Key Words: Shaanxi province; technical investment; economic growth; cointegration.

Abstract. According the data from 1995—2008, this paper has analyzed empirically the relationship between technical investment and economic growth in Shaanxi province government. The result showed that technical investment of Shaanxi province government has greatly improved the economic growth; however, there was big gap between the whole investment scope and the specific scopes of different districts and provinces and, the technical investment take a comparative small scale on the whole finance expenditure or GDP. So, this paper pointed out some suggestions to optimize technical investment of Shaanxi government, that to improve pluralism technical investment system, help universities to enhance multi-research & exploration and enhance the establishment of the army and the people scientific and technological innovation system.

Introduction

Presently, the world economy dependent on science and technology increasingly, whatever developed, developing countries or underdeveloped countries highly attend to the development of national science and technology. This paper from the analysis of financial technology investment in Shaanxi Province, the status quo of government science and technology inputs on the size and proportion of the total scale of in-depth analysis, and analyzes the science and technology investment in Shaanxi Province the role of economic growth, to discover the existence of the Shaanxi provincial government investment in science and technology issues for science and technology investment to optimize the government of Shaanxi Province, the rational allocation of financial resources to reference recommendations.

Analysis of Shaanxi provincial government investments in science and technology.

Funding for major scientific and technological activities from government, business and financial institutions loans etc. Shaanxi Province, the main source of funding science and technology activities from the government.Shaanxi Province funding for science and technology activities raise a total of 277.4057 million Yuan in 2008, of which 137.2637 million Yuan of government funds, accounting for 49.48% of the total; corporate capital 115.6043 million Yuan, accounting for only 41.67%, a smaller proportion; 11.9772 billion in loans from financial institutions, accounted for 4.31%, other funds 12.5605 billion. [1]

Longitudinal comparative analysis of science and technology investment of Shaanxi Provincial Government.

Government Technology Investment broader scope. The form is mainly financial technology spending. Financial Technology including Technology Promotion, scientific research and operating expenses and capital costs. [1]

[1]Statistical Yearbook of the "scientific infrastructure costs in Shaanxi Province," there is no clear statistics to the "Financial Technology", referring only to "Technology Promotion" and "scientific operating expenses", the Ministry of Finance of the Government revenue and expenditure classification reform in 2006, abolition the

First, the analysis of the total scale, we can see that science and technology investment, from the Shaanxi provincial government in 1995 is 170 million Yuan, reaching 1.33 billion Yuan in 2008, 17.14 billion Yuan, more than 10 times in 1998, the total can be seen to increase government investment in science and technology.

Second, from the analysis the proportion of scale, including the Shaanxi provincial government investment in science and technology expenditure and GDP, accounting for the proportion of two ways. With the development of western countries such as the implementation of preferential policies, rapidly GDP growth in Shaanxi Province, fiscal expenditure. Through analysis we can see science and technology investment in 1995, the proportion of total expenditure was 1.66% and it accounted for 0.25% in 2008, the Shaanxi provincial government science and technology investment overall proportion is GDP, remained at 0.2%, the proportion of small and fluctuating state.

In short, the above analysis we can see although the surface of the Shaanxi provincial government investment in science and technology increased, but in fact can be seen from the ratio of the scale, Government Technology Investment in correspondingly reduced with the increase in fiscal expenditure and GDP.

Comparative analysis of the horizontal of Shaanxi provincial government investment in science and technology.

The paper selected economic representative in Beijing, Shanghai and Sichuan Province was compared.

First, from a comparative analysis on the total amount of the details shown in Figure 1.

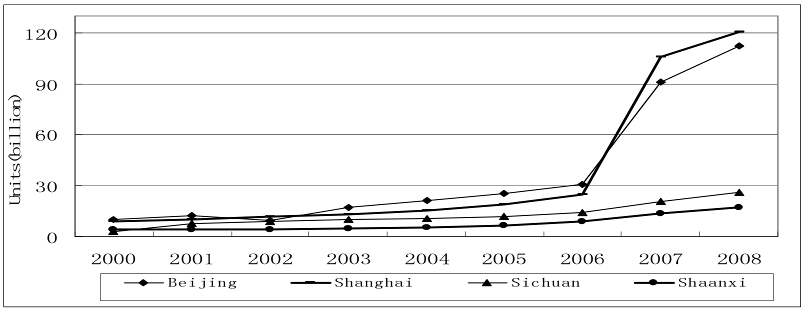

Figure 1 More representative of the regional economy and the province of Government Technology Investment case
Source: 2001-2009, "China Statistical Yearbook."

Second, the analysis from proportion of scale, Compared the proportion of total fiscal expenditures in science and technology investment, the results shown in Figure 2. Compare the state of the proportion in GDP and investment in science and technology, the results shown in Figure 3.

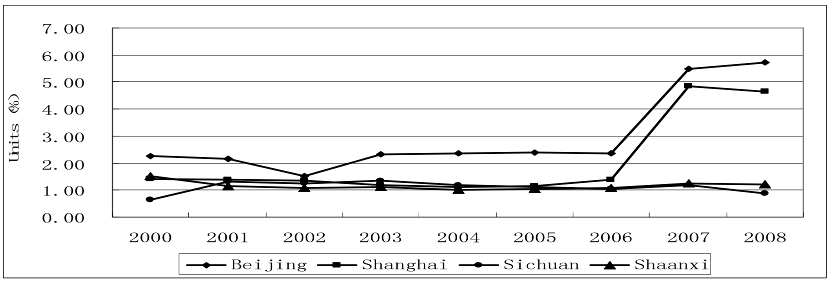

Figure 2 Comparison of representative areas of the economy and the province of government science and technology into account the proportion of financial expenditure
Source: 2001-2009, "China Statistical Yearbook."

Ministry of Finance of the Government revenue and expenditure classification reform in 2006, abolition the "Technology Promotion" and "scientific operating expenses", and set up a "science and technology", therefore, "Financial Technology" means the "science and technology" in 2007 and 2008.

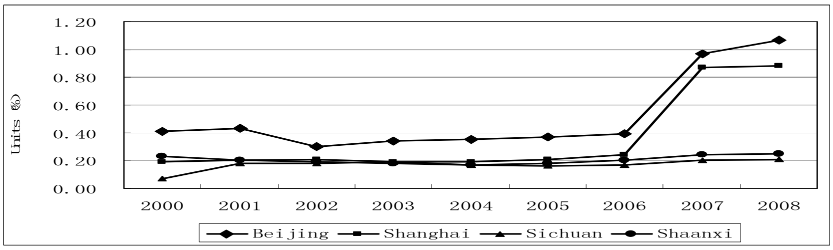

Figure 3 More representative of the regional economy and the province of government Investment in GDP, Science and Technology

Source: 2001-2009, "China Statistical Yearbook."

In short, the above analysis we can see that investment in science and technology activities in Shaanxi Province mainly from governments. With the increase of fiscal expenditure and GDP, longitudinal analysis showed that the Shaanxi Provincial Government Technology Investment in correspondingly reduced. Compared with Beijing, Shanghai and Sichuan the amount invested of Shaanxi Province is the least. Comparative Government Technology Investment expenditure and GDP, total financial situation can be found, since 2006 among Shaanxi Province and Beijing and Shanghai, the gap is bigger and bigger, and the gap does not reassert the Sichuan, Shaanxi provincial government lateral analysis is obviously insufficient investment in science and technology.

The regression Analysis of Shaanxi Provincial Science and Technology and Economic Growth.

We need to do the Regression Analysis in order to deep analysis of the use of funds in Shaanxi Provincial Science and Technology and know the power of Shaanxi government science and technology investment to the economic growth.

Variables and data.

Data were used in this section summarized above, the Shaanxi provincial government in 1995-2008 GDP value and the value of science and technology input in the basis of collected data, through Eviews5.0 software, the Shaanxi provincial government investment in science and technology (STI) and GDP data is doing regression analysis. The first GDP of Shaanxi Provincial Science and Technology and by the year of price data for unified constant prices of 1978 to adjust.

The test of Unit root.

Time series data is more non- stationary, which would not change the nature of the original sequence on the number of treatment and can be excluded from the impact of heteroscedasticity. So the number of the original processing of the data obtained LNSTI and LNGDP time series data. To analyze the relationship between the existences of, understanding the distribution of random variables and the trend to make the two maps and scatter, respectively, as shown in Figure 4 and Figure 5.

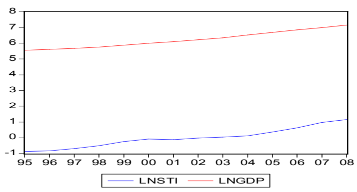

Figure4 LNSTI and LNGDP the trend

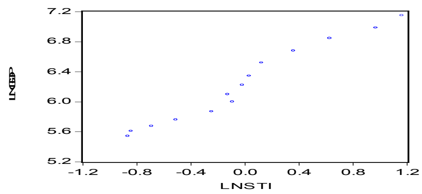

Figure5 LNSTI and LNGDP the scatter

As can be seen from Figure 4, LNSTI and LNGDP linear trend of the two variables, Figure 5 also shows a correlation between the two and we can be further regression analysis. After inspection of the number of stationary sequences, methods for the unit root test (unit root test), the specific methods are six: ADF test, DFGLS test, PP test, KPSS test, ERS test and NP testing. This paper selects ADF (Augmented Dickey-Fuller Test) test method (ADF 5% critical value of the check).

Table 1 ADF unit root test results

Sequence	Inspection Type	ADF test value	1% critical value	5% critical value	10% critical value	Conclusion
LNGDP	（c,t,2）	-1.903573	-4.886426	-3.828975	-3.362984	Unstable
LNSTI	（c,t,2）	-2.119017	-4.992279	-3.875302	-3.388330	Unstable
△LNGDP	（c,0,2）	-1.481121	-4.121990	-3.144920	-2.713751	Unstable
△LNSTI	（c,t,2）	-2.119017	-4.992279	-3.875302	-3.388330	Unstable
$\triangle^2$LNGDP	（c,0,2）	-3.758778	-4.420595	-3.259808	-2.771129	stable
$\triangle^2$LNSTI	（c,0,2）	-3.300970	-4.200056	-3.175352	-2.728985	stable

Note: △ indicates that the variable first-order differential: $\triangle^{2}$, said variable second-order difference; Inspection form (c, t, k) of the c, t and k represent the unit root test equation including the constant term, time trends and lagged order number.

By inspection, found LNGDP and LNSTI differenced twice to become stationary series, the original second-order single whole sequence is that LNGDP ~ I (2); LNSTI ~ I (2). Based on cointegration theory, if two variables are single integer variable, and only when it's the same one the entire order is only possible cointegration. [2]So we can determine that the LNSTI and LNGDP exist cointegration relationship between variables.

Cointegration test.

By the previous stability test sequence shows, LNSTI and LNGDP are second-order single whole, to meet the prerequisite for cointegration test, the EG test, with the OLS estimates on the Long linear regression equation obtained as follows:

$$LNGDP = 6.2457 + 0.8330 * LNSTI \qquad [1]$$

$$(220.8614) \qquad (17.79696)$$

$$R^2 = 0.963496, \quad F = 316.7318, \quad D.W. = 0.598772$$

Among them, the figures in brackets are the corresponding parameter of the t test value, R^2 is the coefficient of determination, F, and DW is the two test statistics. Need to look after the estimated model parameter estimates, due to the presence of fluctuations in the sampling and selection of the different estimation methods, the estimated parameters will be incorrect. In this regression model, using the coefficient of determination R2 to test the model goodness of fit, the statistics are more close to 1, the higher the goodness of fit model, it is easy to see, R^2 = 0.963496, the model goodness of fit Degree better. But DW = 0.598772, look-up table (n = 14, k = 2, a = 5%), have dL = 1.045, dU = 1.350, as DW = 0.598772 <1.045, so the model has first order autocorrelation.

Regression analysis of generalized differential.

The model of time series data sample often occur in the serial correlation, serial correlation model is the random disturbance term violates the basic assumption of mutual independence. So we need to remedy and the development of new methodologies to estimate the model. A method of dealing with serial correlation in the generalized least squares and generalized difference method, the most commonly used is the generalized difference method .The results are as follows:

$$LNGDP = 6.2377 + 0.8993 * LNSTI + [AR(1) = 1.0995, AR(2) = -0.7453] \qquad [2]$$

$$(199.4658) \quad (14.44342) \qquad (4.661832) \quad (-2.880370)$$

$$R^2 = 0.986719 \qquad F = 198.1220 \qquad D.W. = 2.575909$$

After adjustment model, DW = 2.575909, n = 12, k = 2, look-up table may have $d_L = 0.971$, $d_U = 1.331$, $d_U < DW < 4 - d_U$, that show model has no autocorrelation. Followed by partial correlation coefficient test, also shows that there is no autocorrelation, therefore, the model has been eliminated from the correlation. And from the regression analysis of the residuals of generalized differential trends can be seen, the model fitting results are satisfactory on historical data. So the variable regression equation [2] is the cointegration equation, the long-term equilibrium relationships is between two variables. Regression coefficient of 0.8993 is the coefficient of elasticity of that one variable causes another variable is the relative change in the relative changes in the measure. It is the ratio of the rate of change of variables. In short, through the above analysis we can see that between 1995 and 2008, the Shaanxi provincial government investment in science and technology on a larger role in economic growth, the growth of Government Technology Investment is 1%, it can promote the growth of GDP of 0.8993 percent.

Conclusions and recommendations.

In order to give full play to the role of technology in promoting the economy, for the Development of Shaanxi Province and the problems can be improved from the following aspects:

First of all, improve the diversification of science and technology investment system. Shaanxi provincial government should improve the social scientific and technological input increasing expenditure on the basis of co-ordinate local research institutions, the central research institutes, and universities, businesses and social and technological forces, pooling strengths.

Second, supporting schools to strengthen joint research and development. Shaanxi Province has 76 colleges and universities into the national "211 Project" universities for key construction with 8, 126 national key disciplines in 2008 totally. [3]Shaanxi Province must use the university research spillovers fully to provide a solid scientific basis for human and material.

Finally, strengthening the military and civilian science and technology innovation system. Shaanxi Province is one of China's defense industrial base, military, strong technological resources, science and technology into the vast majority of them are used for defense research. The Shaanxi provincial government should strengthen the construction of military and civilian technology innovation system, stepping up military and civilian, to promote regional economic development.

Thanks. Humanities and Social Science Fund, Ministry of Education Youth Project, “DEA-based government and public R&D intensity of effect” (item number 09 XJC630009); Soft Science Foundation of Shaanxi Province,” Financial Investment in Shaanxi Province and the target strength of performance evaluation” (item number2009KRM78).

References

[1] Information from the “Shaanxi Statistical Yearbook (2009)."

[2] Li Zi Nai and Pan Wen Qing, in: Econometrics. Beijing: Higher Education Press, 2005 (4).

[3] Information from the http://www.sninfo.gov.cn