

Enterprises Independent Innovation and Government Public Expenditure

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Abstract. Fiscal policy, as one of important tools of government's macro-control and adjustment, cannot be substituted by other economic ways for building independent innovation strategy. Now government public expenditure on independent innovation includes financial expenditure on both science and technology and R&D. But there are some issues what reduce domestic enterprises' abilities to innovation, such as insufficient public financial investment, unreasonable R&D expenditure structure and so on. So government public expenditure policy should be carried out and perfected accordingly for implementing dependent innovation strategy.

Keywords: independent innovation; public expenditure; science and technology; R&D

1. Introduction

For a long time, the question of many domestic enterprises excessively depending on foreign technology has occupied a central place in China's economy development. Domestic enterprises' abilities to independent research and innovation are too inadequate to be the real entity of science and technology progress. To avoiding this trend, policymakers introduce the strategy of independent innovation. Fiscal policy, as one of most important tools of government's macro-control and adjustment, can not be substituted for improving independent innovation by other economic ways. Criteria no more than fiscal policy must be considered when comparing alternatives. Before proceeding, we must discuss aspects of fiscal policy about independent innovation. It comes from: (1) public expenditure policy, including science and technology expenditure and R&D expenditure; (2) tax policy, mainly due to favorable tax provision. Since tax system reform in 1994, China government has carried out many favorable tax policies to stimulate domestic innovation activities. The statistics shows that tax exemptions and deductions for new and high-tech development enterprises are up to ¥25 billion in 2003, ¥70 billion in 2004[1]. Because of limitation, we do not attempt to discuss tax policy. So this paper will present a framework for government public expenditure influence on independent innovation and then use this framework to give some suggestions. We will discuss them in detail on the following.

2. Independent Innovation and Public Expenditure on Science and Technology

We begin by some information on the present government public expenditure policy. Notions concerning independent innovation are government's spending activities on both science and technology and R&D.

2.1 Presence

To understanding significance of the fact, we require a definition of science and technology expenditure. A part of public funds are directly input by government to new and high- tech development enterprises,

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research institutes and universities available for studying. So it reflects on the extent that government supports independent innovation.

Tab. I shows the data about China public expenditure on science and technology for selected years since 2000. In 2000, science and technology expenditure is about ¥58 billion and then increases ¥178 billion in 2007. However, the trend has been upward continuously overtime.

TABLE I. PUBLIC EXPENDITURE ON SCIENCE AND TECHNOLOGY

Year	Science and Technology Expenditure(billion)	Percent of Public Expenditure (%)	Percent of GDP (%)
2000	57.56	3.6	0.58
2001	70.33	3.7	0.64
2002	81.62	3.7	0.67
2003	97.56	4.0	0.71
2004	109.5	3.8	0.68
2005	133.49	3.9	0.72
2006	168.85	4.1	0.80
2007	178.30	3.6	0.71

Source: from Yearbook of China Statistics, 2008

2.2 Questions

If observing carefully, comparing with total public expenditure and GDP, we will find the presence of a lot of inadequacy for independent innovation.

- Firstly, in recent years, although government spending on science and technology has been increasing steadily, which the increasing rate is 16% annually, total public expenditure increases is higher than the part of science of technology expenditure. The increasing rate of public expenditure gets to 18% in the same time. Fig. 1 depicts this situation. As mean while, tab. I tells us that independent innovation, the percent of total public expenditure, has been not fluctuating so long term and is always about 4% as well as. It also indicates that the level of government supporting available to independent innovation is too low.

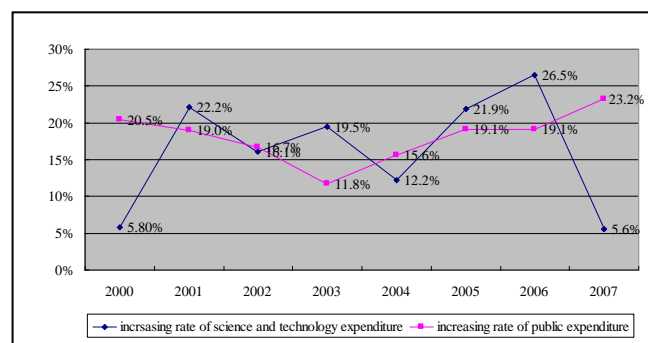


Figure 1. Increasing Rate of Science and Technology Expenditure and Public Expenditure

- Secondly, considering the economy development, the proportion of science and technology expenditure to GDP is always less than 1% over the observation period. Given international standard in Tab. II, if government science and technology expense, the percent of GDP, is under 1%, it is assumed to inadequate abilities to innovation. As far as concerned, we can make a basic conclusion that China has been deficient in independent innovation. The official activities miss important simultaneous relationship in the level of economic development available to science and technology progress and innovation.

TABLE II. INTERNATIONAL STANDARD OF INNOVATION

Science and Technology Expenditure/GDP	Ability to Innovation
<1%	low
1%-2%	middle
>2%	high

3. Independent Innovation and Public Expenditure on R&D

We turn now from a discussion of government R&D funds related to independent innovation. R&D funds are main source of enterprises' activities on research and development. So how much government input and what government play a role are very important factor when measuring abilities to independent innovation for one country. Before discussing, distinguishing difference between input-scale and input-intensity of R&D is needed. Input-scale of R&D refers to the total level of government spending on R&D in any year. While input-intensity of R&D is taken into account for computing the rate of R&D expenditure and GDP.

3.1 Input-Scale of R&D

Measures based on R&D expenditure, such as in Tab.III, suggest the appropriate position since the late 1990s. From 2000 to 2007, input-scale of R&D in China changes ¥89.6 billion to ¥371 billion. The annual raising rate of R&D input reaches 23.8%, which the speed is very high even in the whole world.

TABLE III. R&D EXPENDITURE

Year	R&D Expenditure (billion)	Proportion to GDP (%)
2000	89.6	0.9
2001	104.2	0.95
2002	128.7	1.07
2003	154.0	1.13
2004	196.6	1.23
2005	245.0	1.33
2006	300.3	1.42
2007	371.0	1.49

Source: from Yearbook of China Statistics, 2008

3.2 Input-Intensity of R&D

We must note from Tab. III as well. That is not optimistic. It allows us to obtain some strong information.

- However, only one-tenth of such GDP belongs to R&D since. The data also suggests that the proportion has been not increased sustainably over time. The share of expenditure going to enterprises R&D activities now is almost no than it was several years ago. Although the input intensity is higher than in developing countries, such as India, Brazil and so on, there is a great deal of gap with developed countries[2].
- Tab.IV depicts disparities of input-intensity of R&D in some developed countries for recent selected years. The table suggests that input-intensity of R&D in some developed countries exceeds 2%, especially 3% in Japan. While the share in China has been under 1.5% at all over this period. In fact, 1.5%, the goal put forward in 1995, should be achieved in 20th century. It has been not coming true today. The incidence of lack spending on innovation by government in China considerably lower than it is in other countries.

TABLE IV. INPUT-INTENSITY OF R&D

Year	US	Japan	France	Germany	Korea
2000	2.74	2.99	2.15	2.45	2.39
2001	2.76	3.07	2.20	2.46	2.59
2002	2.65	3.12	2.23	2.49	2.53
2003	2.68	3.15	2.18	2.52	2.63
2004	2.68	3.13	2.16	2.49	2.85
2005	-	-	-	-	2.99

Source: from [Http://www.stats.gov.cn](http://www.stats.gov.cn)

3.3 Source of R&D Funds

A related concept is source of R&D funds. It is popularly believed that R&D funds are from not only government but also enterprises own themselves. However, an appropriate share should be allocated in government and enterprises. Moreover, government plays more important role in supplying R&D funds. But in China, it is not at all. R&D funds mainly from enterprises themselves accumulated rather than government. The comparison, collectively referred to as source of R&D funds, is listed in Fig. 2. In US, Germany and France, except Japan and Korea, R&D funds supported by government has all been above 30 percent of total

funds in 2004 or 2005, while only 24.6% in China in 2007. Government funds are so low that seriously limit domestic enterprises innovating activities.

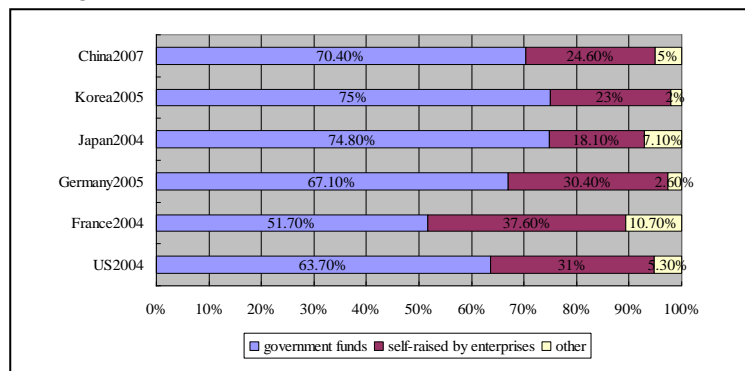


Figure 2. Source of R&D Funds

3.4 Structure of R&D Funds

Another consideration is the structure of R&D funds. According to estimation by OECD, R&D funds are devoted to basic research, applied research and experimental development as well. From an empirical point of view, the proportion of these three should belong to 15%, 25% and 60% [3]. It is clearly in Fig. 3 that in general, some developed countries, such as US, Japan, Korea accord with this condition. But in 2007 there only 4.7 percent of R&D funds is for basic research and 82% for experimental development in China. It is said that a great deal of funds is used to experimental development. The issue of government ignoring basic research must be thought a lot. As known, basic research is the beginning of researching and developing activities, which decides the level of the whole research course. Absences of basic research expenditure lead to weak competition for domestic enterprises in the market. So the government should change this failure and consider any problem for a long term.

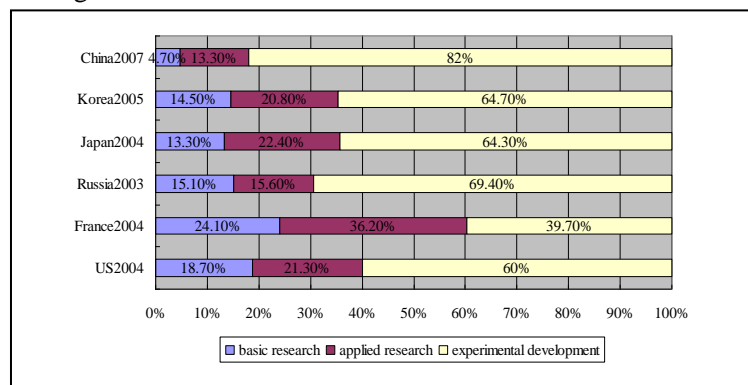


Figure 3. Structure of R&D Funds

4. Some Suggestions

As noted above, for some of independent innovation, the link between independent innovation and government public expenditure is quite weak. This helps explain why fiscal policy reform and adjustment is needed. In fact, government's spending activities are bond to change domestic enterprises innovating activities. More generally, it is true that virtually many important issues on independent innovation depend on financial expenditure policy. Undoubtedly, government should become the most important organizer and supplier in enterprises' independent innovation activities. Helping with public expenditure, more domestic enterprises can receive benefit in the event of government supporting. Moreover, government might be responsible to creating favorable development environment for every enterprise as possible, especially new and high-tech development enterprise. In short, some suggestions is following.

4.1 Increasing Government Expenditure on Independent Innovation

It is believed that an increase in any of public expenditure on independent innovation, other things being the same, increases an enterprise's capacity of independent innovation. Based on this thinking, government should change spending activities, which means to input more public funds so as to supporting more innovating opportunities for private sector.

1) *Setting up a stable system of increasing public expenditure on science and technology.*

a) Government should input more funds on the field of science and technology.

b) The increasing speed of public expenditure on science and technology would be higher than whole government public expenditure.

c) Government must enlarge the proportion of expenditure on science and technology to public expenditure.

d) Raise the percent of GDP as well.

2) *R&D funds should be adjusted.*

a) More R&D funds should be financed by public department rather than private sector.

b) Changing the situation of low input-intensity of R&D funds, it is said that increasing the proportion of R&D funds to GDP.

4.2 Limiting the Range of Government Expenditure

It is well known that one of responsibility of public finance might be to supply sufficient public goods for social members in order to solving market failure. Public expenditure, as a consequence, should focus on the field of public goods and market failure. For example, basic research is typical public goods. To seeking for the max profit, any enterprise cannot pay attention to basic research what cannot generate benefit right now. But in fact it is really the basis of the whole research and development activities and will make significant effect on independent innovation in the further. So in order to avoiding market failure, public finance must emphasize on supporting basic research and guarantee R&D funds of basic research increasing in advance. However, it is not refers to entirely giving up applied research and experimental development. Another effective way will do. For patent rights owned by competitive industry, public finance should try it best to draw private capital into new and high-tech industry with government guide and demonstration, including assurance provided by public finance, interest given by public finance etc.[4].

4.3 Optimizing Structure of Government Public Expenditure

China financial expenditure is close to ¥ 5000 billion in 2007, in which the largest program is expenditure on economic construction, equal to 30% of whole public expenditure. In addition, administrative expenses are too high, 20%, as well. These important issues indicate to unreasonable structure of public expenditure, because in the condition of the amount of public expenditure fixed, excessive other expenditure must occupy science and technology expenses. It is one of reason of low science and technology expenditure. In brief, the structure of government public expenditure should be adjusted as follows:

- Decreasing public expenditure on economic construction, means that public finance withdraw from the field of competitive industry. Where efficient market system does not needed to be handed in by government.
- Government should reduce administrative expenses. Administrative cost holding a very high level is one of outstanding problems in the administrative management in China. But it is so complicated.
- Repeatedly, it is significant to increasing public expenditure on science and technology.

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