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Experiences of Diversified Investment in Basic Research

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Abstract

Basic research is the source of the whole scientific system. How to improve the efficiency of diversified investment in basic research is of special significance to the development of basic research in China. Therefore, this paper combines China's basic research investment dilemma, draws on the excellent experience of the United States, Japan and other advanced countries, further develops the fund-raising channels for basic research, guides social capital to fund basic research in the form of donations or the establishment of foundations, etc., and promotes the high-quality development of basic research in China.

Keywords: basic research, diversified investment, the United States, Japan

1. Introduction

As the foundation for creating and accumulating new knowledge and supporting continuous innovation, basic research plays an important role in leading social and economic development. To further strengthen basic scientific research, China has issued several important policies and plans, including a regulation that mentions "basic research" 15 times, which shows that China attaches great importance to basic research. Basic research has the property of public goods, coupled with high risk and difficult to see the effect in the short term, so basic research generally relies on government investment. However, many theoretical studies also show that the efficiency of government investment is mainly reflected in "compensating for market failure" and "guiding social capital", i.e., there is a gap between government investment and social investment.

As the highest award in the field of basic research, the number of Nobel Prizes awarded is often regarded as an important indicator of a country's scientific and technological capabilities and original innovation capacity. Since the twenty-first century, Japan has been rapidly developing in the field of basic research, with a total of 20 awards, and in the latest announcement of the 2021 Nobel Prize in Science, U.S.-born scientists occupy 70%, including one Japanese-American scientist. As shown in Figure 1, the overall scale of basic research investment in the United States is much larger than that in Japan and China, where the level of basic research investment in China is larger than that in Japan, but the intensity of basic research in China is much smaller than that in Japan.

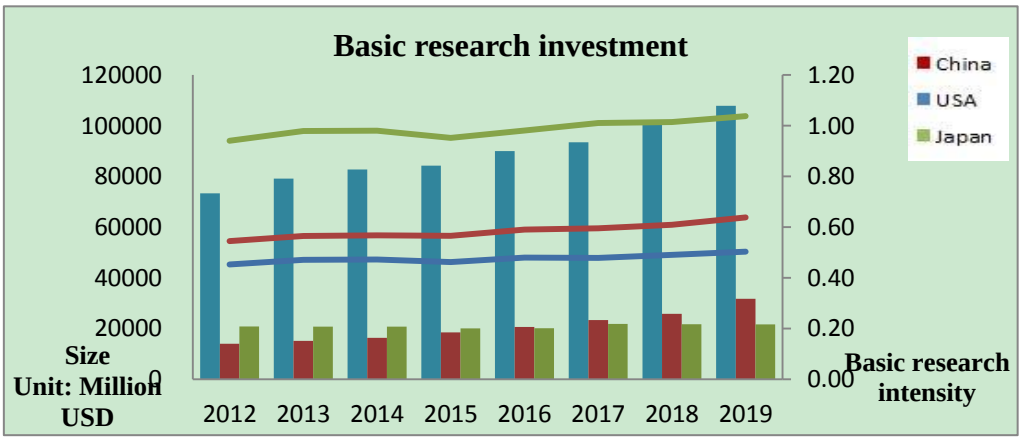

Figure 1. Basic research investment in China, the United States and Japan

In 2020, the investment in basic research in China will increase from 32.45 billion Yuan in 2010 to 146.7 billion Yuan, and the intensity of basic research will increase from 0.08% to 0.14%(China Science and Technology Statistics). In the final account of the central fiscal expenditure in 2020 published by the Ministry of Finance, the national general public budget expenditure applied to basic research is 88.055 billion Yuan. Among them, the central government spent 62.536 billion Yuan and local governments spent 25.519 billion Yuan. Although the scale of investment in basic research in China is expanding, the overall volume of basic research funding in China is not enough to meet the current trend of rapid development of basic scientific research, and it is urgent to optimize the investment structure and form a stable and diversified investment mechanism to ensure sufficient funding for basic research in the long term. In response to the problem of unreasonable investment structure of basic research funding in China, in 2018, the State Council issued "Several Opinions on Comprehensively Strengthening Basic Scientific Research" (Guo Fa, 2018, No. 4), proposing to "strengthen stable support, optimize the investment structure, build a diversified investment mechanism for basic research, and guide and encourage local, corporate and social forces to increase investment in basic research "The national "14th Five-Year Plan" and the latest revision of the Science and Technology Progress Law also proposed that "the state will guide enterprises to increase investment in basic research, and encourage social forces to invest in basic research through multiple channels such as donations and the establishment of funds". For the stable investment mechanism, improve the diversified investment mechanism has put forward the requirements. In order to guide diversified social investment in basic research, in 2018, China established the "Joint Fund for Regional Innovation Development" and "Joint Fund for Enterprise Innovation Development", and in 2020, the National Natural Science Foundation of China funded 1,084 joint fund projects, with a total funding of The total amount of funding is about 2.831 billion Yuan, and as of 2020, 20 provinces, autonomous regions, municipalities directly under the Central Government, 6 enterprises and 6 industry sectors are attracted to join the joint fund, with a total absorption of 9.174 billion Yuan of funding from funders in the ratio of 1:3 with the overall input funding from local governments; 1:4 with the overall input funding from enterprises; and 1:2 with the input funding from industry authorities (National Natural Science Foundation of China). The Joint Science Fund is significant in mobilizing local governments and enterprises to participate in basic research, promoting cooperation between industry, academia and research, and building a diversified investment mechanism, but there are also more problems. The characteristics of high risk, high investment, long cycle, and insignificant short-term benefits of basic research have led to a small number of enterprise participation, and most of the participants in the joint fund are large state-owned enterprises, while small and medium-sized and private enterprises are not very enthusiastic in participating. Meanwhile, according to the Law of the People's Republic of China on Public Welfare Donations, public welfare organizations and public welfare non-profit institutions can accept donations and the National Natural Science Foundation of China can define social donations for supporting basic research as public welfare donations or charitable donations. However, the current share of social donation sources for basic research in China is still low.

The United States and Japan have unique experience in receiving corporate and social funds to strengthen diversified investment channels for basic research. Studying and learning from the experience of diversified investment in basic research in the United States and Japan can help China stabilize the investment in basic research and build a diversified investment mechanism in line with our national conditions. Therefore, this paper will analyze the characteristics of diversified investment in basic research in the United States and Japan, and provide ideas for the construction of diversified channels of basic research in China by drawing on the excellent experiences of advanced countries.

2. Diversified Investment Mechanism of Basic Research in the United States

The U.S. basic research presents a diversified investment mechanism led by the federal government, with active participation of enterprises and strong support from private and other non-profit institutions. The Ensuring Global Leadership in Science and Technology Act (2021) and the NSF Future Act both propose to increase the investment in basic research by federal agencies, and the increase is strong. The Ensuring America's Global Leadership in Science and Technology Act (2021) proposes to prioritize the doubling of funding for federal basic research funding agencies over the next decade. The NSF Future Act proposes to increase NSF funding by 59.8% over the next five years. The proposed program establishes the dominant position of the U.S. federal government in the field of basic research investment. The U.S. enterprises play a very important role in basic research investment, thanks to the unique guiding policies and tax incentives of the federal government. 1981, in the Economic Recovery Tax Act, the U.S. formally proposed the tax credit policy for enterprise R&D expenditure for the first time, which considered that R&D expenses could be deducted in a lump sum in the year of occurrence; 25% of the increase in R&D expenses of enterprises over the average value of R&D investment in

the previous three years could be The policy considers that R&D expenses can be deducted in a lump sum in the year they are incurred; 25% of the increase in R&D expenses over the average value of the previous three years' R&D investment can be deducted from the taxable amount of that year. The Tax Reform Act of 1986 set the tax credit for regular R&D at 20%, and proposed that enterprises could also claim a 20% tax credit for basic research expenses commissioned by universities through contracts. In 2006, the Bush Administration passed the Tax Credit and Health Care Act, which added the simplified credit method, i.e., the benchmark is 50% of the average value of R&D investment in the previous three years. In 2008, the Economic Stabilization Emergency Act increased the credit rate to 14%, and the credit has been in use ever since. The U.S. tax credit policy has been in the process of extension and revision until the enactment of the Protecting Americans from Higher Taxes Act of 2015, which made the tax credit system permanent and achieved comprehensive coverage of the tax credit, further stimulating enterprises' attention to basic research. It also focuses on supporting small businesses by allowing eligible small businesses to use the R&D tax credit system to offset payroll taxes. 2016 IRS classifies R&D tax credits claimed by companies into regular credits, alternative simplified credits, current year credits, and qualified small business payroll tax credits.

Tax incentives and policy support from the federal government and the philanthropic climate in the U.S. attract individuals or through nonprofit organizations to donate to basic research. U.S. giving takes the form of a direct deduction from taxable income for charitable giving expenses, capped at 50% of adjusted net income, with any excess carried forward over the next five years. In the United States, many people donate for tax deductions, from charitable giving tax deductions to high estate taxes; the United States has a very well-developed system of donation tax laws. When individuals or corporations make donations to charitable organizations of different nature, there are differences in the percentage of pre-tax deduction benefits enjoyed: 50% for individual donations to public charities, 30% for private foundations, and 20% of the individual donation base for other specific tax-exempt organizations. Meanwhile, the highest percentage of the high estate tax imposed in the United States has been 70%, while lifetime gifts and bequests to charitable organizations are eligible for a 100% pre-tax deduction under the Internal Revenue Code.

Private foundations, as a source of basic research investment, also play an important role in diversifying the investment in basic research in the United States. U.S. law requires foundations to set aside only 5% of their assets each year for charitable activities. It also sets a very low tax rate on investment income, and donors are entitled to a personal income tax deduction. The Gates Foundation, for example, views philanthropy as an "investment" and not only conducts charitable operations, but also earns income by investing in stocks and other securities. The Gates Foundation not only invests in innovative projects that the government and other institutions cannot or will not invest in, but also helps to improve global inequality and is based on the long term, and will also strictly control the donations, set specific work targets and regularly evaluate the donated projects, and only when the evaluation is passed will the next donation be possible.

3. Japan's Diversified Investment Mechanism for Basic Research

The diversified investment mechanism of basic research in Japan is mainly composed of government, enterprises, universities and non-profit organizations. The Japanese government mainly provides research funds in two ways, one is to maintain the normal operation of research institutions, and the other is competitive funding for research, which is mainly allocated to researchers by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Ministry of Economy, Trade and Industry (METI) by way of projects, and in recent years the Japanese government has mainly increased the share of competitive funding to improve the efficiency of the use of funds.

In order to promote the expansion of basic research investment by enterprises, which are the second largest contributor to basic research in Japan, Japan has introduced guiding policies to promote the diversification of research funding sources. First, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), in order to promote innovation by industry, academia and government, has developed industry-academia-government cooperation, linking the achievements of universities and national research and development corporations, etc. with basic research, deepening organization-to-organization industry-academia cooperation, further promoting open innovation, expanding active corporate investment in R&D, and creating a virtuous circle of knowledge, capital and human resources while obtaining sufficient funds from outside as a source of research and development. In addition, since 1966, the Japanese government has been supporting R&D activities through tax incentives, and in 1985, the Japanese government enacted the "Tax System for the Promotion of Basic Technology Development", which proposed a 7% tax exemption for basic technology development assets acquired in some high-tech fields on top of the original tax reduction policy. In 2016, the Japanese government implemented a tax credit incentive policy based on a combination of the aggregate and

incremental methods, i.e., companies can apply for a combination of aggregate and incremental R&D tax credit or high R&D intensity tax credit, but the overall R&D tax credit cannot be higher than 40% of the company's taxable income. The overall R&D tax credit cannot be higher than 40% of the enterprise's taxable income (Japan Ministry of Education, Culture, Sports, Science and Technology).

In Japan, to promote the flow of private funds into basic research, a two-pronged approach of tax incentives and philanthropic awareness cultivation has been used to stimulate Japanese companies and individuals to donate funds for national basic research. As a measure to promote donations, a tax support policy is adopted regarding donations to universities and national research and development corporations. For cash donations, the donation deduction is applied to the total amount of donations minus 2,000 yen for individual donations as a deduction of income for the year in which it is paid. In addition, with regard to corporate tax, a corporation may include the full amount of the donation as a loss when donating to a national university corporation, etc., while donations to a school corporation or a national research and development corporation should be calculated separately from the loss calculation limit for general donations, with a limit of (amount of income * 6.25% + amount of capital, etc. * 0.375%) * 1/2 for loss calculation. For in-kind donations, the transfer income tax will not be taxed with the approval of the Director-General of the National Tax Agency (Statistics Bureau, Ministry of Internal Affairs and Communications, Japan).

4. Discussion

From the basic research investment in the United States and Japan, the basic research funding sources in advanced countries are mainly government, enterprises and private and other non-profit organizations, which provide references for China's diversified investment in basic research in terms of guiding enterprises to expand basic research investment, receiving social donations and establishing private foundations to broaden the channels of basic research funding.

4.1 Improving Incentive Policies and Guiding Enterprises to Participate in Basic Research

Because basic research is characterized by large investment, long period, high risk, slow results, etc. and the lack of funds, talents and research facilities of small and medium-sized private enterprises, the enthusiasm of enterprises to participate in R&D is not high. The government needs to improve incentive policies to guide enterprises to participate in basic research. Such as the government to buy services and other forms, so that the marketization of basic research, incentives for enterprises to participate in basic research, to alleviate the concerns of enterprises due to the slow results of basic research, the benefits are not obvious. At the same time, tax incentives related to basic research should be explored, and preferential incentives should be increased in terms of enterprises purchasing research facilities and absorbing research talents.

4.2 Improve the Donation Incentive Policy to Attract Social Donations

At present, the maximum pre-tax deduction for charitable donations in China is 30% of taxable income for individuals and 12% of total annual profits for enterprises. Compared with developed countries, the pre-tax deduction for charitable donations in China is low, and the deduction ratio should be appropriately increased, and the provisions on donations in the individual income tax law should be consistent with the relevant provisions of the corporate income tax law, with a three-year deferred carry-forward, or a joint extension of the carry-forward period to five years, to incentivize enterprises and individuals to make charitable donations. At the same time, China's tax preferential policies on public welfare donations for scientific research are scattered, and it is necessary to collect and integrate the tax preferential policy documents for full deduction and form a compilation or guide with authoritative interpretation for donors' reference.

4.3 Encourage the Establishment of Private Foundations for Science and Technology to Fund Basic Science Research and Development

In order to encourage social funds to invest in basic research through multiple channels, reference can be made to the experience of the United States to encourage individuals or enterprises to establish private foundations, and introduce relevant preferential policies and management policies to help private foundations build a sustainable institutional system. Encourage private foundations to set up special investment departments while absorbing social donations, invest in stocks and bonds to expand the scale of the foundation's capital, and regularly disclose the foundation's statements to make the information on the absorption of funds and investment transactions transparent.

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