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TAX DEDUCTIONS FOR RESEARCH AND DEVELOPMENT: IMPLICATIONS FOR TECHNOLOGY FIRMS LIKE LEPU MEDICAL

Olivia Mae Harrison

Department of Business Administration,
University of Technology, Springfield, USA
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Abstract: Innovation serves as a fundamental pillar for enterprise resilience, adaptability, and competitive advantage in the context of dynamic and complex macroeconomic environments. However, despite its strategic importance, innovation is often hindered by significant uncertainties, high sunk costs, and the lack of a robust innovation protection framework. These barriers discourage enterprises from fully engaging in research and development (R&D) activities, while enabling imitation and the misappropriation of economic gains by non-innovating entities.

In response to these challenges, governments have implemented a range of policy instruments, among which R&D expense deductions stand out as a crucial fiscal tool to stimulate innovation. Introduced in 2008, the R&D expense deduction policy has evolved through multiple reforms aimed at expanding its reach and increasing its impact. The 2018 policy revision broadened the eligibility criteria, allowing most enterprises to claim deductions of up to 75% of qualifying R&D expenditures. In 2021, further enhancements were introduced specifically for manufacturing firms, raising the deduction rate to 100%.

This study examines the role and effectiveness of R&D expense deduction policies in promoting innovation and supporting high-quality economic development. By analyzing the policy's evolution and its practical implications for enterprises, this paper highlights the significance of targeted government intervention in fostering a more innovative and competitive business environment. The findings contribute to a deeper understanding of fiscal innovation incentives and provide insights for future policy refinement.

Keywords: Innovation, R&D expense deduction policy, high quality economic development, government intervention, enterprise competitiveness

1. Introduction

From the perspective of the macro environment, due to the unpredictable external environment, innovation is a crucial ability for enterprises to adapt to the changing external environment and ensure their survival and development. From the perspective of industrial competition, continuous innovation is the fundamental guarantee to maintain the competitive advantage of enterprises. Based on the long-term development of enterprises, innovation is the most crucial source for enterprises to obtain sustainable competitive advantage. However, due to

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the considerable sunk cost of innovation, the result of innovation is also full of uncertainty [1]. Moreover, in a real society where the innovation protection system is not perfect enough, even if the innovative products are successfully developed, they are quickly imitated and copied by other enterprises, resulting in the economic benefits that should flow to the innovation subject flow to the free-riding financial subject. Therefore, there are many obstacles and external environmental factors on the innovation road of enterprises, which need to be regulated by macro policies [2] . Based on this, to achieve high-quality economic development, the government promulgated tax incentives and other procedures to intervene, help the market to effectively allocate resources, and promote the willingness of enterprises to innovate. Due to its universality, the research and development expense deduction policy has become a significant means of government intervention. The procedure was promulgated as early as 2008. After several adjustments, the most recent two adjustments are that in 2018, the beneficiaries of the adjustment are extended to all enterprises except those industries that do not apply the additional deduction policy, and the deduction proportion is 75%. Increase the deduction for manufacturing to 100% in 2021.

2. Relevant concept definition and policy introduction

2.1. High-tech enterprises

According to the "Measures for the Administration of the Identification of High-tech Enterprises", revised and issued in 2016, high-tech enterprises can be defined. In China, high-tech enterprises generally refer to resident enterprises that, within the scope of the "Key High-tech Fields supported by the State" promulgated by the State, continue to conduct research and development and transform technological achievements with scientific and technological innovation as the core and with the support of advanced and sophisticated technical talents, form core independent intellectual property rights of enterprises, and carry out business activities on this basis. It is a knowledge-intensive and technology-intensive economic entity. It mainly has the following characteristics: (1) High investment, research and development, innovation and upgrading require a large number of sophisticated equipment, talent and capital investment to ensure the sustainability of the research and development process. (2) High risk, although a lot of human and material resources and financial investment, not necessarily can bring visual research results for the enterprise to bring business income and profits. (3) High profitability, according to the risk-return equilibrium theory, high risk corresponds to high profitability, there are various uncertainties in the process of product development and innovation, but according to the market feedback forecast, innovative products meet the market demand is bound to bring high returns for enterprises [3].

2.2. The evolution of the R&D expense deduction policy

The policy of additional deduction of R&D expenses is mainly to reduce the tax base of enterprises, thereby reducing the tax expenditure of enterprises, reducing the cash outflow of enterprises and achieving the purpose of reducing the cost burden of enterprises, which means that the government bears part of the cost of enterprises' R&D investment. And the additional deduction policy clearly states that even if the research and development fails, the amount of the research and development expenses that meet the conditions can still be deducted in the calculation of income tax expenses, which means that the risk of enterprise innovation failure is partially transferred. Therefore, the reduction of cost and the transfer of risk stimulate enterprises to innovate, and the increase in the deduction ratio will encourage the innovation investment of enterprises to a greater extent.

Table 1: Evolution of R&D expense deduction policy

Year	Policy		main content	deduction proportion

Original Article

2008	Enterprise Income Tax Law of the People's		Confirm the policy of additional deduction of R&D expenses in legal form	50%
	Republic of China and its Implementing Regulations			
2008	National Tax Issue (2008) 116		Make systematic and detailed provisions on the policy of deducting additional research and development expenses	50%
2015	Finance and Taxation (2015) No. 119		The scope of R&D activities and R&D expenses of enterprises enjoying preferential treatment has been relaxed, and the difference between the scope of R&D expenses deduction and the scope of R&D expenses collection recognised by high-tech enterprises has been dramatically reduced	50%
2017	Finance and Taxation [2017] No. 34		We will increase the percentage of R&D expenses deducted by small and medium-sized enterprises in science and technology from 50% to 75%	50%,75%
2018	Finance and Taxation [2018] No. 99		Increase the deduction rate for all research and development costs from 50% to 75%	75%
2021	No. 13 of 2021		Increase the deduction rate for research and development expenses of manufacturing enterprises from 75% to 100%	75%,100%

Original Article

2022	Number 16, 2022		We will increase the deduction rate for R&D expenses of small and medium-sized enterprises in science and technology from 75% to 100%	75%,100%
2022	Number 28 in 2022		For enterprises that currently apply a 75% pre-tax deduction of R&D expenses, the pre-tax deduction of R&D expenses will be	100%
			increased to 100% from October 1, 2022, to December 31, 2022.	
2023	7 in Number 2023		The policy of increasing the pre-tax deduction for R&D expenses of enterprises in eligible industries from 75% to 100% has been implemented as an institutional arrangement on a long-term basis	100%

According to Table 1, the additional deduction policy was confirmed in the legal form in 2008 and officially implemented on January 1. Then the State Administration of Taxation issued the "Management Measures for pretax deduction of Enterprise research and development expenses (Trial)" (State Tax FA (2008) No. 116) to make detailed provisions on the policy; at this time, the additional deduction ratio is 50%; Until 2017, the deduction rate of small and medium-sized enterprises in science and technology will be increased, and then by 2018, the deduction rate of all enterprises except the negative list will be increased to 75%; At present, the increase in the deduction for manufacturing from 2021 to 2022, the increase in the deduction ratio of small and medium-sized enterprises in science and technology, and finally in 2023, the adjustment of the deduction ratio of eligible industry enterprises to 100%, and as a long-term institutional arrangement. Policies and regulations have been continuously improved to encourage enterprises to increase investment in R&D and innovation, and the proportion of additional deductions has been increased from 50% to 100%. The incentive effect of the procedure has gradually emerged, and it is easy to see obvious changes through the changes in the national R&D expenditure and R&D intensity.

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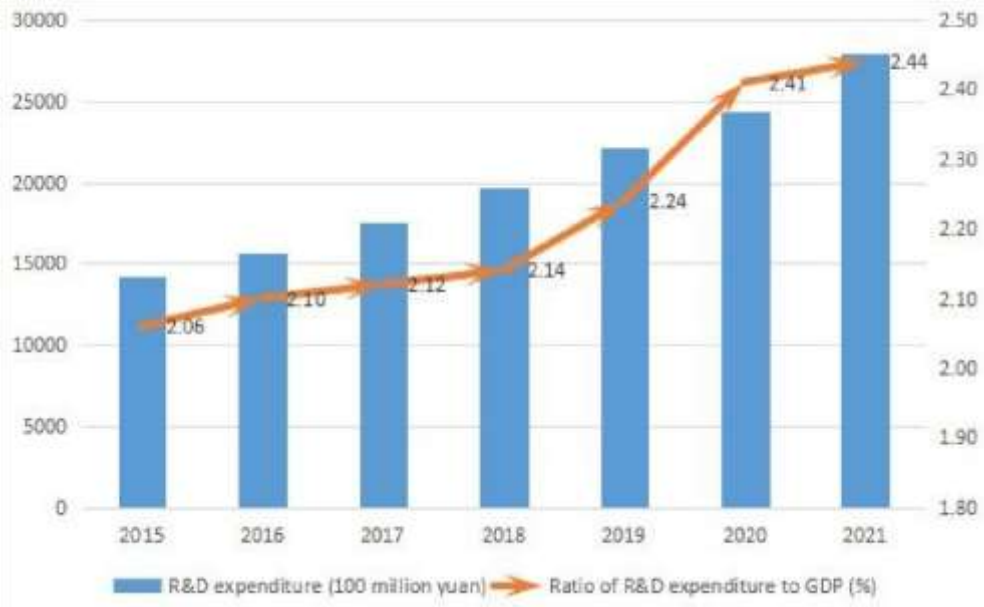

Figure 1: National Research and Development (2015-2020)

The national R&D expenditure from 2015 to 2021 from 1416.99 billion yuan to 2795.63 billion yuan to achieve a quantum leap, but also for the development of China's enterprises to bring qualitative improvement. In Figure 1, the ratio of R&D expenditure to GDP refers to the intensity of R&D expenditure. The greater the percentage, the greater the R&D intensity, indicating that national enterprises attach more importance to R&D activities. From 2015 to 2017, although there was an inevitable increase in the intensity of R&D expenditure, it showed weak growth. In 2018, the deduction policy was adjusted to increase the deduction ratio to 75%, and the beneficiaries were expanded to all enterprises (except the negative list). From the data point of view, although there was an increase that year, it was not significant. It may be that there is a certain degree of delay in the effect of policy adjustment, so it can be seen in the data of 2019 and 2020 that the increase in the proportion of additional deductions has caused the national enterprises to pay more attention to R&D and innovation activities to a certain extent.

2.3. Interpretation of the new policy of additional deduction of R&D expenses in 2018

If the R&D expenses incurred by the enterprise in carrying out R&D activities are not included in the current profit or loss as intangible assets, based on actual deduction according to regulations, during the period from January 1, 2018, to December 31, 2020, 75% of the exact amount will be deducted before tax; If intangible assets are formed, 175% of the cost of intangible assets shall be amortised before tax during the said period.

The deduction ratio will be uniformly increased to 75%. Since the implementation of the Enterprise Income Tax Law in 2008, research and development expenses shall be deducted by 50% of the amount incurred. If intangible assets are formed, 150% shall be amortised before tax. In Document No. 34 of Finance and Taxation (2017), only the additional deduction rate for small and medium-sized enterprises in science and technology was increased to 75%. Then in the document of 2018, the beneficiary body was expanded to all enterprises, and the deduction rate was adjusted to 75%.

Applicable industry. All enterprises in the six damaging list industries except tobacco manufacturing, accommodation and catering, wholesale and retail, real estate, leasing and business services, and entertainment.

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2.4. Interpretation of the new policy of additional deduction of R&D expenses in 2021

The R&D expenses incurred by the enterprise in carrying out R&D activities shall, based on actual deduction by regulations, be deducted by adding 100% of the exact amount before tax; If intangible assets are formed, they shall be amortised before tax at 200% of the cost of intangible assets during the said period.

The deduction rate is increased to 100%. The Ministry of Finance and the State Administration of Taxation announced document No. 13 of 2021 to increase the deduction ratio of manufacturing enterprises from 75% to 100%, from 50% in 2008 to 100% now, achieving a doubling of the deduction ratio.

Applicable industry. The primary beneficiaries are only manufacturing enterprises, except for the six damaging list industries.

3. The implementation of the research and development expense deduction policy in Lepu Medical

This paper chooses Lepu Medical as the case company mainly based on the following three reasons: First, in the 14th Five-Year Plan, China will enter the forefront of innovative countries as one of the longterm goals, coupled with a clear plan for the development of the biological economy, and constantly promote the innovation and upgrading of the biomedical industry in our country, so the exploration of research and development expenses plus deduction policy adjustment on the impact of typical companies in the pharmaceutical industry is to better conform to the strategic development of the country. Second, Lepu Medical has been approved by the national high-tech enterprise audit five consecutive times (2008 to date) and has a strong representation in high-tech enterprises and the pharmaceutical industry. Lepu Medical also has a specific model in the special equipment manufacturing industry, which can not only observe the changes before and after the increase of the deduction ratio in 2018 but also apply to the adjustment of the deduction ratio in 2021 and analyse the impact of the adjustment of the balance again in 2021. Third, as a listed company, Lepu Medical can easily find various data results on R&D innovation in publicly disclosed annual reports. Because its high-tech enterprises continue to be recognised as successful, there will be no additional impact caused by preferential corporate income tax rates during the study period involved in this paper.

3.1. The basic introduction of the enterprise

Lepu Medical (stock code 300003), the full name of Lepu (Beijing) Medical Device Co., LTD., was established in 1999 with a registered capital of 1.782 billion yuan. It was listed on the GEM of the Shenzhen Stock Exchange in 2009 and was one of the first listed enterprises on the GEM. Over the years, Lepu Medical has always positioned its business scope as a "cardiovascular patient service company". Under the guidance of the company's strategy, Lepu Medical has continued to develop, manufacture and sell cardiovascular drugs and devices. And became the first to obtain the "Coronary artery stent delivery system" product registration certificate (Class III) issued by the State Food and Drug Administration, the first industry enterprise to develop and successfully produce an anti-infection "drug central venous catheter", and was selected as "National Technological Innovation Demonstration Enterprise" in 2019. According to the company's overall strategy, it has developed four business modules: medical devices, pharmaceuticals, medical services and new medical services.

3.2. Investment in R&D of enterprises

3.2.1. Research and development investment of Lepu Medical from 2015 to 2022

According to the data of Lepu Medical on the company's R&D investment in the database of Guotai 'an, it can be seen from Figure 2 that the company's R&D investment has increased from about 170 million yuan in 2015 to 1.3 billion yuan in 2022, which has almost reached an eight-fold increase, and the rise of 342 million yuan has been completed from 2017 to 2019. From 2020 to 2022, it will increase by 478 million yuan, an awe-inspiring growth rate. R&d intensity can roughly show the company's emphasis on R&D and innovation. According to the line chart in Figure 2, it can be seen that Lepu Medical achieved a breakthrough growth of 7.42% in 2018 and a rapid increase in the two years after the policy adjustment, and the R&D intensity reached 12.1% in 2022. From 2015 to 2022, it almost doubled its growth. It can be seen that although the company's R&D investment and R&D intensity

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increased to a certain extent from 2015 to 2017, it did not have such a growth rate. In 2018 and 2021, the additional deduction policy was increased by 25%, immensely stimulating Lepu Medical's investment in R&D innovation activities.

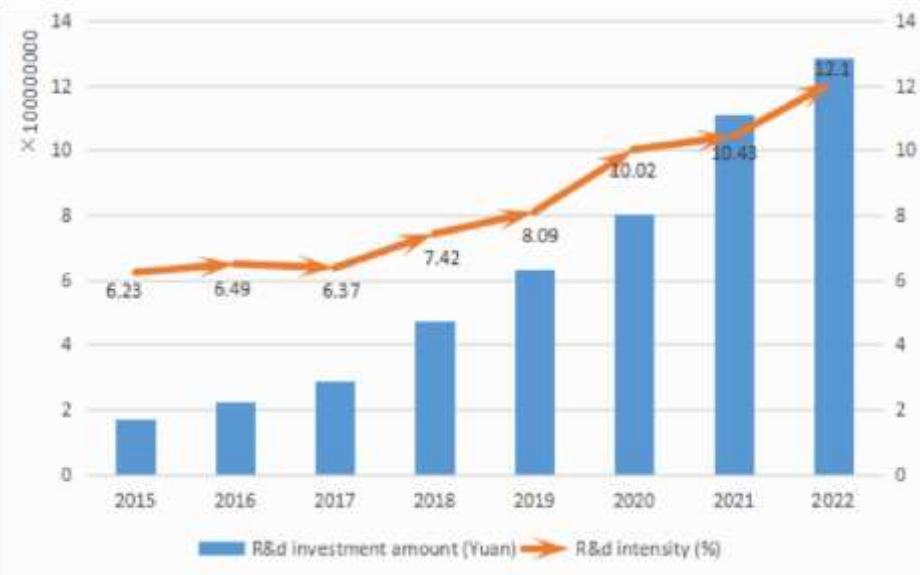

Figure 2: Research and development investment and intensity of Lepu Medical research and development from 2015 to 2022

3.2.2. Research and development personnel of Lepu Medical

As of 2022, Lepu Medical has a research and development team of about 2,000 people in research and development, from 976 people in 2015 to 1875 people today, almost double the growth. It is easy to see from Table 2 that there was a significant increase in 2018 when the policy adjustment was added. From the proportion of the number of R&D personnel, it can be seen that after completing the rapid growth in 2018, the following years began to gradually warm back, maintaining the proportion range of about 20%. It can be seen that the increase in policy incentives has encouraged Lepu Medical to invest in R & D personnel, and the number of R & D personnel may reach a peak in 2020. The company has achieved some results in R & D products, increasing the number of sales, production and other aspects of personnel, so it has caused the phenomenon of the proportion of R & D personnel.

Table 2: LPU Medical R&D personnel from 2015 to 2022

Year	2015	2016	2017	2018	2019	2020	2021	2022
Number of R&D personnel (people)	976	1035	1251	1769	2005	2338	1944	1875
Number of R&D personnel (%)	22.59	18.98	19.82	23.01	22.48	24.9	17.8	17.6

4. The impact of the R&D expense deduction policy on the financial performance and innovation performance of enterprises

4.1. Financial performance analysis

As the economic subject of the company, it is necessary to consider the relationship between cost and income when facing every activity. The additional deduction policy is to bear part of the cost of enterprise innovation by reducing the corporate tax base and the corporate income tax, which is equivalent to the government taking part of the cost when enterprises carry out innovation activities, and the economic benefits brought by the success of research and

development are all enjoyed by enterprises. The increase of the deduction ratio with high probability will get a specific improvement in the profitability of the enterprise and a clear positive promotion to its financial performance. This paper studies the impact of the increase of the preferential deduction policy on the financial performance of Lepu Medical, takes R&D intensity as the index to measure R&D investment, takes R&D investment as the intermediate variable, selects return on equity (ROE) and earnings per share (ESP) as the indicators to measure the financial status of the enterprise, and analyses whether the adjustment of the additional deduction policy will affect the financial performance of the enterprise[4] . The return on equity and earnings per share comprehensively reflect the company's profitability. According to Table 3, in the eight years from 2015 to 2022, Lepu Medical's earnings per share nearly doubled from 0.64 to 1.22, but even showed a downward trend before the additional deduction of preferential treatment was not increased in 2018. After the preferential treatment of other deduction policies in 2018 and 2021, Lepu Medical's earnings per share showed a good growth trend. Before the additional deduction policy was not adjusted, the ROE of Lepu Medical had been maintained at about 15% until the adjustment of the other deduction ratio in 2018. With the increase in research and development intensity, the ROE of Lepu Medical completed a rise of about 4% and reached a value of about 25% in 2019. The increase in the proportion of additional deductions has brought a substantial rise in Lepu's medical profitability. However, due to the impact of the novel coronavirus pneumonia epidemic, the hospital's outpatient volume and operation volume have been greatly affected, resulting in the sales of the company's implant devices being affected. In addition, the company's medical service and health management revenue and drug sales of medical institutions have declined due to the isolation of local governments, the suspension of business of medical institutions and the suspension of outpatient services. Therefore, although the additional deduction of preferential policies in 2021 will increase, the return on equity will still decline, and the performance will be sluggish. It can be seen that the proportion of additional deduction policies has increased significantly, which has improved the financial performance of enterprises to a certain extent.

Table 3: Financial indicators of Lepu Medical from 2015 to 2022

Year	2015	2016	2017	2018	2019	2020	2021	2022
R&D intensity	6.23%	6.49%	6.37%	7.42%	8.09%	10.02%	10.43%	12.1%
Return on equity	15.62%	14.7%	15.17%	19.13%	25.03%	21.12%	16.00%	17.60%
Earnings per share	0.64	0.39	0.50	0.68	0.97	1.01	0.96	1.22

4.2. Innovation performance analysis

The impact of the R&D expense deduction policy on enterprise output is mainly reflected in financial performance and innovation ability. Quantifiable economic indicators have been used to analyse the effect of additional deduction policy adjustments on enterprise financial performance. Now, we will explore the impact of further deduction policy adjustment. In the annual report of Lepu Medical, the number of patent applications and the number of patent grants of the company were not disclosed, so this paper used the increase of patent rights and non-patented technologies in intangible assets (internal research and development) in the current period to analyse the innovation performance of the company. From Table 4, after the increase in the proportion of additional deductions in 2018, the increase in patent rights rose from 980,000 yuan in 2017 to 69.56 million yuan in 2019; However, there was a decline in the following years; it was still in a higher growth position than the data before the proportion of additional deductions was not increased. The increase in the amount of non-patented technology with the rise in the proportion of other premises in 2018 also suddenly increased from 6.88 million yuan to 18.63 million yuan.

Original Article

Table 4: Increase of internal R&D intangible assets of Lepu Medical

Item	Year	2017	2018	2019	2020	2021	2022
Increase in (internal R&D)	Patent right	984,423.41	1,893,284.28	69,562,042.01	43,407,584.69	42,931,244.4	45 ,743, 65
	intangible assets	Unpatented technology	6,401,197.34	6,881,452.34	18,639,341.18	48,611,130.31	37,705,291.52	1,963,051.41	33
Total (yuan)		7,865,875.75	20,532,625.46	118,173,172.3	81,112,876.21	44,894,295.8	52 ,144, 85
							2	8	1.98

5. Conclusions and Suggestions

5.1. Conclusion

The above analysis shows that the deduction ratio of R&D expenses increased from 50% to 75% and then from 75% to 100%, which promoted the overall R&D investment of the country. The R&D investment of the case company Lepu Medical was also strengthened due to the increase in the deduction ratio, which enhanced the innovation impetus of the enterprise. Further analysis shows that the rise in the R&D expense deduction ratio not only promotes the R&D intensity of enterprises but also has a positive effect on the financial performance and innovation performance of enterprises.

5.2. Suggestions

5.2.1. Increase R&D investment and control R&D risks

Under the background of national policy support and financing channel optimisation, the number of potential entrants in domestic and foreign industries has been increasing in recent years, and the progress of product research and development has also been promoted rapidly. The number of potential competitive products of the company's products under examination has shown a growing trend, and the commercial competition pattern will be more incentive in the future. The innovative drugs and medical devices have the characteristics of extensive research and development investment, high research and development risk, and long certification registration cycle, so it is recommended that Lepu Medical will strengthen the top-level forward-looking strategic layout, increase research and development investment, consolidate its own research and development capabilities, to improve the efficiency of product research and development, improve the success rate of registration and declaration, and achieve sustainable growth through product upgrading.

5.2.2. Standardize information disclosure to attract more investment

Lepu Medical has disclosed the number of R&D personnel, the proportion of R&D personnel, the amount of R&D investment, the intensity of R&D, the amount of capitalisation and the balance, etc. Still, it needs to disclose the number of R&D achievements, such as the number of patent applications and the specific number of patent grants. The R&D level of enterprises needs to be fully displayed, and the results of innovation output need to be visually displayed, which makes it difficult for investors to intuitively and clearly understand the R&D level of enterprises through public information, which may lead to the loss of potential investors. Therefore, it is suggested that Lepu medical standard research and development level of relevant information disclosure attract more investors.

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