

The Impact of Tax Incentives on R&D Investment and Corporate Competitiveness: A Case Study of CATL

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Abstract

In recent years, guided by the national “dual carbon” strategic goals, the State Taxation Administration and the Ministry of Finance have introduced a series of tax incentive policies. These measures, including continuously increasing deduction ratios and expanding the scope of applicable industries, aim to encourage high-tech enterprises to conduct independent R&D and innovation, thereby promoting high-quality industrial development. Such policies effectively reduce the tax burden and R&D costs of enterprises, directly improve net profit and cash flow levels, and thereby enhance their profitability and core competitiveness, injecting strong momentum into the sustained improvement of financial performance. This paper selects Contemporary Amperex Technology Co., Limited (CATL, stock code: 300750), a global leader in the power battery industry, as the research object. Adopting a case study approach, it deeply explores the mechanism and impact of tax incentives on innovation investment and corporate competitiveness. Based on the analysis of its financial data from 2018 to 2024, the study finds that tax incentives increase the company’s current net profit and operating cash flow by reducing the tax burden and improving cash flow, effectively lowering the effective tax rate. Furthermore, the R&D expense super-deduction policy directly reduces the actual cost per unit of R&D investment, ensuring the continuity and high intensity of the company’s R&D investment, which provides key support for its long-term value creation. The conclusions indicate that tax incentives can effectively stimulate corporate innovation and further enhance market competitiveness. This offers a reference for other high-tech enterprises to utilize policies to achieve high-quality development, while also providing useful micro-level evidence for government departments to optimize and improve industrial tax policies.

Keywords

Tax Incentives, R&D Investment, Corporate Competitiveness,

1. Introduction

1.1. Research Background and Significance

The “dual carbon” goals represent a strategic decision made by China based on the inherent requirements of sustainable development and the responsibility of building a community with a shared future for mankind. These goals inject powerful momentum into China’s energy green and low-carbon transition and lead systematic changes in the economy and society. Promoting the shift of energy utilization towards clean, low-carbon, safe, and efficient directions is a key focus for accelerating the comprehensive green transformation of economic and social development.

Tax incentive policies, as a universal and guiding macro-control tool, are widely used to encourage enterprise R&D innovation and industrial upgrading. However, at the interaction level between macro-policies and micro-enterprise behaviors, clarifying the micro-mechanisms of how tax incentives affect enterprise R&D behaviors, strategic decisions, and their translation into sustainable market competitiveness is not only crucial for the objective evaluation of policy effects but also holds practical guiding significance for enterprises to efficiently utilize policy dividends and achieve high-quality development.

1.2. Research Object and Method

This study selects Contemporary Amperex Technology Co., Limited (CATL) as the research object. As a global leader in the power battery industry, CATL has ranked first in global installed capacity for many consecutive years, and its technology roadmap and market strategies have a significant leading effect on the industrial chain. Simultaneously, CATL is a typical technology-intensive and capital-intensive enterprise, long enjoying multiple policy supports such as preferential income tax rates for high-tech enterprises, R&D expense super-deduction, and VAT refund upon collection. As an industry benchmark, its behavior patterns and performance have high reference value, helping to enhance the external validity of the research conclusions. Its tax incentive scale is significant and sustained, with transparent financial data, providing a clear empirical window to observe the impact of policy variables on corporate behavior. In the current context of intensified industry competition and accelerated technological iteration, CATL faces multiple pressures from domestic and foreign competitors, as well as challenges such as fluctuations in supply chain costs and adjustments in customer strategies. At this critical stage, studying how tax incentives empower enterprises to break through resource constraints, maintain innovation rhythm, and consolidate competitive advantages holds significant practical and theoretical value.

This paper adopts a combined research method of literature review and case

analysis. By reviewing theoretical literature on tax incentives and corporate innovation, an analytical framework is constructed. Taking CATL as the research object, and combining its public financial data, information disclosed by tax authorities, and industry reports, this study systematically analyzes the transmission path of tax incentives on corporate innovation investment and its specific impact on competitiveness, extracting relevant insights.

2. Literature Review

2.1. Impact Mechanism of Tax Incentives on R&D Investment

Tax incentive policies, as a core tool for the government to guide corporate innovation, have proven effective in numerous studies. Early classic research suggested that policies like R&D tax credits directly reduce the marginal cost of corporate R&D activities through a “price effect,” thereby effectively incentivizing increased R&D investment (Hall & Van Reenen, 2000). Subsequent empirical studies further support this conclusion, finding a significant positive impact of tax incentives on R&D investment, particularly more pronounced for small and medium-sized enterprises (SMEs) with strong financing constraints and high-tech enterprises (Czarnitzki et al., 2011). Domestic studies based on the Chinese context also draw similar conclusions. Research on panel data of high-tech enterprises suggests that policies like R&D expense super-deduction can significantly enhance the intensity of corporate R&D expenditure, such as increasing the quantity and quality of R&D personnel and enhancing R&D equipment and facilities (Chen, 2015). However, some studies point out that policy effects may have threshold effects or be influenced by corporate heterogeneity, not having the same incentive effect on all enterprises (Gan & Cao, 2020). Some even argue that tax reduction has an insignificant effect on corporate innovation investment, or that tax incentive policies may lead to “rent-seeking” behavior, having a counterproductive effect on innovation investment (Tian et al., 2017).

2.2. Link between R&D Investment and Corporate Competitiveness/Financial Performance

Corporate competitiveness stems from unique resources and capabilities, and sustained R&D investment is a key pathway to building technological barriers and forming core competitiveness (Barney, 1991). Extensive literature confirms that R&D investment, by promoting technological innovation, improving product performance, and production efficiency, can ultimately translate into superior market performance and financial performance (Griliches, 1998). This transformation is specifically reflected in: on one hand, the product advantages brought by R&D results can help enterprises gain higher market share and pricing power, enhancing external competitiveness (e.g., market share); on the other hand, process innovation can reduce costs and improve asset utilization efficiency, thereby enhancing financial competitiveness (e.g., gross margin, return on equity) (Xiao & Lin, 2014). However, the performance transformation of R&D investment is not

automatic; its efficiency is moderated by multiple factors such as corporate absorptive capacity, corporate governance level, and external market environment (Cohen & Levinthal, 1990).

2.3. Chain Relationship: Tax Incentives, R&D Investment, and Competitiveness

Research on the transmission path of how tax incentives affect corporate competitiveness has formed a relatively mature theoretical framework. Studies indicate that tax incentives have dual functions of resource support and policy signaling: they directly alleviate R&D financing constraints and also enhance corporate innovation confidence by releasing clear policy expectations, thereby laying the foundation for building long-term competitiveness (Peng et al., 2022). At the mechanism verification level, the R&D expense super-deduction policy has been proven to effectively enhance corporate R&D intensity and, through the mediating role of innovation output, ultimately translate into better market and financial performance (Zhu & Wang, 2024). Further research suggests that this mediating effect may have nonlinear characteristics, meaning that when R&D investment crosses a specific threshold, the marginal incentive effect of tax incentives significantly amplifies (Yang & Hou, 2025). Additionally, the research perspective is expanding in a more diversified direction. For instance, studies focusing on environmental regulations have found that well-designed policy mixes (such as tax incentives) can effectively motivate enterprises to engage in green technology research and development, thereby fostering new competitive advantages within environmental constraints (Li & Xiao, 2020).

Meanwhile, the boundary conditions and moderating factors of this transmission path are receiving increasing attention. The external institutional environment is a key moderating variable; a good business environment and standardized market order can significantly strengthen the policy effect of tax incentives (Tang & Li, 2020). Specifically, in contexts where internal corporate governance is sound and external intellectual property protection is robust, the transmission process from tax incentives to enhanced competitiveness via R&D investment is smoother and more efficient. This systematically reveals that the effectiveness of the chain mechanism highly depends on the synergistic role of internal and external contexts.

2.4. Literature Commentary

Existing research has made important progress in the following aspects: firstly, explaining the multiple mechanisms of how tax incentives affect corporate R&D decisions from different theoretical perspectives; secondly, adopting more refined methods to measure the multidimensional characteristics of R&D investment and corporate competitiveness; thirdly, beginning to explore the intermediate paths and boundary conditions of policy transmission. However, the following research gaps remain: First, most studies treat tax incentives as homogeneous policies, paying insufficient attention to the differential impact mechanisms of different types

of policies (e.g., preferential tax rates, super-deduction, refund upon collection). Second, the measurement of R&D investment mostly focuses on the financial dimension, relatively neglecting R&D talent investment and its synergistic effect with capital investment. Finally, research on the micro-process of competitiveness enhancement is not deep enough, particularly lacking process analysis of how leading enterprises in the industry dynamically adjust R&D strategies and achieve competitiveness leaps under policy incentives.

Based on the literature review, this paper constructs a four-stage analytical framework of “Policy Tools-Resource Input-Capability Building-Performance Manifestation” to systematically explore the impact mechanism of tax incentives on CATL’s R&D investment and competitiveness. This framework extends the influence of tax incentive policies from the macro level to the micro-decision-making process of enterprises. By examining the longitudinal data changes of CATL from 2018 to 2024, it systematically reveals the dynamic process of how policies affect innovation capability building and ultimate competitive performance by altering corporate resource investment decisions.

2.5. Theoretical Framework: Symbiotic Finance Perspective

In addition to the traditional resource-based and signaling theories, this study introduces a “Symbiotic Finance Perspective” to analyze how leading enterprises leverage policy-derived financial advantages to invest in their industrial ecosystems. This perspective emphasizes that corporate financial strategies should extend beyond internal value creation to include the health and resilience of the entire supply chain and innovation network. Through mechanisms such as technology licensing, joint ventures, and supplier development, enterprises can transform tax savings into ecosystem-wide competitiveness, thereby achieving sustainable co-creation of value.

3. Case Background

3.1. CATL Overview and Industry Position

Contemporary Amperex Technology Co., Limited (CATL) was established in 2011 and is headquartered in Ningde City, Fujian Province. It was listed on the Shenzhen Stock Exchange’s ChiNext board in 2018, with the stock code “300750”. According to the “Industrial Classification for National Economic Activities” (GB/T 4754-2017) issued by the National Bureau of Statistics, the company belongs to the small category “C3841 Lithium-ion Battery Manufacturing” under the major category “C38 Manufacture of Electrical Machinery and Equipment” within the sector “C Manufacturing”.

CATL possesses independent R&D, procurement, production, and sales systems, dedicated to providing first-class power battery and energy storage battery products and related innovative solutions for global new energy applications. Its products specifically include: power battery systems, energy storage battery systems, solutions for emerging applications and innovations, and battery materials

and recycling. Furthermore, to further secure the supply of upstream key resources and materials required for battery production, the company participates in the investment, construction, and operation of battery mineral resources such as lithium, nickel, cobalt, and phosphorus through various methods including self-construction, equity participation, and joint ventures.

The company is a globally leading enterprise in power batteries and energy storage batteries. According to SNE Research data, in the power battery sector, the company ranked first in global usage for eight consecutive years from 2017 to 2024, with a global market share of 37.9% in 2024, 20.7 percentage points higher than the second place. In the energy storage sector, the company ranked first in global shipments for four consecutive years from 2021 to 2024, with a global market share of 36.5% in 2024, 23.3 percentage points higher than the second place.

CATL's core competitiveness is manifested in two aspects: sustained high-intensity R&D investment and leading technological innovation capability. Its core technologies are mainly reflected in: Kirin Battery, Shenxing Superfast Charging Battery, Sodium-ion Battery, and Condensed Matter Battery. Through technological layout, CATL has established technological advantages in key dimensions such as energy density, charging speed, safety, and cost control, building industry technological barriers.

3.2. SWOT Analysis of CATL's Development

3.2.1. Strengths

CATL has formed a unique R&D and innovation system in the lithium battery industry based on first principles. It possesses six major R&D centers with over 20,000 R&D personnel. The company integrates safety, quality, and cost throughout the entire process management. It has independently developed efficient R&D platforms such as high-throughput material integrated computing, intelligent cell design, and intelligent process design. Based on massive, multi-scenario customer and end-user demand feedback for R&D design, it specifically enhances product performance and optimizes product solutions, forming a positive virtuous cycle and creating comprehensive R&D advantages. As of December 31, 2024, the company owned a total of 43,354 patents and patent applications, including 25,439 in China and 17,915 overseas. Based on comprehensive R&D advantages, it has created the industry's most comprehensive and advanced product portfolio. Its products feature advantages such as high energy density, long cycle life, high charging rate, wide temperature adaptability, and high safety, widely applicable to passenger vehicles, commercial vehicles, energy storage fields, and emerging application scenarios. The company has established long-term and in-depth strategic cooperation with globally renowned automobile manufacturers, energy storage system integrators, energy storage project developers, or operators. Beyond product sales, it engages in comprehensive cooperation with customers through equity participation, joint ventures, technology licensing, etc., helping customers build globally leading competitiveness. Its automotive customers include BMW, Mercedes-

Benz, Ford, Toyota, Honda, Volvo, SAIC, Geely, NIO, Li Auto, Yutong, Xiaomi, etc. Its energy storage customers and partners include NextEra, Synergy, Wärtsilä, Excelsior, Jupiter Power, FlexGen, China Energy Investment Corporation, China Power Investment Corporation, China Huaneng Group, China Huadian Corporation, CNPC, etc. As of December 31, 2024, the company has achieved cumulative installation of power batteries in over 17 million vehicles and application of energy storage batteries in over 1700 projects globally. This extensive customer binding and the global brand recognition of “CATL” provide stable market outlets for its products and enhance its bargaining power in the industrial chain. To ensure supply chain security and stability, CATL extends into upstream key mineral resource areas such as lithium, nickel, and cobalt through controlling stakes, equity participation, and self-construction. This vertical integration strategy enhances its control rate over core raw materials and strengthens its ability to cope with fluctuations in raw material prices.

3.2.2. Weaknesses

Despite continuous revenue growth, CATL’s gross profit margin is significantly affected by the cyclical sharp fluctuations in the prices of raw materials such as battery-grade lithium carbonate, posing challenges to its profitability. Its cost transmission mechanism has certain limitations in the fierce market competition. Maintaining technological leadership and capacity expansion requires continuous and huge R&D investment and fixed asset investment. This not only places high demands on the company’s cash flow management but also brings pressure from asset depreciation and amortization. If future market demand falls short of expectations, there are risks of declining capacity utilization and asset impairment. Some mainstream automobile manufacturers, to ensure their own supply chain security and control costs, are adopting strategies of “in-house R&D and production” or fostering second and third suppliers. This exposes CATL to customer loss risk, reflecting the challenges it faces in customer relationship management.

3.2.3. Opportunities

Driven by global “carbon neutrality” goals, the new energy vehicle and electrochemical energy storage markets are experiencing explosive growth, providing long-term and huge market space for the power battery industry. This is the largest external driver for CATL’s continuous expansion and innovation. Chinese governments at all levels have listed the new energy vehicle and key components industry as a national strategic emerging industry, providing comprehensive policy support including tax reductions, R&D subsidies, and government procurement. This creates a superior development environment for local enterprises including CATL. As the first batch of power batteries enter the end-of-life phase, the battery recycling and cascade utilization market is forming. Early layout in this field not only complies with environmental regulations but also helps the company form a closed-loop supply chain of “materials-batteries-recycling-mate-

rials,” reducing dependence on primary minerals.

3.2.4. Threats

Domestic competitors (e.g., BYD) are catching up rapidly in technology, and foreign giants (e.g., LG Energy Solution, Panasonic) continue to exert efforts, leading to structural overcapacity in the industry, intensified price war pressure, and downward pressure on corporate profit margins. Automobile manufacturers such as Tesla, BYD, NIO, and Geely are entering the battery manufacturing field through self-built factories or acquisitions, aiming to master core component technology themselves, which poses a direct threat to CATL’s market share. Geographical concentration of mineral resources like lithium, cobalt, and nickel and their susceptibility to geopolitical influences cause sharp price fluctuations, posing persistent external shocks to the cost control and operational performance of battery enterprises. Global regulations represented by the EU’s “New Battery Regulation” impose mandatory requirements on the carbon footprint, recycled material content, due diligence, and recycling rates of batteries. These “green barriers” significantly increase corporate compliance costs and may affect their access to global markets.

4. Empirical Analysis

It is important to note that while tax incentives provide crucial financial support, CATL’s growth is also driven by strong external market dynamics, particularly the global surge in electric vehicle and energy storage demand. The following analysis focuses on the marginal and enabling role of tax policies within this broader growth context, rather than attributing corporate success solely to fiscal measures.

As a global leader in the power battery industry, the rapid development of Contemporary Amperex Technology Co., Ltd. (CATL) benefits both from accurately judging technology trends and the incentive innovation of national tax policies. According to CATL’s audit reports from 2018 to 2024, CATL is recognized as a high-tech enterprise. According to the “Enterprise Income Tax Law of the People’s Republic of China” and its implementation regulations, its enterprise income tax rate enjoys a preferential rate of 15%. Meanwhile, since its listing in 2018, CATL has fully experienced the multiple upgrades of the R&D expense super-deduction policy and has internalized it as a key financial lever driving technology iteration and maintaining competitive advantage. These two tax incentives are not isolated but resonate synergistically.

4.1. Three Major Mechanisms of Tax Incentives

4.1.1 Directly Increase Profits and Reduce Effective Tax Burden

The effect of tax incentives is directly reflected in the “Income Tax Expense” item on the income statement, which directly increases the company’s net profit through a dual effect. As shown in **Table 1**, from 2018 to 2024, CATL’s total profit and income tax expense showed significant asymmetric growth. Especially after 2021, as the R&D expense super-deduction ratio increased to 100%, its effective income tax rate further dropped to around 10.19%. In 2022, when R&D expenses

nearly doubled, the effective tax rate was as low as 8.77%. The 15% high-tech enterprise tax rate, compared to the 25% statutory benchmark, directly reduces the levy ratio of the tax base. The 100% super-deduction for R&D expenses achieves a “reduction” of the tax base (taxable income). The mechanism can be simplified as: Effective Tax Burden \approx (Total Profit – R&D Expenses) \times 15%. This means that huge R&D investment is “doubly amplified” for deduction when calculating tax, resulting in a final tax payable and effective tax rate far lower than the nominal level.

Table 1. Key Data on CATL’s tax burden and R&D investment (2018-2024) (Unit: 10,000 CNY).

Year	R&D Expenses	R&D Expense Super-Deduction Ratio	Total Profit	Income Tax Expense	Effective Tax Rate
2024	1,860,675.60	100%	6,318,203.90	917,524.50	14.52%
2023	1,835,610.80	100%	5,391,405.33	715,301.88	13.27%
2022	1,551,045.35	100%	3,667,285.62	321,571.27	8.77%
2021	769,142.76	100%	1,988,712.91	202,639.90	10.19%
2020	356,937.77	75%	698,255.34	87,863.54	12.58%
2019	299,210.75	75%	576,076.46	74,809.07	12.99%
2018	199,100.04	75%	420,481.30	46,891.70	11.15%

Data Source: CATL Annual Financial Reports. Note: The Effective Tax Rate is calculated as Income Tax Expense/Total Profit. This simplified formula reflects the immediate tax burden impact of preferential policies such as the high-tech enterprise tax rate and R&D super-deduction. It does not account for deferred tax assets/liabilities or other one-time adjustments, which are minimal in CATL’s case given the consistency of its tax incentive eligibility.

4.1.2. Optimize Cash Flow to Support Strategic Investment

The deeper value of tax incentives is reflected in their cash flow effect. By reducing the actual cash outflow, they directly and powerfully improve the company’s operating cash flow. The income statement is based on accrual accounting, while the cash flow statement is based on cash accounting. The tax benefits enjoyed by the company result in the increase in “Taxes Payable” being lower than the theoretical tax burden based on accounting profit, leading to a significant reduction in the “Taxes Paid” item in the cash flow statement (**Table 2**).

Table 2. Key Data on CATL’s taxes and net cash flow from operating activities (2018-2024) (Unit: 10,000 CNY).

Year	Total Profit	Net Profit	Increase in Taxes Payable	Taxes Paid	Net Cash Flow from Operating Activities	Tax Refunds Received
2024	6,318,203.90	5,400,679.40	230,538.40	2,852,918.80	9,699,034.50	1,050,618.80
2023	5,391,405.33	4,676,103.45	694,938.51	1,711,719.15	9,282,612.44	1,273,961.05
2022	3,667,285.62	3,345,714.35	238,864.37	1,052,973.34	6,120,884.33	947,868.99
2021	1,988,712.91	1,786,073.01	108,273.84	412,778.90	4,290,800.87	41,454.28
2020	698,255.34	610,391.80	35,807.45	226,558.74	1,842,990.26	15,192.85
2019	576,076.46	501,267.39	24,044.80	268,880.01	1,347,195.46	39,568.66
2018	420,481.30	373,589.60	28,633.98	186,808.17	1,131,626.57	3712.77

Data Source: CATL Annual Financial Reports.

The “Tax Refunds Received” surged from 37.12 million CNY in 2018 to 12.74 billion CNY in 2023. Although it slightly decreased in 2024, it remained high at 10.51 billion CNY. This is mainly due to policies like export tax rebates enjoyed by the company’s export business, representing a direct cash inflow injected into the company. The “Net Cash Flow from Operating Activities” continued to grow rapidly, increasing from 11.316 billion CNY in 2018 to 96.99 billion CNY in 2024. Its scale has been significantly higher than “Net Profit” for years; in 2024, operating cash flow was almost 1.8 times the net profit.

Tax incentives have created a liability for the government in terms of unpaid taxes, which can be used as working capital before payment. This has optimized the cash cycle of the company. The company’s R&D expenses have increased from 19.9 billion yuan in 2018 to 183.6 billion yuan in 2023. This dramatic growth in sustainable investment is supported by strong operating cash flows. To build production bases in the global market (such as German factories, Hungarian projects), to develop upstream mineral resources, and to need large capital expenditures. The investment activities cash flow of the company is always in a massive negative flow, while the cash inflow from stable and larger-scale operations fills this funding gap. Tax incentives indirectly provide financial support for the company’s global production expansion and supply chain security.

4.1.3. Reduce Innovation Cost and Incentivize R&D Investment

The core incentive logic of tax incentives lies in directly reducing the actual cost per unit of R&D investment for the enterprise, thereby influencing corporate decisions and making them more inclined to increase R&D investment. CATL’s data perfectly confirms this logic. R&D expenses soared from 1.99 billion CNY in 2018 to 18.6 billion CNY in 2024, with a compound annual growth rate (CAGR) far exceeding revenue growth. This magnitude and speed indicate that the company actively directs massive resources to innovation, which requires strong strategic determination and solid cash flow support. The number of R&D personnel expanded from 4217 in 2018 to 20,346 in 2024, a nearly fivefold increase. The proportion of R&D personnel remains high annually, proving the absolute core position of R&D within the company (Table 3).

Table 3. Key data on CATL’s R&D investment (2018-2024).

Year	R&D Expenses (10,000 CNY)	Operating Revenue (10,000 CNY)	R&D Intensity (R&D/Revenue)	Number of R&D Personnel	R&D Personnel Percentage
2024	1,860,675.60	36,201,255.40	5.14%	20,346	15.42%
2023	1,835,610.80	40,091,704.49	4.58%	20,604	17.75%
2022	1,551,045.35	32,859,398.75	4.72%	16,322	13.73%
2021	769,142.76	13,035,579.64	5.90%	10,079	12.06%
2020	356,937.77	5,031,948.77	7.09%	5592	18.16%
2019	299,210.75	4,578,802.06	6.53%	5364	20.03%
2018	199,100.04	2,961,126.54	6.72%	4217	16.95%

Data Source: CATL Annual Financial Reports.

Ideally, as a high-tech enterprise enjoying a 15% corporate income tax rate and a 100% R&D expense super-deduction policy, the actual after-tax cost per 100 CNY of R&D investment is 85 CNY. The tax policy directly bears 15% of the R&D cost for the enterprise. This “cost discount” effect significantly enhances the marginal return and financial feasibility of R&D activities. It incentivizes management to allocate more resources to high-risk, long-cycle basic R&D projects (e.g., all-solid-state batteries), as the policy subsidy shares the potential failure risk.

Tax incentives systematically incentivize and support CATL’s R&D investment through the following closed loop:

Policy Dividends (Super-Deduction/Preferential Tax Rate) → Reduce Actual Innovation Cost & Optimize Operating Cash Flow → Enhance Willingness to Invest & Ensure Investment Capacity → Expand R&D Scale and Team → Consolidate Technological Leadership (Kirin Battery, Shenxing Superfast Charging Battery) → Achieve Market Leadership and Higher Revenue → Feed Back into Larger Scale R&D Investment.

4.2. Specific Pathways of R&D Investment Transforming into Corporate Competitiveness

Based on the Resource-Based View, sustained R&D investment is key to building core resources and forming long-term barriers. This section empirically examines, using CATL’s panel data from 2018-2024 and focusing on the dual dimensions of “R&D Financial Input” and “R&D Human Capital Input,” how these inputs translate into “Market and Financial Performance” and “Sustainable Operational Efficacy” through the core mediator of “Technological Competitiveness Building,” forming a complete value creation chain (Table 4).

Table 4. R&D Input and Corporate Competitiveness Indicators (2018-2024).

Year	R&D Exp. (10k CNY)	Global Mkt Share (Power Batt.)	Global Mkt Share (Storage Batt.)	Top 5 Cust. %	Gross Margin	ROE (WAvg)	R&D Pers. Count	Granted Patents	Patent Apps.	Core Prod. Rev. %	Rev. Growth Rate	Inventory Turnover	Acc. Rec. Turnover
2024	1,860,675.60	37.9%	36.5%	37.03%	32.35%	24.13%	20,346	16,145	27,209	85.73%	-10%	6.9	6.4
2023	1,835,610.80	36.8%	40.0%	36.78%	29.72%	24.04%	20,604	9987	19,500	86.09%	22%	7.1	5.5
2022	1,551,045.35	37.0%	43.4%	35.33%	25.39%	24.67%	16,322	6583	10,054	85.69%	152%	9.0	4.5
2021	769,142.76	32.6%	Leading	31.32%	35.65%	21.52%	10,079	445	5777	80.64%	159%	10.0	4.8
2020	356,937.77	Leading	-	29.70%	38.43%	11.27%	5592	3317	3454	82.21%	10%	12.2	7.0
2019	299,210.75	Leading	-	41.88%	40.96%	12.78%	5364	-	-	85.60%	55%	10.3	5.7
2018	199,100.04	Leading	-	42.34%	48.78%	11.75%	4217	-	-	83.43%	48%	9.5	9.0

Data Source: CATL Annual Financial Reports, SNE Research. Note: “-” indicates data not available or not prominently disclosed in sources.

4.2.1. R&D Financial Input Drives Technological Barriers and Market Leadership

The company’s R&D expenses surged from 1.991 billion CNY in 2018 to 18.607

billion CNY in 2024, an increase of over 8.3 times within six years, far exceeding revenue growth and demonstrating an overwhelming commitment to innovation. This high-intensity, sustained financial input is the source driving all subsequent competitive advantages. Substantial R&D funding directly ensures the conquer of cutting-edge technologies (e.g., Kirin Battery, Shenxing Superfast Charging Battery) and pilot testing, providing the material basis for the “quality” and “quantity” of patents. This represents the critical leap from “capital” to “technology.”

Technological advantages are directly translated into product competitiveness, enabling the company’s global power battery market share to rapidly evolve from a qualitative “industry leader” position to a quantitative dominance exceeding 36% (2021-2024). More crucially, while market share climbed, the sales contribution from the top five customers significantly decreased from 42.34% in 2018 to 37.03% in 2024. This demonstrates that the product irreplaceability fostered by R&D has successfully optimized the customer structure, reduced single dependencies, and significantly enhanced market bargaining power and risk diversification capabilities.

4.2.2. Synergy of R&D Human Capital and Financial Input Accelerates Patent Output and Commercialization

R&D personnel are the “execution carriers” of R&D funds, and their synergy constitutes a complete innovation input. The R&D team size expanded from 4217 in 2018 to a peak of 20,604 in 2023, synchronizing with the growth in R&D expenses. This multiplicative effect of “financial resources” and “human resources” catalyzed an explosion of innovation outcomes: the number of granted patents surged from 3317 in 2020 to 16,145 in 2024, a nearly fourfold increase in four years; patent applications surged from 3454 to 27,209. This clearly reveals the strong causal chain: scale input of “R&D funding + talent” → extreme acceleration of knowledge production → geometric thickening of patent barriers. The revenue contribution from core products remained consistently above 80%. This indicates that the massive R&D investment is highly focused on the main business areas that generate direct market value, forming a tight closed loop of “R&D input-patent output-core revenue,” ensuring the effective translation of innovation resources into commercial value.

4.2.3. Transmission of Technological Competitiveness to Financial Performance and Operational Resilience

Technological leadership, built on a solid R&D foundation, is ultimately realized in financial metrics and operational quality. Despite industry cycles and price wars, the company’s gross margin stabilized and rebounded to 32.35% after touching a low in 2022 (25.39%). This temporary decline was partly attributable to sharp fluctuations in the prices of key raw materials such as battery-grade lithium carbonate, as highlighted in the SWOT analysis. Nevertheless, CATL’s subsequent recovery demonstrates its strong cost control capabilities, supply chain integration strategy, and ability to command a technology premium. More convincingly,

the weighted average Return on Equity (ROE) systematically leaped from 11.27% in 2020 and remained stable at a high level above 24%. This critical leap directly confirms that high-intensity R&D investment has been efficiently translated into top-tier capital profitability and value creation capability within the industry.

During a period of slowing revenue growth (−10% in 2024), the company’s inventory turnover and accounts receivable turnover rates actively adjusted and stabilized from their 2021 peaks. This is not a decline in efficiency but rather a reflection of enhanced product planning and supply chain management capabilities fostered by R&D. It allows the company to proactively optimize its asset structure on a massive scale, ensuring cash flow health and demonstrating strong strategic control and development resilience.

The empirical analysis of CATL’s data clearly validates a complete logic for competitiveness generation: sustained and substantial R&D financial input and human capital expansion catalyze the rapid construction of core patent and technology barriers, which translate into a stable market leadership position and optimized customer structure, ultimately manifesting as exceptional profit resilience, top-tier capital returns, and healthy operational quality.

5. Case Implications: Recommendations for Management Practice and Policy Formulation

5.1. Practical Significance for Corporate Management

5.1.1. Strategic and Proactive Tax Planning

Enterprises should not view tax incentives as passive financial subsidies but as active elements of strategic planning. Management, R&D departments, and finance departments need to collaborate closely, planning from the inception of R&D projects to ensure standardized R&D activities and clear cost allocation, thereby fully leveraging policy benefits.

5.1.2. Constructing a “Policy-Cash Flow-R&D” Closed-Loop Management

Enterprises need to establish dynamic models to quantitatively analyze the impact of tax incentives on cash flow and the actual cost of R&D. Taxes saved should be directed towards R&D in core technologies, forming a virtuous cycle of “policy dividends → cash flow optimization → renewed R&D investment → technological breakthrough → enhanced market competitiveness,” internalizing external incentives into sustained innovation momentum.

5.1.3. Transcending the Tax-Saving Perspective to Pursue Ecological Value Co-creation

Leading enterprises should adopt a “Symbiotic Finance Perspective,” utilizing the financial advantages gained from tax incentives to invest in the health of the entire industrial ecosystem through technology licensing, joint ventures, and supplier development. This not only reduces their own supply chain risks but also expands technological standards into industry standards, thereby building more stable and enduring competitive advantages.

5.2. Recommendations for Policy Formulation and Optimization

5.2.1. Maintain Policy Stability and Predictability

Core incentive policies like the R&D expense super-deduction should be institutionalized as long-term arrangements, providing stable policy expectations for enterprises, especially those engaged in long-cycle R&D. This can effectively alleviate corporate concerns and encourage them to undertake more forward-looking and disruptive basic research.

5.2.2. Explore Graded and Targeted Incentive Design

Consideration can be given to setting differentiated super-deduction ratios based on the type of R&D activity (e.g., basic research, applied research, experimental development), providing stronger incentives for basic research and frontier exploration. Simultaneously, policies could be further tilted towards specialized, sophisticated, and innovative SMEs and key links within the industrial chain to ensure the innovation capability and security of the entire chain.

5.2.3. Simplify Procedures and Strengthen Services to Reduce Compliance Costs

Continuously optimize declaration processes, promote e-taxation, and further simplify the requirements for R&D expense auxiliary accounts. Tax authorities should enhance policy communication and guidance, providing certainty services to help enterprises accurately understand and apply policies, thereby reducing compliance costs and ensuring policy benefits reach enterprises efficiently and conveniently.

6. Conclusion

This study, using the global power battery leader CATL as a case, provides an in-depth analysis of how tax incentives affect corporate R&D investment and competitiveness building. The main conclusions are as follows:

First, tax incentives (particularly the R&D expense super-deduction and the preferential high-tech enterprise tax rate) have multidimensional and systematic incentive effects on enterprises. They act not only as a “profit booster,” directly enhancing profitability by reducing income tax expenses, but also as a “cash flow optimizer,” providing solid financial support for large-scale, sustainable strategic investments by reducing cash outflows and providing tax refunds. Their most core function is serving as an “innovation catalyst,” significantly reducing the actual cost of R&D, thereby generating a strong guiding and incentive effect for enterprises to increase R&D investment.

Second, the CATL case demonstrates that viewing tax incentives simply as cost-reduction tools is short-sighted. Successful enterprises skillfully integrate external policy dividends with internal strategy, transforming tax savings into continuous technological breakthroughs and ecosystem advantages through a virtuous cycle of “policy-R&D-cash flow”, ultimately forging global technological leadership and market competitiveness.

Third, the “Symbiotic Finance Perspective” and analytical framework constructed in this study have universal relevance. For ecosystem-oriented enterprises at the core of complex industrial chains, the goal of financial management must evolve from solely safeguarding shareholder value to systematically creating ecological value. Effective tax incentive policies are a key external driver prompting enterprises to complete this paradigm shift and achieve high-quality development.

In summary, for future industrial competition, the combination of forward-looking policy design and strategic proactive utilization by enterprises constitutes a critical pathway for cultivating world-class enterprises and enhancing the nation’s overall industrial competitiveness.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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