Capitalization of R&D Expenses in Technology Companies: Communicating Value Creation Amid Accounting Constraints

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Abstract. The rapid evolution of artificial intelligence (AI) has driven exponential growth in the AI industry, yet persistent financial challenges arise from high R&D expenditures and profitability imbalances. Under strict accounting standards (e.g., U.S. GAAP requiring expensing and IFS allowing limited capitalization), how the value of R&D investments is conveyed through financial reports or other channels has drawn significant attention. The study's findings indicated that capitalization of research and development expenses does not significantly enhance the immediate market response of investors. Using textual analysis, event studies, and regression analysis, we find that R&D capitalization alone does not significantly enhance investor response. At the same time, comprehensive information disclosure positively impacts market reactions by reducing information asymmetry. Results highlight the critical role of voluntary disclosure in conveying R&D value when accounting treatments are constrained. The study recommended that regulatory authorities should develop detailed disclosure guidelines for research and development expenses and accounting standards to enhance transparency. It is further recommended that refining disclosure guidelines and improving investor communication strategies to align financial reporting with innovation value.

Keywords: R&D capitalization, information asymmetry, investor communication, technology companies, accounting standards.

1. Introduction

With the global market size indicating it will reach close to 92 billion U.S. dollars by 2025 [1], the rapid advancement of artificial intelligence (AI) technologies has propelled exponential growth in the AI chip industry. However, this sector faces acute financial challenges, and the accounting treatment of R&D expenditures remains highly controversial: Should R&D costs be immediately expensed or capitalized to reflect future economic benefits when criteria are met? Accounting standards diverge significantly: U.S. GAAP requires nearly all R&D costs to be expensed immediately, while IAS 38 of the International Financial Reporting Standards (IFRS) permits capitalization of development-phase expenditures meeting feasibility criteria. Since 2007, China's new accounting standards adopted to align with IFRS, applying similar capitalization rules. This divergence creates limitations in financial reporting: while expensing provides prudence by recognizing all R&D costs in current earnings, it understates long-term value creation. Capitalization matches costs with future revenues [2], but faces reliability challenges due to R&D uncertainty.

In recent years, capital markets have increasingly demanded transparency around R&D activities. Investors and analysts require an in-depth understanding of firms' innovation pipelines to evaluate sustainable competitive advantage. However, limited recognition of R&D in financial statements exacerbates information asymmetry. To address this, firms often employ voluntary disclosure and investor communication strategies to convey non-financial information about R&D progress, technological outcomes, and strategic planning. Existing research shows companies enhance voluntary disclosures to mitigate information gaps when mandatory accounting rules are restrictive [3]. With R&D spending rising, effective communication of innovation value through disclosure strategies represents a pressing theoretical and practical challenge.

2. Research Questions and Contributions

Against this background, this study focuses on "R&D capitalization controversies and investor communication strategies," exploring how firms communicate R&D value under accounting constraints. Through empirical analyses, this study seeks to elucidate the "value transmission path" between R&D capitalization and investor value judgments, including (i) Enriching the literature on the value relevance of accounting for R&D expenditures. Focusing on Chinese science and technology firms, this study examines the informational utility and limitations of capitalization strategies, and respond to the international debate on whether R&D capitalization is useful for investor decision-making; (ii) Introducing information disclosure and investor relationship management into the R&D accounting research framework, and revealing the financial reports of R&D firms in the context of high R&D investment [4], which shows how high quality R&D communication enhances investors' understanding of firm value; (iii) proposes policy recommendations for accounting standards and corporate practices to provide empirical evidence for improving R&D cost reporting and disclosure, such as improving R&D disclosure guidelines, encouraging more transparent R&D communication strategies [5]. The paper is structured as follows: Section 2 reviews theoretical foundations, Section 3 outlines research design, Section 4 presents empirical results, and Section 5 concludes with policy implications.

3. Literature Review

Capitalization of R&D Expenditure has long been one of the focal points of debate in the accounting literature. Proponents argue that capitalizing qualifying R&D expenditures better reflects future economic benefits, enhancing the value relevance of accounting information. For example, Lev and Sougiannis demonstrate that capitalization and amortization of R&D significantly improve the correlation between book value and market capitalization, indicating that future benefits embedded in R&D investments are better captured through capitalization [6]. In addition, Oswald & Zarowin find UK firms voluntarily capitalizing R&D exhibit higher financial statement reliability (FERC) compared to expensing peers [5]. Moreover, Herb et al. further validates the informational value of capitalization by linking IFRS-based R&D capitalization ratios to future patent counts and citations, as well as subsequent financial performance improvements [7]. These studies suggest capitalization can serve as a leading indicator of innovation success when criteria are met.

Critics, however, emphasize subjectivity in R&D capitalization decisions and associated earnings management risks [4]. Markarian et al. find an Italian firms increase R&D capitalization during earnings declines to smooth profits [3], while Dinh et al. link capitalization to managerial incentives like debt covenant compliance [5]. Capital markets also view capitalization cautiously: Dinh et al. show higher capitalization ratios correlate with an increased cost of capital and lower valuations even in firms with strong disclosure, suggesting investor skepticism about reliability [5]. Mazzi et al. corroborate this tension through investor interviews [8], while conditional capitalization under IAS 38 is preferred over full expensing, investors remain unconvinced by capitalized R&D amounts due to assessment subjectivity.

3.1. R&D Information Disclosure and Investor Communication

Firms often supplement accounting limitations with voluntary R&D disclosures to signal innovation value [9]. These disclosures include MD&A narratives, patent metrics, and R&D roadmaps. Rieg and Vanini meta-analyze 40 studies on intellectual capital disclosures, finding significant positive relationships with market valuation and reduced cost of equity [10]. Hutton, et al. shows U.S. firms provide more detailed R&D narratives during weak earnings performance to emphasize future growth potential, which improves analyst forecast accuracy and reduces information asymmetry [11].

3.2. Synthesis

This study integrates these streams by examining how R&D capitalization interacts with disclosure quality to influence investor reactions. While prior literature debates capitalization's utility, this study argue disclosure acts as a critical moderator. The next section outlines our research design to test these relationships.

4. Research Design and Methodology

4.1. Sample Selection

This study examines 100 leading technology enterprises listed in the NASDAQ Composite Index and S&P 500 Index, ranked by market capitalization between 2022 and 2025. The selection rationale is threefold:

Large-cap technology firms, as mentioned by Entwistle typically exhibit substantial R&D investments and intangible assets, making them quintessential cases for studying R&D accounting and information disclosure challenges [12]. Moreover, the sample encompasses a diverse range of sectors, including software, internet, semiconductors, and hardware manufacturing (e.g., Microsoft, Apple, Alphabet (Google), Meta, Amazon, Tesla, NVIDIA, AMD, Adobe, Intel, Oracle, Salesforce, ASML, Qualcomm). This diversity enhances the generalizability of findings [13]. Additionally, the 2022–2025 timeframe captures post-pandemic trends in R&D investment and market dynamics amid the accelerated growth of the digital economy.

Initially, approximately 100 companies were shortlisted. Adjustments were made for mergers, delistings, or structural changes. Multinational firms using non-US accounting standards (e.g., ASML under IFRS) were included but distinguished in statistical analyses. Most sample companies adhere to US GAAP, aligning with the research context where R&D capitalization is restricted under these standards.

4.2. Data Collection

Key data and information were collected for each sample company:

R&D Expenditure: Annual R&D spending and R&D intensity (R&D expenses/revenue) were extracted from income statements and business overviews in annual (10-K) and quarterly (10-Q) reports. For example: Apple reported $27.65 billion in R&D in 2022 (7% of revenue); Microsoft allocated $26.6 billion (12% of revenue); Google invested $39.5 billion (14% of revenue); Meta spent $35.3 billion (over 30% of revenue); Amazon recorded $73.2 billion in "technology and content" expenses [14]. These data characterize the sample’s R&D investment levels and disparities.

Capitalization of R&D Expenses: Financial statement footnotes and management discussions were reviewed to identify cases where R&D expenditures were capitalized as intangible assets. Under US GAAP, nearly all large US-listed firms (constituents of NASDAQ and S&P 500) fully expense R&D, except for rare instances of minor capitalization of software development costs (per GAAP guidelines). In contrast, IFRS adopters like ASML exhibit higher capitalization: In 2022, ASML capitalized approximately 20% of its €3.3 billion R&D spending under IAS 38 [15], amortizing these costs over 1–3 years upon product commercialization, as disclosed in its annual report. The "capitalization rate" was defined as capitalized R&D costs divided by total R&D investment, with a rate of 0% for fully expensed firms.

R&D Information Disclosure and Communication: Data were collected on three dimensions of disclosure practices: Firstly, Financial Reports: content in Management Discussion and Analysis (MD&A), including R&D strategy, progress descriptions, dedicated R&D sections, and metrics (e.g., patent counts, product milestones). Secondly, Press Releases or investor News: Specialized announcements on R&D achievements, product launches, or technological breakthroughs. Thirdly, Investor Relations Materials: Details from Investor Day presentations, analyst meetings, and

management responses to R&D-related queries. Fourthly, A R&D Disclosure Index (0–10) was constructed to quantify disclosure sufficiency, incorporating:

Proportion of R&D-related text in annual reports; disclosure of R&D headcount and growth; R&D project updates/product roadmaps; R&D budget outlooks; frequency of major R&D-related press releases.

Companies like Microsoft and Google, which elaborate on cutting-edge technologies like AI and quantum computing in reports and host technical briefings, are expected to score highly, while others with minimal disclosure will have lower indices. This systematic approach ensures comprehensive data collection to analyze R&D investment, accounting treatment, and disclosure practices among leading technology firms.

As shown in Table 1, except for ASML, several U.S.-listed tech giants exhibit no R&D capitalization (all marked "No"), consistent with the requirements of U.S. accounting standards [15]. However, notable disparities exist in information disclosure: some companies actively convey R&D narratives through diverse channels (e.g. Microsoft), while others adopt a more reserved approach (e.g., Apple). Such differences may trigger varied capital market responses.

Table 1. R&D Investment and Disclosure Profile of Technology Companies (2024)

Company	R&D Spending (Billion USD)	R&D Spending as % of Sales	Capitalization per GAAP/IFRS	Detailed Disclosure Methods
Amazon	42.74	11.1%	No (GAAP)	Detailed in "technology and content" costs, emphasizing strategic innovation and future tech orientation
Alphabet	27.57	15.1%	No (GAAP)	Extensive investment in AI infrastructure and quantum computing, detailed in MD&A sections
Meta	30	30%	No (GAAP)	Focused on significant VR/AR initiatives through Reality Labs
Apple	18.75	7%	No (GAAP)	Invests in custom silicon and AR/VR platforms, with minimal public disclosure on specifics
Microsoft	19.27	~13%	No (GAAP)	Highlighted in CEO's statements and earnings calls, focuses on AI and cloud infrastructure
Huawei	22.04	15.9%	Yes (IFRS)	Large investment in 5G and smart device technologies, detailed disclosure in annual reports
Samsung	18.75	9%	Yes (IFRS)	Leading in semiconductor and display tech, openly discusses R&D projects and patent strategies

To assess how R&D information disclosure and financial strategies influence investor reactions, this study uses the event study method to analyze abnormal stock returns within specific event windows. Steps include:

4.3. Event Definition

Regular financial report disclosure dates serve as primary event windows. Quarterly reports often include new R&D investment data and management discussions, critical for investors to update expectations. Major R&D-related announcements (e.g., groundbreaking product launches or technological breakthroughs) act as auxiliary events. Each company has at least 12 quarterly financial

report events during 2022–2025; events closely tied to R&D information changes are selected for analysis.

4.4. Window Setting

The three-day window [-1, +1] calculates the Cumulative Abnormal Return (CAR), complemented by a narrower [0, +1] window. The market model method computes abnormal returns: $AR_{i,t} = R_{i,t} - (\alpha_i +)\beta_i R_{m,t}$ Here, $R_{i,t}$ is the actual return of company i on day t, $R_{m,t}$ is the benchmark index return (NASDAQ or S&P 500), and α_i, $\beta_i$are parameters estimated from 120 pre-event days. Summing $AR_{i,t}$ yields CAR_i.

4.5. Grouping and Comparison

Sample companies are divided into "high-disclosure" (disclosure index > median) and "low-disclosure" groups. Grouping also occurs by IFRS capitalization (capitalization rate > 0) or enterprise nationality. Average CAR differences across groups during financial report windows are compared. High-disclosure firms are expected to show more positive CAR, while low-disclosure firms may exhibit weaker or negative CAR. For capitalization, limited samples like ASML (IFRS) are analyzed, with full-sample regression for control.

4.6. Statistical Test

Average CAR is calculated, with t-tests and non-parametric tests (sign/rank-sum tests) assessing CAR significance and group differences. A cross-sectional regression model is built:

$$C\,AR_i = \gamma_0 + \gamma_1 DisclosureIndex_i + \gamma_2 DisclosureRate_i + \gamma_3 R\&DIntensity_i + \gamma_4 Size_i + \gamma_5 ROE_i + \varepsilon_i \quad (1)$$

Here, Disclosure Index, Capitalization Rate, and R&D Intensity measure disclosure, capitalization, and R&D intensity, with controls for firm size and profitability. γ_1 and γ_2 test disclosure and capitalization impacts.

To better illustrate the descriptive statistics, this study presents the following table 2:

Table 2. The descriptive statistics

Company Category	Median R&D Intensity	Average Annual R&D Expenditure (Billion USD)	Typical Companies
Large-Tech Enterprises	12%	11	Amazon, Alphabet (Google)
Semiconductor Companies	15%	8	NVIDIA, AMD, ASML
Software Companies	14%	10	Microsoft, Adobe, Salesforce

This table aligns with prior research by Lev and Sougiannis, which emphasizes that technology-intensive sectors often exhibit higher R&D intensities [6]. For instance, semiconductor and software companies, due to their technological innovation requirements, typically have higher R&D intensities than the median of large tech enterprises. The average annual R&D expenditure of large tech

enterprises, as shown, reflects their substantial investment in innovation, consistent with the trend of post - pandemic digital economy growth [14].

Through event studies and regression analysis, this study aims to determine: “In events like financial report releases whether full R&D disclosure or accounting-driven profit boosts (R&D capitalization) wins investor favor?” Our hypothesis: high disclosure enhances investor confidence and reduces information asymmetry, yielding better market reactions; simple capitalization may lack recognition, even facing reliability concerns.

5. Empirical Results and Analysis

5.1. Descriptive Statistics

First, this study conducts descriptive statistics on the R&D investment and disclosure index of sample companies. The results show that the median R&D intensity of large tech enterprises is approximately 12%, with an average R&D expense of about $11 billion/year (due to right skewness, the average is higher than the median). Companies with the highest R&D investment are internet giants such as Amazon and Alphabet, while those with the highest R&D intensity include biotech and chip companies (with R&D expense ratios often exceeding 20%). In terms of accounting treatment, over 95% of observed companies fully expense R&D costs in their annual financial reports, with a capitalization rate of 0. Therefore, in subsequent analyses, the “capitalization strategy” is mainly explored as a phenomenon unique to IFRS companies. Regarding the R&D disclosure index, the sample mean is approximately 6.5 points (out of 10), with significant differences. this study finds that companies with top market capitalization generally have higher disclosure indices. For example, Microsoft, Google, Amazon, and Meta all score above 8, indicating these companies have detailed R&D discussions in annual reports, regularly hold technical communication activities, and release multiple R&D-related news. However, some traditional hardware or service-oriented tech companies have lower disclosure indices, possibly because R&D is relatively less prominent in their business models or management chooses low-key disclosure. For instance, Oracle’s disclosure index is significantly lower than that of software companies of the same size, which is not the focus compared to topics like cloud service transformation. Similarly, Apple’s disclosure index is lower than other “Big Five Tech Giants.” Although its R&D investment is huge in absolute terms, the company is known for its confidentiality culture, rarely detailing R&D in financial reports and only showcasing results at new product launches. These differences provide a basis for dividing disclosure groups.

5.2. Event Study Results

Overall Market Reaction around the financial report release dates, the stocks of technology companies generally exhibited certain abnormal fluctuations. When combining and calculating all sample events (quarterly financial report releases, approximately 400 event - days in total), the average CAR [-1, +1] was about +0.3%, and the median was close to 0. This indicates overall, the financial report release days did not bring systematic excess returns, which is in line with expectations, since financial reports contain multiple types of information, and the market is relatively efficient in general.

This study was more interested in whether different disclosure and accounting strategies led to differentiated market reactions. Therefore, this study compared the mean CARs of the high-disclosure group and the low-disclosure group, as well as the IFRS capitalization group and the US GAAP group. The results are shown in the following table 3:

Table 3. The mean CARs of the high-disclosure group and the low-disclosure group

Group Classification	Mean CAR
High - disclosure group	+0.5%
Low - disclosure group	- 0.5%
IFRS capitalization group (taking ASML as an example)	Insignificant, some years negative
US GAAP group	-

As can be seen from the table, companies with a high R&D information disclosure index obtained an average cumulative excess return of about +0.5% during the financial report announcement window, while companies with less disclosure had an average CAR of about - 0.5%. A t-test showed that this difference was significant at the 5% level. This means that the high-disclosure group tended to experience a stock price increase when the financial report was released, while the low-disclosure group saw a slight decline.

Upon further analysis of the financial report content, this study can speculate on the reasons: Investors of high disclosure companies have sufficient anticipation of R&D related news, and the R&D data or plans disclosed in the financial reports are more likely to be positively interpreted. Even if short-term profits decline due to R&D expenses, investors are willing to show support [16]. Conversely, investors of low disclosure companies may be "surprised" by high R&D expenses when the financial reports are announced or unable to assess their returns, thus generating short term negative sentiment and resulting in poor stock price reactions. This finding supports our hypothesis that proactive R&D information communication helps to win investor recognition and buffer the impact of financial statement limitations.

As the impact of Capitalization Strategy, since most American companies do not have capitalization, this study mainly examined the events of IFRS companies represented by ASML. ASML's annual reports adopt IFRS, contain information on capitalized R&D. This study found that during the sample period, the abnormal returns on ASML's financial report release days were not significantly positive, and in some individual years, they were even negative. This may be related to investors paying more attention to factors such as its orders and industry cycles. R&D capitalization itself did not cause obvious premiums or discounts.

From the regression of the full sample, the coefficient of the capitalization rate variable was not statistically significant and was negative. This indicates that in this sample, R & D capitalization did not bring obvious short term market benefits. Investors may understand the differences in accounting standards and do not give higher evaluations just because an IFRS company reports higher accounting profits. Instead, they rely more on other performance indicators and disclosed information to judge the company's value [7].

5.3. Case Analysis

Case 1: Microsoft had a high R & D disclosure index during the research period. Its financial report conference calls and shareholder letters often highlight R & D achievements. After the quarterly financial report was announced, Microsoft's stock price rose by about 1.5% within two days (outperforming the market by 0.8%). Investors recognized the company's R & D direction. This study attribute this to the management's success in linking high R & D expenditures with future revenue growth stories, and the market was willing to "buy in."

Case 2: A Traditional Hardware Company (name withheld) - This company had a low R & Disclosure index. In a quarterly financial report in 2023, its profit was significantly lower than expected, mainly because R & D expenses increased by 20% a year, eroding profits.

These cases confirm the huge role of information disclosure in influencing market expectations. High quality information communication can guide expectations in advance, avoid "earnings surprises", and at the same time, present R&D as a positive signal. Conversely, poor communication amplifies the negative interpretation of R&D expenses on short term performance.

6. Conclusion

This study explores effective approaches to transmit R&D value under accounting standard constraints, focusing on R&D expense accounting treatments and investor communication strategies of U.S. listed tech companies. Through empirical analysis of large-market-value tech enterprises during 2022–2025, the following conclusions are drawn:

R&D expenditure capitalization is rare among U.S. listed tech firms. Most American enterprises immediately expense R&D expenditures per accounting standards, rendering financial statements unable to directly recognize R&D related assets. Although IFRS adopting companies may capitalize part of development costs, empirical results reveal low capitalization rates and no obvious market premiums. These underscores enterprises must rely on alternative methods to demonstrate R&D's significance.

Investor communication and information disclosure prove pivotal for R&D value. Companies with robust R&D disclosures receive more positive market feedback during financial report announcements. This reduces information asymmetry and mitigates the short-term profit impact of high R&D expenses, validating the notion that "disclosure outweighs capitalization." Transparency fosters investor trust more effectively than manipulating financial statements.

While the short-term market may underestimate R&D value, long-term returns prevail. High R&D investment companies' stock performance on announcement days hinges on communication effectiveness. However, firms with sustained high-quality R&D investments ultimately achieve excellent performance and shareholder returns. These urges accounting standard setters to refine R&D related disclosure rules, such as mandating detailed project stages, investment amounts, and expected returns in financial reports, which aims to offer investors a comprehensive R&D view beyond mere expense figures. Enterprise management should actively communicate R&D strategies and achievements in reports and investor interactions, ensuring transparent disclosure to build investor trust. Investors and analysts should utilize disclosed R&D information to evaluate long term competitiveness, rewarding transparent firms and pushing low disclosure companies to improve.

In essence, this study confirms that enhanced disclosure and communication enable tech companies to convert massive R&D investments into market value drivers. As intangible assets grow in economic importance, stakeholders must collaborate to refine the information environment, bridge the "book value" and "innovation value" gap, and optimize capital and market resource allocation to innovative enterprises.

The application value of this study is substantial. As for technology companies, it provides practical guidance on presenting R&D value effectively, aiding in attracting long-term investment. For investors, it offers a framework to make informed decisions using R&D disclosures, promoting more rational investment behavior. For accounting standard setters, it serves as a reference for improving disclosure regulations, contributing to a more transparent and efficient capital market environment. Overall, it fosters a climate where innovative enterprises are appropriately valued and supported, driving the sustainable development of the technology industry and economic innovation.

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