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Том III



5-7 ноември 2026 г.

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# ИНТЕНЗИВНОСТ НА НАУЧНОИЗСЛЕДОВАТЕЛСКАТА И РАЗВОЙНАТА ДЕЙНОСТ И СТОЙНОСТ НА ФИРМАТА В КИТАЙСКИЯ ИНДУСТРИАЛЕН СЕКТОР: ДОКАЗАТЕЛСТВА ЗА ХЕТЕРОГЕННОСТ НА СОБСТВЕНОСТТА

**Докторант Синюе Ду**[1]

**Резюме:** *Докладът изследва дали интензивността на научноизследователската и развойната дейност повишава стойността на фирмите в китайския индустриален сектор и дали този оценъчен ефект се различава между държавните и недържавните предприятия. Използвани са годишни панелни данни за китайски дружества, листвани с акции клас А, за периода 2015-2024 г. Анализът се фокусира върху нефинансови индустриални предприятия без специален режим (ST) и прилага модели с фиксирани ефекти по фирми и години, като стандартните грешки са клъстерирани на фирмено равнище. Стойността на фирмата се измерва чрез коефициента Q на Тобин, а интензивността на НИРД се измерва като разходи за НИРД, разделени на общите активи, със закъснение от една година с цел ограничаване на едновременността. Резултатите показват, че закъснената променлива НИРД/активи е положително и статистически значимо свързана с коефициента Q на Тобин, което означава, че капиталовият пазар третира инвестициите в НИРД като релевантен за стойността нематериален актив. Същевременно природата на собствеността променя тази връзка. Взаимодействието между НИРД/активи и държавната собственост е отрицателно и статистически значимо, а регресиите по подизвадки показват, че положителният оценъчен ефект е концентриран при недържавните предприятия. За държавните предприятия ефектът не е статистически значим. Изводите показват, че сходни инвестиции в НИРД могат да получат различна пазарна оценка според институционалната среда, стимулите за комерсиализация и дисциплината на собствеността. Проучването допринася към литературата за оценката на НИРД и хетерогенността на собствеността, като показва, че пазарната стойност на иновационните ресурси зависи не само от мащаба на инвестициите, но и от институционалната рамка, в която те се реализират.*

**Ключови думи:** *научноизследователска и развойна дейност; стойност на фирмата; държавна собственост; коефициент Q на Тобин; индустриален сектор; Китай.*

**JEL:** G32; O32; L25; P31.

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# R&D CAPITAL INTENSITY AND FIRM VALUE IN CHINA'S INDUSTRIAL SECTOR: EVIDENCE FROM OWNERSHIP HETEROGENEITY

**Xinyue Du**

**Abstract:** *This study tests whether R&D capital intensity is priced by investors in China's industrial sector and whether that price response changes with ownership. The sample covers Chinese A-share listed companies from 2015 to 2024 and excludes financial firms, ST firms, and observations with abnormal basic accounting values. The analysis uses firm and year fixed effects with standard errors clustered at the firm level. Firm value is measured by Tobin's Q. The key explanatory variable is lagged R&D expenditure divided by total assets, which separates current market valuation from the R&D decision in the same year. In the industrial sample, lagged R&D/assets has a positive coefficient that is significant at the 1% level. This result suggests that investors treat research spending as an asset-like signal of future capability. Ownership changes the result in a clear way. The interaction between lagged R&D/assets and state ownership is negative and significant at the 1% level. Split-sample estimates show a strong positive effect for non-state-owned firms, while the coefficient for state-owned firms is small and statistically insignificant. The evidence points to a market-discipline channel: R&D spending receives a stronger valuation when firms have clearer commercial incentives and stronger pressure to turn technical projects into cash-flow gains. The study adds to the R&D valuation literature by showing that ownership conditions affect how similar research inputs are priced in an emerging-market industrial setting. The evidence is also useful for investors comparing R&D-intensive firms and for policy makers concerned with the efficiency of state-sector technology spending.*

**Keywords:** *R&D capital intensity; firm value; state ownership; Tobin's Q; China.*

**JEL:** G32; O32; L25; P31

## 1. Introduction

R&D investment is now a routine part of industrial upgrading, but its market value is still difficult to judge. For industrial enterprises, research spending can support new products, process improvement, technical capability, and future growth options. These activities matter in China's industrial sector because listed firms are under pressure to move beyond scale-based expansion. From a capital-market perspective, the practical question is simple: do investors treat R&D expenditure as an asset-like signal, or merely as a current-period cost?

The theoretical basis for this question comes from Schumpeter's view of technical change and from the resource-based view. Schumpeter (1934) emphasized that new combinations of resources reshape competition. Barney (1991) argued that firms can build sustained advantage when they hold valuable and difficult-to-imitate resources. R&D spending can build those resources through firm-specific

knowledge, technical routines, and research capability. If investors expect these resources to generate future cash flows, R&D capital intensity should be reflected in firm value.

Previous valuation research supports this logic. Griliches (1981) showed that R&D and patent indicators contain information about market value, while Lev and Sougiannis (1996) demonstrated the value relevance of R&D capital. Chan et al. (2001) also showed that R&D-intensive firms may be difficult for investors to value because R&D benefits are uncertain and often invisible in accounting statements. Taken together, these three studies make a narrower point: R&D can be priced by the market, but the strength of that pricing depends on whether investors believe the spending can become future performance.

Ownership may change how investors read this signal. In China, state-owned and non-state-owned firms differ in objectives, governance discipline, financing access, and market incentives. State-owned enterprises may receive policy support and easier access to resources, but they may also face non-commercial objectives and weaker pressure to convert R&D spending into market-oriented outcomes. Non-state-owned firms generally face stronger market discipline and clearer incentives to commercialize technical work. The same level of R&D capital intensity may therefore send different signals across ownership types.

The empirical test focuses on R&D capital intensity and firm value in China's industrial sector, with ownership heterogeneity as the main boundary condition. The study uses annual panel data from the WIND database for Chinese A-share listed firms from 2015 to 2024. Firm value is measured by Tobin's Q, and R&D capital intensity is measured by lagged R&D expenditure divided by total assets. The models include firm and year fixed effects, with standard errors clustered at the firm level.

The paper provides recent evidence on the value relevance of R&D capital intensity in China's industrial sector, and it shows that state ownership weakens the valuation effect. The results connect the R&D valuation literature with research on ownership heterogeneity by showing that the market value of research spending depends on institutional setting as well as investment scale.

## 2. Literature Review and Hypothesis Development

Technical change has long been treated as a source of firm growth and competitive renewal. Schumpeter (1934) argued that new products, processes, and resource combinations change the competitive process. At the firm level, the resource-based view suggests that firms create sustained value when they possess valuable and difficult-to-imitate resources (Barney, 1991). R&D investment is one way to build such resources, especially in industrial sectors where production technology, process upgrading, and product improvement are closely connected with long-term competitiveness.

The valuation of R&D is closely related to the literature on intangible assets. R&D expenditure is usually expensed in accounting statements, but it may still represent knowledge capital that generates future benefits. Griliches (1981) showed

that R&D and patent indicators contain information about market value, while Lev and Sougiannis (1996) found that capitalized R&D estimates are value-relevant to investors. This line of research supports the view that the stock market can recognize R&D as an intangible asset when investors expect it to improve future earnings, productivity, or growth opportunities.

Later work moved this argument into market pricing. Chan et al. (2001) examined the stock market valuation of R&D expenditure and showed that R&D-intensive firms can be difficult for investors to value because the benefits of R&D are uncertain and only partly visible in financial statements. Hall et al. (2005) found that patent citations and knowledge indicators are associated with market value; investors may therefore use technical knowledge indicators to assess future capability. In China, Kim et al. (2018) documented a relationship between R&D investment and firm value and found that the pattern varies by state ownership. Together, these studies support the value relevance of R&D while pointing to ownership and institutional conditions as possible moderators.

Ownership nature is an important boundary condition in China because state-owned and non-state-owned firms differ in objectives, incentives, financing channels, and governance discipline. The general ownership literature argues that private ownership often creates stronger incentives for cost control and market-oriented technical work, while state ownership may introduce policy goals and weaker managerial discipline (Megginson & Netter, 2001; Shleifer, 1998). This does not mean that state-owned enterprises lack research resources. The issue is whether R&D inputs are converted into commercially valuable outcomes in a way that investors regard as credible.

Evidence from Chinese firms also links ownership to the R&D process. Zhang et al. (2003) found that ownership is related to R&D efficiency and productivity in Chinese firms, with the state sector showing lower R&D efficiency than the non-state sector. Jefferson et al. (2006) reported that R&D contributes to new products and productivity in Chinese industry, but its effectiveness depends on firm characteristics and market conditions. Zhou et al. (2017) offer a more balanced explanation: state ownership can help firms obtain important R&D resources, but it can also reduce the efficiency with which those resources are converted into technical outputs. This view helps explain why state ownership may not strengthen the market valuation of R&D, even when it improves access to resources.

The present paper therefore treats ownership nature as a moderating factor in the relationship between R&D capital intensity and firm value. R&D capital intensity is measured by R&D expenditure divided by total assets, which directly connects research effort with the firm's asset base. Because Tobin's Q also reflects market valuation relative to assets, this measure is suitable for examining whether investors value R&D as an asset-based source of future growth. If the market expects R&D spending to create knowledge capital, product upgrading, or process improvement, higher R&D capital intensity should be associated with higher firm value.

This positive relationship may be stronger in non-state-owned firms. Non-state-owned firms usually face harder market discipline and stronger pressure to convert R&D spending into commercial returns. By contrast, state-owned firms may have better access to credit, subsidies, or policy resources, but investors may discount R&D expenditure if they believe that non-commercial objectives, soft budget constraints, or weaker incentives reduce research efficiency. Kim and Quan (2024) also show that state-owned and private Chinese listed firms differ substantially in R&D financing patterns, which supports a direct test of ownership heterogeneity. Based on the above literature, the paper proposes the following hypotheses:

*H1: R&D capital intensity is positively associated with firm value among Chinese industrial enterprises.*

*H2: State ownership negatively moderates the relationship between R&D capital intensity and firm value, so that the positive valuation effect of R&D capital intensity is weaker for state-owned firms than for non-state-owned firms.*

## 3. Data and Methodology

The empirical analysis uses an annual panel dataset of Chinese A-share listed firms obtained from the WIND database for the period 2015-2024. Financial firms and ST firms are excluded because their accounting rules, regulatory environment, and valuation structure differ from ordinary operating firms. Observations with non-positive total assets, operating revenue, or Tobin's Q are also removed. The main analysis focuses on industrial enterprises, including manufacturing, mining, and utilities-related firms. Because the main explanatory variable is lagged by one year, the regression sample covers 2016 to 2024.

The preferred industrial sample contains 22,822 firm-year observations from 3,669 listed firms. This sample is suitable for the research question because industrial enterprises normally have substantial physical assets, R&D expenditure, and capital-market exposure. The industrial setting also provides a meaningful context for comparing state-owned and non-state-owned firms, since ownership nature may affect investment incentives, resource allocation, and investors' interpretation of R&D spending.

The dependent variable is Tobin's Q, which measures firm value from a market-based perspective. Tobin's Q is appropriate for this paper because it reflects investors' assessment of expected future value relative to the firm's asset base (Tobin, 1969). Compared with accounting profitability indicators, it is more suitable for capturing the valuation of intangible and future-oriented activities such as R&D investment.

The main explanatory variable is R&D capital intensity, measured as R&D expenditure divided by total assets. This measure is used because it evaluates R&D investment relative to the firm's asset base rather than relative to current sales. It is therefore better aligned with Tobin's Q, which is also an asset-based valuation indicator. Griliches (1981) and Lev and Sougiannis (1996) show that R&D expenditure can represent economically meaningful intangible capital and can be

reflected in firm valuation. The variable is lagged by one year and standardized in the regression models. The lagged specification helps reduce simultaneity between current market valuation and current R&D decisions.

The moderating variable is ownership nature. State-owned enterprises are coded as 1, while non-state-owned enterprises are coded as 0. The paper uses this variable to test whether the market valuation effect of R&D capital intensity differs between state-owned and non-state-owned industrial firms. This distinction is relevant because ownership structure may influence managerial incentives, access to resources, investment discipline, and the credibility of R&D investment as a signal of future growth (Shleifer, 1998; Zhou et al., 2017).

*Table 1. Variable definitions*

| Variable | Symbol | Measurement | Role |
|---|---|---|---|
| **Firm value** | TobinQ | Tobin's Q, winsorized at the 1st and 99th percentiles. | Dependent variable |
| **R&D capital intensity** | RDTA | R&D expenditure divided by total assets, lagged by one year and standardized in the regressions. | Main explanatory variable |
| **Ownership nature** | SOE | Dummy variable equal to 1 for state-owned enterprises and 0 for non-state-owned enterprises. | Moderating variable |
| **Firm size** | Size | Natural logarithm of total assets. | Control variable |
| **Debt ratio** | Lev | Total liabilities divided by total assets. | Control variable |
| **Revenue growth** | Growth | Annual growth rate of operating revenue. | Control variable |
| **Cash flow** | Cashflow | Operating cash flow divided by total assets. | Control variable |
| **Profitability** | ROA | Net profit divided by average total assets. | Control variable |
| **Ownership concentration** | Top1 | Shareholding ratio of the largest shareholder. | Control variable |
| **Board size** | Board | Number of board directors. | Control variable |
| **Independent directors** | Indep | Proportion of independent directors on the board. | Control variable |
| **Institutional ownership** | Inst | Institutional investors' shareholding ratio. | Control variable |

*Source: Author's compilation based on the WIND database and variable construction described in this study.*

*Notes: Continuous variables are winsorized at the 1st and 99th percentiles before regression estimation.*

The model also includes firm-level control variables that may affect market valuation. Firm size controls for scale and resource capacity. Debt ratio controls for capital structure and financial risk. Revenue growth captures business expansion and market expectations. Cash flow and ROA control for liquidity and profitability. Ownership concentration, board size, independent-director ratio, and institutional ownership control for ownership and governance characteristics. Firm and year fixed effects are included in all regressions, and standard errors are clustered at the firm level.

The baseline model estimates the average relationship between lagged R&D capital intensity and firm value. The specification is written as follows:

$$TobinQ_{it} = \alpha + \beta_1 RDTA_{i,t-1} + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

In this equation, TobinQ denotes firm value for firm i in year t. RDTA denotes lagged R&D expenditure divided by total assets. Controls represents the vector of firm-level control variables. Firm fixed effects control for time-invariant firm characteristics, while year fixed effects control for macroeconomic conditions, capital-market shocks, and regulatory changes that affect all firms in the same year.

To test ownership heterogeneity, the study adds state ownership and the interaction between lagged R&D capital intensity and state ownership. The interaction model is specified as follows:

$$TobinQ_{it} = \alpha + \beta_1 RDTA_{i,t-1} + \beta_2 SOE_{it} + \beta_3 RDTA_{i,t-1} \times SOE_{it} + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

The key coefficient is the interaction coefficient. A negative interaction coefficient means that the positive valuation effect of R&D capital intensity is weaker for state-owned firms than for non-state-owned firms. A positive interact-tion coefficient would suggest the opposite. To make the ownership difference easier to interpret, the empirical results also report split-sample regressions for state-owned and non-state-owned industrial firms.

## 4. Empirical Results

This section reports the empirical results on the relationship between R&D capital intensity and firm value in China's industrial sector. Firm value is measured by Tobin's Q. The main explanatory variable is lagged R&D expenditure divided by total assets, which captures the capital intensity of R&D investment relative to the firm's asset base. The use of a lagged R&D measure helps reduce simultaneity between current market valuation and current investment decisions. This specification follows the valuation literature showing that R&D and patent-related knowledge assets can carry information about future firm value (Chan et al., 2001; Griliches, 1981; Hall et al., 2005). The preferred sample contains 22,822 firm-year observations from 3,669 industrial listed firms over 2016-2024.

Table 2 presents the descriptive statistics for the main industrial sample. Tobin's Q shows substantial dispersion, which indicates clear differences in market valuation across industrial firms. Lagged R&D/assets is also dispersed across firms, suggesting that R&D capital intensity is not evenly distributed in the sample. The variation is useful for testing whether investors price R&D investment differently across ownership structures.

*Table 2. Descriptive statistics*

| Variable | N | Mean | Std. dev. | Median | Max |
|---|---|---|---|---|---|
| **Tobin's Q** | 22,822 | 1.9881 | 1.2071 | 1.6063 | 8.1327 |
| **Lagged R&D/assets** | 22,822 | 0.0253 | 0.0200 | 0.0223 | 0.1270 |
| **R&D/revenue** | 22,822 | 0.0534 | 0.0533 | 0.0409 | 0.3564 |
| **Firm size** | 22,822 | 22.2851 | 1.2577 | 22.0987 | 26.3826 |
| **Debt ratio** | 22,822 | 0.4014 | 0.1923 | 0.3952 | 0.9061 |
| **Revenue growth** | 22,822 | 0.1355 | 0.3335 | 0.0887 | 2.0090 |
| **Cash flow** | 22,822 | 0.0543 | 0.0646 | 0.0522 | 0.2417 |
| **ROA** | 22,822 | 0.0396 | 0.0667 | 0.0393 | 0.2237 |

*Source: Author's calculation based on the cleaned WIND annual panel dataset.*
*Notes: The sample includes non-financial and non-ST industrial listed firms. Continuous variables are winsorized at the 1st and 99th percentiles. Lagged R&D/assets is standardized in the regression models.*

*Table 3. Ownership groups in the industrial sample*

| Ownership group | Observations | Firms | Mean Tobin's Q | Mean R&D/assets | Mean R&D/revenue |
|---|---|---|---|---|---|
| **Non-state-owned firms** | 16,115 | 2,820 | 2.0735 | 0.0286 | 0.0599 |
| **State-owned firms** | 6,707 | 849 | 1.7828 | 0.0199 | 0.0377 |

*Source: Author's calculation based on the cleaned WIND annual panel dataset.*
*Notes: Non-state-owned firms are coded as 0 and state-owned firms as 1 in the original ownership variable.*

Table 3 compares state-owned and non-state-owned industrial firms. Non-state-owned firms account for a larger share of the sample and have a higher average Tobin's Q. They also show a higher mean R&D intensity than state-owned firms. These descriptive patterns do not establish causality, but they suggest that ownership nature may be relevant for understanding how the capital market interprets R&D investment.

Table 4 reports the fixed-effects regression results. Column (1) shows the baseline result for the industrial sample. The coefficient on lagged R&D/assets is positive and statistically significant at the 1% level. Higher R&D capital intensity is therefore associated with higher Tobin's Q after controlling for firm characteristics, firm fixed effects, and year fixed effects. In economic terms, the market appears to treat R&D investment as a value-relevant intangible asset when it is measured relative to the firm's asset base, which is consistent with prior evidence on the market valuation of R&D expenditure (Chan et al., 2001; Lev & Sougiannis, 1996).

Column (2) adds the interaction between lagged R&D/assets and state ownership. The coefficient on lagged R&D/assets remains positive and significant, while the interaction term is negative and statistically significant at the 1% level.

*Table 4. R&D capital intensity, ownership nature, and firm value*

| Variable | (1) Baseline | (2) Interaction | (3) Non-SOE | (4) SOE |
|---|---|---|---|---|
| **Lagged R&D/assets** | 0.0754*** | 0.1082*** | 0.1106*** | -0.0154 |
| | (0.0248) | (0.0294) | (0.0294) | (0.0380) |
| **Lagged R&D/assets x SOE** | | -0.1292*** | | |
| | | (0.0468) | | |
| **Firm size** | -0.7436*** | -0.7445*** | -0.6964*** | -0.8666*** |
| | (0.0389) | (0.0388) | (0.0406) | (0.0793) |
| **Debt ratio** | 0.9079*** | 0.8932*** | 0.8460*** | 0.9313*** |
| | (0.1303) | (0.1298) | (0.1480) | (0.2473) |
| **Revenue growth** | 0.1000*** | 0.1010*** | 0.1735*** | -0.0423 |
| | (0.0241) | (0.0240) | (0.0304) | (0.0333) |
| **Cash flow** | 0.5833*** | 0.5788*** | 0.6779*** | 0.4024* |
| | (0.1276) | (0.1277) | (0.1460) | (0.2359) |
| **ROA** | 2.2465*** | 2.2503*** | 2.2000*** | 2.1861*** |
| | (0.1899) | (0.1891) | (0.2162) | (0.3630) |
| **Firm fixed effects** | Yes | Yes | Yes | Yes |
| **Year fixed effects** | Yes | Yes | Yes | Yes |
| **Clustered standard errors** | Firm | Firm | Firm | Firm |
| **Observations** | 22,822 | 22,822 | 16,115 | 6,707 |
| **Firms** | 3,669 | 3,669 | 2,820 | 849 |
| **Within R-squared** | 0.127 | 0.128 | 0.127 | 0.161 |

*Source: Author's fixed-effects regression results based on the cleaned WIND annual panel dataset.*

*Notes: The dependent variable is Tobin's Q. Lagged R&D/assets is standardized. Standard errors clustered by firm are reported in parentheses. Controls include firm size, debt ratio, revenue growth, cash flow, ROA, ownership concentration, board size, independent-director ratio, and institutional ownership. ***, **, and * denote significance at the 1%, 5%, and 10% levels.*

This means that the positive valuation effect of R&D capital intensity is weaker for state-owned firms than for non-state-owned firms. The result is consistent with the view that investors may attach stronger value to R&D investment when firms face harder market discipline and clearer incentives to transform R&D spending into commercially useful outcomes (Shleifer, 1998; Zhang et al., 2003).

Columns (3) and (4) report split-sample regressions. Among non-state-owned industrial firms, lagged R&D/assets has a positive coefficient of 0.1106 and is significant at the 1% level. Among state-owned industrial firms, the coefficient is negative but statistically insignificant. This split-sample evidence supports the interaction result and shows that the average positive association between R&D capital intensity and firm value is mainly driven by non-state-owned firms.

Figure 1 visualizes the ownership heterogeneity implied by the interaction model. The estimated effect of lagged R&D/assets is clearly positive for non-state-owned firms, while the confidence interval for state-owned firms crosses zero.

The figure therefore reinforces the main empirical message: R&D capital intensity is value relevant in China's industrial sector, but the market valuation effect depends strongly on ownership nature. This pattern is also compatible with

Zhou et al. (2017), who show that state ownership can provide resources while reducing the efficiency with which R&D inputs are converted into technical outcomes.

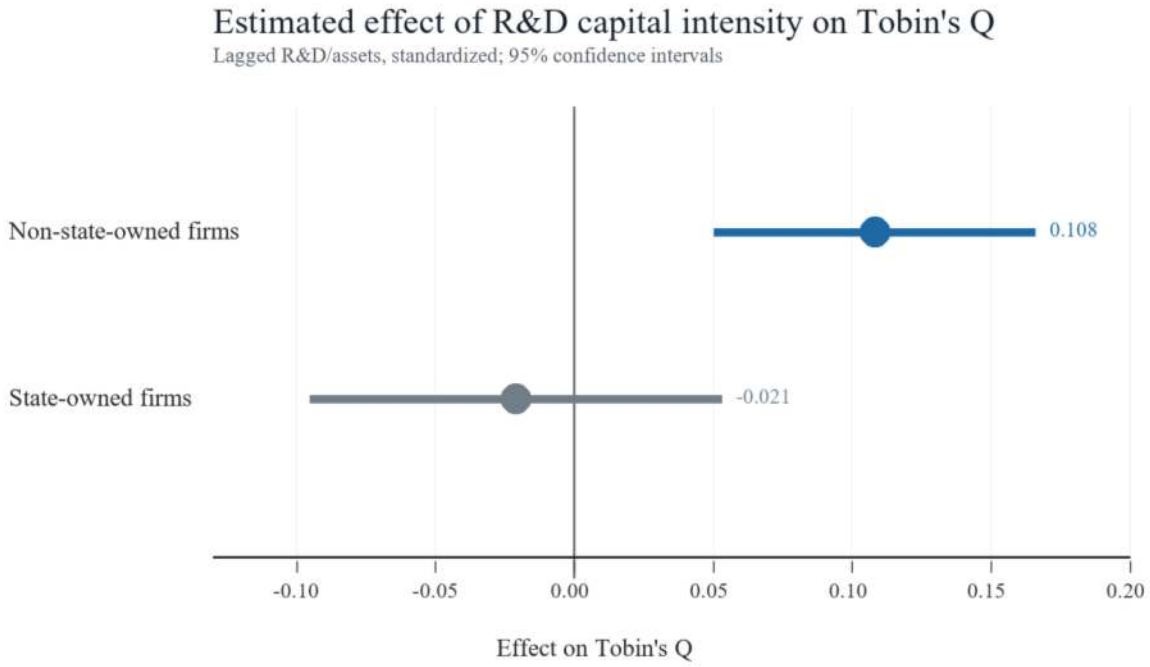



*Figure 1. Ownership heterogeneity in the valuation effect of R&D capital intensity*

*Source: Author's calculation based on Column (2) of Table 4 and the cleaned WIND annual panel dataset.*

Overall, the results support an ownership-contingent interpretation of R&D investment. R&D capital intensity is positively related to firm value in the industrial sample, but this relationship is concentrated in non-state-owned firms. The main empirical point is clear: the valuation of technological investment depends on the ownership environment as well as the scale of R&D spending.

## 5. Discussion

The empirical results show that R&D capital intensity is positively associated with firm value in China's industrial sector. This finding supports the argument that R&D expenditure can be interpreted by the market as a value-relevant intangible investment rather than only as a current-period cost. The result is consistent with the broader valuation literature showing that R&D expenditure, patents, and knowledge-related indicators can contain information about future firm value (Chan et al., 2001; Griliches, 1981; Hall et al., 2005; Lev & Sougiannis, 1996). In the industrial context, this interpretation is reasonable because R&D can improve production technology, product quality, process efficiency, and future growth options.

The sharper result is the ownership difference. The positive coefficient on lagged R&D/assets is clear for non-state-owned firms, while the corresponding effect for state-owned firms is not statistically significant. The negative interaction between R&D capital intensity and state ownership shows that state ownership weakens the market valuation of R&D investment. This does not imply that state-owned enterprises do not conduct research. It suggests that investors distinguish between R&D input and value creation. R&D expenditure is priced more strongly when the ownership environment gives investors greater confidence that research spending will be converted into commercially useful outcomes.

This ownership-contingent interpretation fits the institutional and efficiency logics in the literature. State ownership can provide access to resources, policy support, and long-term funding, but it may also weaken market discipline and reduce the efficiency of research conversion (Zhou et al., 2017). Earlier evidence on Chinese firms similarly shows that ownership differences matter for R&D efficiency and productivity (Jefferson et al., 2006; Zhang et al., 2003). The present results extend this literature by showing that the capital market also prices R&D differently across ownership types. In other words, the market value of R&D depends on the institutional setting in which that investment is made, not just on how much the firm spends.

The findings have several practical implications. For managers, the results suggest that R&D spending should be accompanied by credible commercialization plans, governance discipline, and evidence of research efficiency. Simply increasing R&D expenditure may not be sufficient if investors cannot see how the spending will become future cash flow or competitive advantage. For investors, R&D intensity should be read together with ownership nature. High R&D investment in a non-state-owned industrial firm may be a stronger signal of growth potential, while similar spending in a state-owned firm may require closer examination of project quality, governance incentives, and market orientation.

For policy makers, the evidence points to the efficiency of R&D conversion. Support for industrial technology is important, but ownership-related incentive structures also matter. Policies that improve the governance of state-owned enterprises, strengthen accountability for R&D outcomes, and encourage market-oriented commercialization may help state-owned firms convert technical investment into recognized firm value. Policies that protect financing access for non-state-owned firms also matter, because private firms increasingly contribute to aggregate R&D activity and often rely on different financing channels from state-owned firms (Kim & Quan, 2024).

Several limitations should be acknowledged. First, the paper measures research effort by R&D expenditure divided by total assets. This measure captures R&D input intensity, but it does not directly measure patent quality, technological novelty, or commercialization success. Second, Tobin's Q is a useful market-based valuation indicator, but it may also be affected by investor sentiment and broader capital-market conditions. Third, the ownership classification distinguishes state-

owned and non-state-owned firms, but it does not capture the finer structure of mixed ownership, government level, or political connections. Future research could use patent citations, new product revenue, R&D project quality, or detailed mixed-ownership indicators to examine how R&D input becomes firm value across different institutional settings.

## 6. Conclusion

This paper investigates whether R&D capital intensity is associated with firm value in China's industrial sector and whether this relationship differs between state-owned and non-state-owned enterprises. Using panel data from the WIND database for Chinese A-share listed firms from 2015 to 2024, the study estimates fixed-effects models with firm and year effects. Firm value is measured by Tobin's Q, while R&D capital intensity is measured by lagged R&D expenditure divided by total assets.

The empirical results show that lagged R&D/assets is positively associated with Tobin's Q at the 1% significance level in the industrial sample. This finding indicates that the capital market recognizes R&D investment as a value-relevant intangible asset. The results also show that state ownership weakens this relationship. The interaction term between lagged R&D/assets and state ownership is negative and significant at the 1% level, and the split-sample regressions show that the positive valuation effect is concentrated in non-state-owned firms.

The main conclusion is that R&D investment and ownership nature should be read together. R&D capital intensity can increase firm value, but the market response is stronger when the ownership environment supports market discipline, commercial incentives, and credible conversion of R&D spending into future outcomes. For managers, the findings highlight the importance of linking R&D spending with commercialization and governance discipline. For policy makers, the evidence suggests that industrial technology policy should pair higher R&D inputs with stronger mechanisms for turning research projects into firm value.

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