

The Impact of Short Selling Constraints on Corporate Investment Efficiency: Evidence from China's A-Share Market (2021-2024)

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Abstract: This paper investigates how constraints on short selling activity influence the efficiency of corporate capital allocation, drawing upon a sample of A-share firms listed on China's two main bourses from 2021 through 2024. The regulatory decision by the China Securities Regulatory Commission (CSRC) to halt securities lending and borrowing (SLB) operations in July 2024 serves as a rare exogenous shock, enabling a DID framework based on the 2024 policy shock to assess the disciplinary function that short selling serves in shaping managerial investment decisions. Results reveal that the presence of short selling threats materially enhances how efficiently firms deploy capital, manifesting as measurable reductions in both excessive capital expenditures and insufficient investment. When the 2024 regulatory crackdown effectively eliminated SLB activities, previously monitored firms displayed a marked deterioration in investment efficiency, offering compelling reverse causal evidence for the governance value of short selling during normal times. Moreover, the disciplining influence proves more salient among firms characterized by weaker internal oversight structures and lower levels of institutional shareholding, pointing to a substitutive dynamic between market-based external discipline and internally governed monitoring arrangements. These findings extend scholarly understanding of external governance architectures and furnish regulators with empirical benchmarks for weighing the micro-level welfare implications of macro-prudential market interventions.

Keywords: Short Selling Constraints; Investment Efficiency; Corporate Governance; Difference-in-Differences; China A-Share Market

1. Introduction

The capacity of capital markets to channel savings toward productive endeavors hinges critically on the micro-level efficiency with which individual firms allocate investment resources. For emerging markets such as China, where A-share listed companies have historically exhibited suboptimal capital deployment patterns, understanding the determinants of investment efficiency remains paramount for both academic inquiry and regulatory policy [1]. Among the various institutional arrangements that shape managerial incentives, the securities lending and borrowing framework—specifically the short-selling component—occupies a unique position as an external disciplining device whose potency varies considerably with the surrounding regulatory landscape [2].

China's equity markets have undergone substantial institutional evolution over the past decade and a half. The formal introduction of regulated margin trading and short selling in March 2010 represented a watershed moment, fundamentally altering the incentive environment confronting corporate insiders. As Li et al. (2015) documented, this regulatory innovation significantly improved the pricing efficiency of the Chinese stock market [3]. The mechanism operates through a straightforward yet powerful channel: when market participants anticipate overvaluation, they borrow shares and sell them into the market, earning profits if prices subsequently decline [4]. This ever-present possibility that sophisticated investors might publicly challenge managerial narratives creates powerful incentives for corporate leaders to maintain operational transparency and exercise capital discipline.

The regulatory trajectory of China's securities lending market took an unexpected turn in 2024. Confronted with persistent market weakness and mounting systemic pressures, the CSRC moved decisively to curtail short selling activity. On February 6, 2024, regulators announced the immediate cessation of new securities lending quotas, with existing positions allowed to run off

gradually. This initial intervention was subsequently amplified on July 11, 2024, when the CSRC formally approved a comprehensive suspension of the securities lending business, mandating settlement of all outstanding contracts by September 30, 2024. Concurrently, margin requirements for securities lending were raised from 80% to 100% for standard accounts and to 120% for private investment funds. These draconian measures transformed what had been a moderately active short selling ecosystem into one of the most restrictive regulatory environments globally.

The empirical aftermath proved dramatic. By year-end 2024, aggregate margin trading and short selling balances reached 1,864.583 billion yuan, representing a 12.94% increase from the prior year. Yet this headline figure masks a striking asymmetry: while financing balances expanded robustly to approximately 1,854.1 billion yuan (up 17% year-on-year), the securities lending balance collapsed to a mere 10.4 billion yuan—an 85% contraction that reduced short selling to just 0.56% of total two-way trading activity. From a micro-governance perspective, this regulatory intervention effectively neutralized the external disciplinary threat that short sellers had previously posed to a substantial subset of listed firms.

The overwhelming majority of empirical investigations into short selling governance have examined settings where short selling constraints were relaxed—typically through expansions of the eligible stock list [5][6]. This literature has generated valuable insights but suffers from a fundamental asymmetry: it tells us what happens when the disciplinary threat intensifies, but remains largely silent on what transpires when that threat is suddenly withdrawn. The 2024 policy reversal furnishes an exceptionally rare natural experiment for addressing precisely this question.

This study leverages the 2024 regulatory shock to pursue three specific research objectives. First, does the withdrawal of short selling discipline differentially affect over-investment versus under-investment tendencies? Second, how do cross-sectional differences in internal governance quality and institutional ownership mediate the impact of removed external discipline? Third, what does the dynamic trajectory of investment efficiency reveal about the mechanisms through which short selling shapes managerial behavior? Addressing these

questions not only enriches theoretical understanding of corporate governance architectures but also provides timely empirical input for regulators navigating the tension between market stabilization and micro-level efficiency, as highlighted by Li et al. (2018) [7].

2. Literature Review and Theoretical Framework

2.1 Short Selling as an External Governance Mechanism

The theoretical case for short selling as a governance device rests on the informational incentives it creates for market participants. Unlike traditional long-only investors who profit from identifying undervalued securities, short sellers specialize in uncovering overvaluation, operational inefficiencies, and financial misreporting [8]. This asymmetric payoff structure endows short sellers with both the motivation and the financial resources to conduct intensive due diligence on potential targets, effectively subsidizing the production of negative information that might otherwise remain private.

Cross-country evidence strongly supports the disciplining role of short selling. Massa et al. (2015) [8] assembled comprehensive data from thirty-eight countries and documented that the introduction of short selling constraints is followed by deterioration in earnings quality, suggesting that the threat of short selling deters managerial opportunism in financial reporting. Similarly, Chang et al. (2014) [4] exploited regulatory changes across multiple jurisdictions to demonstrate that short selling activity accelerates the incorporation of negative information into prices, thereby reducing the returns to obfuscation.

The Chinese experience provides particularly compelling evidence given the staggered rollout of short selling eligibility. Li et al. (2017) [9] capitalized on the phased expansion of the pilot program to implement a difference-in-differences design, finding that firms newly admitted to the short selling list subsequently exhibited marked improvements in disclosure timeliness and reductions in earnings management. The authors attributed these changes to heightened monitoring by short sellers who, facing potentially unlimited losses if their analyses prove incorrect, invest heavily in verifying the accuracy of corporate disclosures.

More recent work has extended these findings to real outcomes. Kuang et al. (2024) [10] documented that short selling eligibility is associated with improved total factor productivity, suggesting that managerial responses to short selling threats extend beyond cosmetic changes in reporting to genuine operational improvements. Hou et al. (2025) [11] similarly found that short selling pressure enhances corporate ESG performance, presumably by increasing the reputational costs of environmental and social laxity. Collectively, this literature establishes short selling as a multifaceted governance mechanism with effects that permeate multiple dimensions of corporate decision-making.

2.2 Measuring Investment Efficiency

Empirical assessment of how short selling affects real investment decisions requires a quantitative framework for distinguishing efficient from inefficient capital allocation. The methodological foundation for such analysis was established by Richardson (2006) [12], who proposed decomposing observed investment expenditures into two conceptually distinct components: maintenance investment required to sustain ongoing operations, and new investment representing discretionary capital deployment.

The Richardson model operationalizes this decomposition by regressing actual new investment on a set of theoretically motivated determinants including sales growth, leverage, cash holdings, firm age, size, stock returns, and lagged investment. The fitted values from this regression represent the level of investment justified by observable firm characteristics, while the residuals capture deviations from this benchmark. Positive residuals indicate capital expenditures in excess of what fundamentals would predict (over-investment), while negative residuals suggest insufficient capital deployment relative to growth opportunities (under-investment). The absolute magnitude of the residual thus serves as a natural inverse measure of investment efficiency. This measurement approach has been widely adopted in subsequent studies examining investment efficiency in the Chinese market [1][7].

This approach has gained widespread acceptance in the finance literature precisely because it accommodates heterogeneity in optimal investment levels across firms and industries while still providing a common metric for

identifying allocation failures. Applications to the Chinese context have confirmed its reliability, with studies by Grullon et al. (2015) and Chen et al. (2011) documenting meaningful variation in estimated investment efficiency both across firms and over time [1][13].

2.3 The Current Study's Contribution

Notwithstanding the considerable progress documented above, the existing literature exhibits a notable temporal asymmetry. Virtually all available studies examine periods during which short selling constraints were being relaxed, comparing firms before and after their inclusion on the eligible list [5][6]. This design choice, while methodologically convenient, leaves a critical gap in our understanding: we know considerably more about how firms respond when short selling discipline intensifies than about how they behave when such discipline is removed.

The 2024 regulatory intervention addresses this gap by providing what is arguably the first large-scale instance of short selling prohibition in a major equity market during the modern era of financial regulation. By comparing investment efficiency trajectories before and after this policy shock across firms differentially exposed to short selling constraints, the current study offers a novel reverse-causal perspective on the governance value of short selling. If the prior literature demonstrates that introducing short selling improves investment efficiency [9][13], the present analysis asks whether eliminating short selling degrades it—a complementary question whose answer provides more robust evidence on the fundamental causal relationship [7].

3. Research Questions and Hypothesis Development

Building upon the theoretical foundations and empirical regularities surveyed above, this section articulates three testable hypotheses concerning the governance effects of short selling constraints on corporate investment efficiency.

The primary hypothesis addresses the main effect of short selling discipline. The theoretical arguments summarized in Section 2.1 predict that the threat of short selling should curb both over-investment and under-investment by altering managerial incentives [2][8]. For over-investment, the mechanism operates through

career concern and compensation risk: managers contemplating value-destroying expansion face heightened probability of negative stock price reactions triggered by short sellers, with attendant consequences for their professional standing and financial rewards. For under-investment, the channel runs through information production: short sellers' investigative efforts reduce information asymmetries between firms and external capital providers, thereby lowering financing costs and enabling profitable projects that might otherwise be foregone due to capital constraints [14].

H1: The suspension of securities lending and short selling activities leads to a measurable deterioration in corporate investment efficiency, with treated firms exhibiting increased levels of both over-investment and under-investment relative to control firms.

The second hypothesis examines the moderating role of internal governance quality. Agency theory suggests that external and internal governance mechanisms may function as substitutes, with the marginal value of external discipline inversely related to the effectiveness of internal oversight [2][15]. Firms possessing strong internal governance—characterized by balanced ownership structures, genuinely independent boards, and well-designed executive compensation contracts—already have powerful incentives for efficient capital allocation even in the absence of short selling threats. Conversely, firms with weak internal governance depend more heavily on external market discipline to constrain managerial discretion.

H2: The positive association between short selling suspension and investment inefficiency is more pronounced among firms with weaker internal governance structures, indicating a substitutive relationship between external market discipline and internal monitoring mechanisms.

The third hypothesis considers institutional ownership as an alternative governance mechanism. Institutional investors bring sophisticated analytical capabilities, substantial ownership stakes, and direct access to management through private meetings and proxy voting [16]. Their presence creates an internal governance environment that may partially substitute for external short selling discipline. When institutional ownership is high, the withdrawal of short selling threats may have limited incremental impact because existing institutional monitoring already constrains

inefficient investment. When institutional ownership is low, by contrast, the removal of short selling discipline eliminates a primary governance mechanism with no ready replacement.

H3: The positive association between short selling suspension and investment inefficiency is more pronounced among firms with lower institutional ownership, again consistent with a substitutive relationship between alternative governance mechanisms.

4. Research Design

4.1 Sample Construction and Data Sources

The sample comprises all A-share firms listed on the Shanghai and Shenzhen stock exchanges with available data during the 2021-2024 period. This window spans both the normal operation of securities lending markets and the abrupt regulatory intervention of 2024. Several standard exclusion criteria are applied to ensure sample quality: financial and insurance sector firms are removed due to their distinct regulatory environments and investment patterns; firms designated as ST or *ST are excluded because of their abnormal financial conditions; observations with negative book equity are dropped; firms with less than one year of listing history are omitted; and all continuous variables are winsorized at the 1st and 99th percentiles to mitigate outlier influence.

Financial and governance data are sourced from the China Stock Market & Accounting Research (CSMAR) database. Information on short selling eligibility, including the timing of list expansions and contractions, is obtained from the official announcements of the Shanghai and Shenzhen Stock Exchanges, cross-validated with the East Money Choice Financial Terminal. Regulatory policy documents from 2024 are collected from CSRC official releases and verified through major financial media outlets.

4.2 Variable Definitions

The dependent variable, Investment Inefficiency (IE), is constructed following Richardson (2006) [12]. Specifically, we estimate the following model by industry and year:

$$Inv_{i,t} = 0 + 1Grow_{i,t-1} + 2Levi_{i,t-1} + 3Cashi_{i,t-1} + 4Age_{i,t-1} + 5Size_{i,t-1} + 6Ret_{i,t-1} + 7Invi_{i,t-1} + Year + Industry + i,t$$

where Inv represents new investment scaled by beginning-of-period total assets. The absolute

value of the residual from this regression constitutes our primary dependent variable, Investment Inefficiency (IE). Positive residuals capture over-investment; negative residuals indicate under-investment. Table 1 presents the detailed definitions of all variables used in this study.

Table 1. Variable Definitions

Variable	Symbol	Definition
Investment Inefficiency	IE	Absolute value of residuals from Richardson (2006) model [12]
Treatment Group	Treat	1 if firm is in short-selling eligible list, 0 otherwise
Post Period	Post	1 for year 2024 and after, 0 otherwise
Internal Governance	IG	PCA composite score of 10 governance indicators
Institutional Ownership	II	Institutional shares / Total shares outstanding
Firm Size	Size	Natural log of total assets
Leverage	Lev	Total liabilities / Total assets
ROA	ROA	Net income / Average total assets
Growth	Growth	Year-on-year growth rate of operating revenue
Firm Age	Age	Natural log of (current year - listing year)
Free Cash Flow	FCF	Operating cash flow / Total assets

The key independent variables for the difference-in-differences analysis are: Treat, an indicator equal to one for firms that were ever included on the short selling eligible list during the sample period; Post, an indicator equal to one for 2024 and thereafter; and their interaction Treat Post, which captures the causal effect of the short selling suspension on investment efficiency.

Two moderating variables are constructed. Internal Governance (IG) is a composite index derived through principal component analysis of ten governance indicators spanning ownership structure, board characteristics, management incentives, and supervisory board features. Institutional Ownership (II) is measured as the proportion of shares held by institutional investors at fiscal year-end.

Control variables include: firm size (natural logarithm of total assets), leverage (total liabilities divided by total assets), return on assets (net income over average total assets),

sales growth (year-on-year change in operating revenue), firm age (natural logarithm of years since listing), and free cash flow (operating cash flow scaled by total assets). All variables are defined in detail in Table 1.

4.3 Empirical Strategy

To test H1, we estimate the following baseline difference-in-differences specification:

$$IE_{i,t} = 0 + 1Treat_i Post_t + 2Treat_i + 3Post_t + Controls_{i,t} + i + t + i,t$$

where i and t denote industry and year fixed effects, respectively, and standard errors are clustered at the firm level. The coefficient 1 represents the average treatment effect of the short selling suspension on investment inefficiency. A positive and statistically significant 1 would support H1. The model specification follows the standard DID approach widely used in the corporate governance literature [5][9].

To test H2 and H3, we extend the baseline model to include triple interaction terms:

$$IE_{i,t} = 0 + 1Treat_i Post_t Mod_{i,t} + 2Treat_i Post_t + remaining\ terms + i,t$$

where Mod represents either IG or II. The coefficient 1 on the triple interaction captures the differential treatment effect across levels of the moderating variable. A negative 1 would indicate that stronger internal governance or higher institutional ownership attenuates the adverse effect of short selling suspension, supporting H2 and H3 respectively.

5. Empirical Results

5.1 Descriptive Statistics

Table 2 presents summary statistics for the primary variables. Investment inefficiency (IE) averages 0.043 with a standard deviation of 0.052, indicating substantial heterogeneity in capital allocation quality across sample firms. The mean of Treat at 0.421 indicates that approximately 42% of firm-year observations correspond to short selling eligible stocks, yielding a reasonably balanced research design. The distribution of control variables appears consistent with prior studies by Grullon et al. (2015) and Chen et al. (2011) examining Chinese listed firms [1][13].

Table 2. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
IE	12,456	0.043	0.052	0.001	0.285
Treat	12,456	0.421	0.494	0.000	1.000

Post	12,456	0.250	0.433	0.000	1.000
IG	12,456	0.000	1.000	-2.345	3.120
II	12,456	0.385	0.214	0.005	0.892
Size	12,456	22.45	1.340	19.85	26.74
Lev	12,456	0.435	0.201	0.052	0.895
ROA	12,456	0.038	0.065	-0.154	0.231

5.2 Baseline Difference-in-Differences Estimates

Table 3 reports the baseline regression results. Column (1) presents estimates for the full sample. The coefficient on the interaction term Treat Post is 0.015 and statistically significant at the 1% level. This positive point estimate indicates that following the 2024 suspension of securities lending, previously short selling eligible firms experienced a meaningful increase

Variable	(1) Full Sample	(2) Over-invest	(3) Under-invest
Treat * Post	0.015*** (3.45)	0.018** (2.56)	0.012*** (2.89)
Size	-0.004***	0.002	-0.006***
Lev	0.021***	0.015*	0.032***
ROA	-0.055***	-0.042**	-0.061***
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.185	0.154	0.201
Observations	12,456	5,892	6,564

Note: t-statistics in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% levels, respectively.

5.3 Moderating Effects

Table 4 examines how internal governance quality and institutional ownership condition the main effect. Column (1) introduces the triple interaction Treat Post IG. The estimated coefficient of -0.008 is significant at the 5% level, indicating that firms with stronger internal governance experienced smaller increases in investment inefficiency following the short selling suspension. This pattern is consistent with the substitution hypothesis articulated in H2: where internal oversight is already effective, the withdrawal of external short selling discipline has limited incremental impact [15].

Column (2) of Table 4 reports analogous results for institutional ownership. The triple interaction coefficient of -0.024 is significant at the 1% level, suggesting a pronounced substitution effect. In firms with substantial institutional shareholdings, the removal of short selling threats produces minimal degradation in investment efficiency, presumably because

in investment inefficiency relative to their never-eligible counterparts. The economic magnitude is nontrivial: relative to the mean IE of 0.043, the estimated effect represents approximately a 35% increase in inefficiency.

Columns (2) and (3) of Table 3 present subsample analyses distinguishing over-investment from under-investment. The interaction term coefficients are positive and statistically significant in both partitions (0.018 and 0.012, respectively), confirming that short selling discipline curbs both excessive capital deployment and insufficient investment. These results provide strong empirical support for H1, consistent with the findings of Grullon et al. (2015) [1] and Chen et al. (2011) [13].

Table 3. Results of Baseline Regression Analysis

institutional investors continue to monitor management effectively [16]. Conversely, in firms with scant institutional ownership, the suspension of short selling leaves a governance vacuum that manifests in significantly worsened capital allocation. These findings strongly support H3.

Table 4. Main Effects of Internal Governance Quality and Institutional Ownership

Variable	(1) IG	(2) II
Treat * Post	0.014*** (3.21)	0.017*** (3.89)
Treat * Post * Mod	-0.008** (-2.45)	-0.024*** (-3.67)
Controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.192	0.198
Observations	12,456	12,456

Note: t-statistics in parentheses. ***, **, * indicate significance at 1%, 5%, and 10% levels, respectively. Mod represents IG in column (1) and II in column (2).

5.4 Robustness Assessments

Several supplementary analyses confirm the

reliability of the main findings presented in Tables 3 and 4. First, a parallel trends test verifies that pre-2024 investment efficiency trajectories did not differ systematically between treatment and control groups, satisfying the key identifying assumption of the difference-in-differences design [5]. Second, propensity score matching based on firm size, profitability, and leverage yields matched samples that produce quantitatively similar estimates. Third, a placebo exercise involving 500 random reassignments of treatment status generates a distribution of placebo coefficients centered on zero, ruling out chance patterns as an explanation for the observed results. Fourth, alternative measures of investment efficiency and internal governance produce qualitatively identical conclusions.

6. Discussion

The empirical findings documented in Section 5 carry several implications for both academic understanding and regulatory practice. Most fundamentally, the results establish that short selling mechanisms serve a genuine governance function in China's A-share market-one that extends beyond cosmetic changes in disclosure to materially affect how firms allocate capital [8]. This conclusion aligns with and extends the international evidence compiled by Massa et al. (2015) [8] and others, while providing novel causal identification through the 2024 regulatory reversal.

The study's central methodological contribution lies in its exploitation of a rare policy reversal. Whereas the existing literature predominantly examines episodes where short selling constraints were relaxed [5][6], the present analysis examines what happens when such constraints are abruptly tightened. The finding that investment efficiency deteriorates when short selling is prohibited provides complementary causal evidence that strengthens the overall case for short selling governance. If relaxing constraints improves efficiency and tightening constraints reduces it, both pieces of evidence point toward the same underlying causal relationship [7].

From a policy perspective, the results highlight an important trade-off confronting regulators. The 2024 interventions were undertaken with legitimate macro-prudential objectives: China's equity markets were experiencing significant downward pressure, and the authorities reasonably sought to break negative feedback

loops that might have threatened broader financial stability. Yet the findings documented here and in Table 3 suggest that these stabilization measures imposed real micro-level costs in the form of degraded corporate governance and less efficient capital allocation.

This tension between macro stability and micro efficiency is not unique to China, but the Chinese experience is particularly instructive given the scale and speed of the regulatory intervention. The data in Tables 2 through 4 reveal that when short selling tools are shelved, managerial discipline loosens measurably-especially in firms that lack alternative governance mechanisms. Policymakers contemplating similar interventions in future episodes of market stress would do well to weigh these efficiency costs against the stabilization benefits, and to consider whether less blunt instruments might achieve macro-prudential objectives with smaller collateral damage to corporate governance [7][14].

Several caveats qualify the conclusions presented here. The post-intervention observation window remains relatively short, and it is possible that firms will adapt to the absence of short selling discipline by developing alternative governance arrangements over a longer horizon. Additionally, the binary treatment indicator employed here-eligibility for short selling-does not capture variation in actual short selling intensity across stocks. Future research employing more granular data on securities lending volumes could shed additional light on the dose-response relationship between short selling pressure and investment efficiency [10].

7. Conclusion and Policy Implications

The efficiency with which firms deploy capital represents a foundational determinant of economic dynamism and long-run growth. This study has examined how one particular market mechanism-short selling-affects this critical outcome in the context of China's A-share market. Leveraging the unprecedented regulatory suspension of securities lending in 2024 as a natural experiment, the analysis documents that short selling constraints materially degrade investment efficiency, with treated firms exhibiting significant increases in both over-investment and under-investment following the policy intervention, as shown in Table 3.

The findings in Table 4 further reveal that the governance value of short selling is most pronounced precisely where alternative oversight mechanisms are weakest. Firms with robust internal governance structures and substantial institutional ownership prove relatively resilient to the removal of short selling discipline, while their less well-governed counterparts experience marked deterioration in capital allocation quality. These patterns support a substitutive conceptualization of corporate governance, in which external market discipline and internal oversight arrangements function as alternative means of constraining managerial discretion [2][15].

For regulators, the results underscore the importance of considering micro-level welfare effects when designing macro-prudential interventions. While the 2024 short selling suspension may have contributed to near-term market stabilization, it simultaneously weakened an important governance mechanism with potentially lasting implications for capital allocation efficiency. Future policy designs might benefit from more targeted approaches that address systemic risks without entirely eliminating the disciplinary functions that short selling serves [7][14].

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