

The Impact of the Value-Added Tax Credit Refund Policy on Corporate Fixed-Asset Investment Intensity

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Abstract. High-quality economic development is significantly driven by fixed-asset investment, which also acts as a vital avenue for firms to boost their core competitiveness and innovation capabilities. This research takes the 2018 value-added tax (VAT) credit refund policy as a quasi-natural experiment. Drawing on panel data of Chinese listed firms from 2013 to 2022, this study employs a difference-in-differences (DID) framework to investigate how the policy influences the intensity of fixed-asset investment and the mechanisms through which this effect occurs. The empirical evidence suggests that the VAT credit refund policy produces a striking promotional impact on the intensity of firms' fixed-asset investment, with more pronounced effects observed among large firms and those located in eastern China. Mechanism tests further reveal that the policy operates through two channels: alleviating financing constraints and optimizing debt structure, thereby providing stable financial support for fixed-asset investment. Based on the conclusions obtained, this study advances improvements in the design of the tax system and emphasizes the need to strengthen policy implementation and complementary support measures. Such measures are crucial to fostering the role of tax policy in stabilizing investment and promoting sustainable corporate development.

Keywords: Value-added tax reform, VAT credit refund, Fixed-asset Investment, Financing constraints, Debt structure

1. Introduction

Following decades of economic liberalization and modernization, China has realized remarkable economic progress. Nevertheless, in recent years, the country has faced mounting downward pressure due to the waning demographic dividend, global uncertainties, and intensifying trade frictions. In this context, stimulating market vitality and promoting enterprise investment—especially in long-term fixed assets—has become central to achieving high-quality development.

Fiscal and tax policies, as key tools of macroeconomic regulation, are important in guiding resources and encouraging investment. Among them, the VAT credit refund policy is a crucial reform aimed at easing capital constraints and improving the tax environment. Traditionally, when input VAT exceeded output VAT, the surplus could only be carried forward, creating “stranded” credits and locking up working capital—particularly for manufacturing firms with long investment

cycles. Through the conversion of excess input VAT into cash refunds, the VAT credit refund policy tackles this problem, thus turning idle credits into liquidity. This reform alleviates financial strain, improves cash flow, and enhances firms' capacity and confidence to invest. Since its pilot in 2018 and gradual expansion, it has become a cornerstone of China's tax and fee reduction system, playing an important role in revitalizing enterprise capital and supporting stable economic growth.

Existing research provides extensive insights into the determinants of corporate fixed-asset investment. Prior studies emphasize the roles of financial development, environmental uncertainty, and marketization level in shaping investment behavior [1-2]. Firm investment decisions also exhibit strong path dependence [3], while ownership structure and financing capacity generate systematic differences in investment incentives [4]. These findings construct a theoretical foundation for analyzing firm investment from both micro-level characteristics and macro-institutional contexts, offering a basis for understanding the potential effects of the VAT credit refund policy.

Amongst these determinants, fiscal and tax policies play a particularly critical role. Reductions in corporate income tax rates or preferential measures such as accelerated depreciation and investment tax credits are found to significantly stimulate fixed-asset investment [5], whereas heavier tax burdens suppress investment activity [6]. Cross-country evidence further shows that tax reforms can promote capital formation, though the effect may weaken under financial liberalization or higher interest rates, and is stronger for highly leveraged firm [7]. Regarding China's VAT credit refund policy, recent research points to the fact that it enhances corporate liquidity and mitigates financing constraints, thereby stimulating R&D, innovation [8], and employment [2]. However, existing studies primarily address liquidity and innovation effects, while few systematically investigate its direct impact on fixed-asset investment intensity or transmission mechanisms—leaving an important empirical gap for further research.

This paper makes threefold marginal contributions. To begin with, in terms of the research perspective, existing studies have examined various effects of the VAT credit refund policy, yet its direct influence on firms' fixed-asset investment intensity remains insufficiently explored. This study identifies fixed-asset investment as a key channel through which the policy enhances long-term production capacity, thereby deepening understanding of how VAT credit refunds stimulate enterprise investment and support sustainable economic growth. Second, methodologically, a multi-period DID model is employed to address endogeneity concerns. A sequence of robustness checks further validate the credibility of the results, providing a solid empirical foundation for causal inference in tax policy evaluation. Third, in terms of research content, our research not only estimates the average causal effect of the policy but also uncovers its mechanisms through financing constraints and debt structure adjustments. Heterogeneity analyses by firm size and region reveal differentiated policy effects. Overall, the study enriches the theoretical and empirical understanding of how fiscal and tax policies influence corporate investment.

2. Theoretical mechanisms

2.1. VAT credit refund policy and corporate fixed-asset investment

According to the financing constraints theory [9], internal cash flow constitutes a key determinant of firms' investment decisions. When firms face financing constraints, internal cash flow becomes an important source of funding for investment, rendering corporate investment highly sensitive to internal liquidity. The VAT credit refund policy provides a cost-free, one-time cash injection by refunding previously uncredited input VAT. This directly augments firms' internal financing capacity [10], improving not only corporate liquidity but also reducing reliance on external financing and the

associated financing premium [11]. Increased cash reserves enable firms to better afford the upfront costs of large fixed-asset investments and enhance their confidence in undertaking the risks of long-term project [12]. Accordingly, we propose:

H1: The VAT credit refund policy exerts a significant facilitative impact on corporate investment in fixed assets intensity.

2.2. The mediating mechanism of financing constraints

The alleviation of financing constraints acts as a key channel via which the VAT credit refund policy promotes investment. On the one hand, cash inflow from the refund directly improves firms' liquidity and debt-servicing capacity, sending a positive financial signal to external creditors. This helps enhance firms' commercial credit and external financing capacity [13]. On the flip side, the policy carries an implicit "government endorsement" effect. Firms eligible for the refund typically exhibit sound tax compliance, which further boosts market confidence and reduces information asymmetry between firms and capital providers. This, in turn, broadens financing channels and lowers financing costs. The alleviation of financing constraints enables firms to more easily secure the funds required for fixed-asset investments. Accordingly, we propose:

H2: By alleviating corporate financing constraints, the VAT credit refund policy enhances fixed-asset investment intensity.

2.3. The mediating mechanism of corporate debt structure

In addition to directly increasing equity-like cash flow, the VAT credit refund may also optimize firms' debt maturity structure. The refunded funds can be used to repay high-interest short-term liabilities, thereby reducing firms' reliance on short-term debt and improving their overall debt structure. According to debt maturity matching theory, long-term asset investments should be supported by long-term funding. When short-term financial risk decreases due to an improved debt structure, firms' financial stability increases, creating favorable conditions for raising long-term debt to match the extended funding needs of fixed-asset investments. A more stable and long-term-oriented debt structure provides reliable and sustainable financial support for corporate fixed-asset investment. Accordingly, we propose:

Hypothesis 3: By optimizing firms' debt structure, the VAT credit refund policy enhances fixed-asset investment intensity.

3. Research design

3.1. Sample selection and data sources

The initial sample comprises all A-share listed firms in China during 2013–2022. The sample is further processed by excluding companies that conducted IPOs during the sample period, removing ST and *ST firms, eliminating financial industry entities, and discarding observations featuring missing or outlier values for key variables are excluded. The sample is drawn from the CSMAR database, and all variables are adjusted by winsorizing the top and bottom 1% to control for outliers.

3.2. Variable selection

3.2.1. Outcome variable

Corporate investment intensity (Inv1) is measured as the ratio of cash outflows for fixed, intangible, and other long-term assets to total assets at year-end, multiplied by 100.

3.2.2. Independent variable

We construct a DID policy variable (Treat \times Post). Specifically, Treat is a variable assigned a value of 1 if an enterprise is engaged in any of the crucial experimental industries outlined in the regulatory documents, and 0 in other cases. Post serves as a temporal dummy indicator that assumes a value of 1 for the period subsequent to the full implementation of the policy (i.e., 2018 and beyond) and 0 for years prior to 2018.

3.2.3. Mediating variables

Our paper leverages the SA index to gauge the degree of enterprise financing constraints. The construction of this index primarily relies on two highly exogenous variables with the specific formula for calculation is as follows:

$$SA = -0.737 \times \text{Size} + 0.043 \times \text{Size}^2 - 0.040 \times \text{Age} \quad (1)$$

Here, Size is calculated as $\ln(\text{total assets})$, and Age refers to years of the firm since establishment. The SA index yields negative figures, with a greater absolute magnitude indicating a more pronounced level of financing constraints confronting the firm.

The other mediating variable is corporate debt structure (Debt_Struct), which this paper uses to measure financial soundness from the perspective of debt maturity structure, expressed as the percentage of long-dated liabilities relative to total liabilities, computed as: Long-term Debt Ratio = $(\text{Long-dated Liabilities} / \text{Total Liabilities}) \times 100$.

3.2.4. Control variables

Eight firm-level control variables are added to the model, together with year and firm fixed effects, to reduce the risk of omitted variable bias. All variables and their definitions are in Table 1.

Table 1. Definitions of the variables

Variable Type	Variable Name	Symbol	Definition
Outcome Variable	Fixed-Asset Investment Intensity	<i>Inv</i>	(Cash spent on fixed assets / Total assets) × 100
Core Independent Variable	Individual Effect	Treat	Equals 1 if the firm belongs to a key pilot industry, else 0
	Time Period	Post	Equals 1 for years after full policy implementation (2018 onward), else 0
Control Variables	Firm Size	Size	Natural logarithm of total assets at year-end
	Asset-Liability Ratio	Lev	Total liabilities / Total assets
	Return on Assets	Roa	Net profit / Total assets
	Growth Opportunity	Grow	Operating revenue growth rate
	Fixed Asset Ratio	Tang	Net fixed assets / Total assets
	Ownership Concentration	Top1	Percentage of shares held by the largest shareholder
	Board Size	Board	Natural logarithm of the number of board members
Mediating Variables	CEO Duality	Dual	1 if CEO also serves as chairperson, else 0
	Financing Constraints	SA	SA index measuring financing constraints
	Debt Structure	Debt_Struct	Long-term debt / Total liabilities

3.3. Model specification

We draws on methodologies from studies to establish the following model [13]:

$$Inv_{i,t} = \alpha_0 + \alpha_1 (Treat_i \times Post_t) + \alpha_2 Controls_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

$Inv_{i,t}$ denotes the fixed-asset investment intensity of firm i in year t . $Treat_i \times Post_t$ is the main explanatory factor, and its coefficient α_1 captures the causal effect of interest. Firm fixed-effect specifications μ_i and time fixed-effect specifications λ_t are integrated into address unobserved heterogeneity, and $\varepsilon_{i,t}$ is error term.

4. Analysis of empirical results

4.1. Descriptive statistics

The dependent variable in Table 2, fixed-asset investment intensity (Invest), has a mean of 0.053, indicating that fixed-asset investment accounts for 5.3% of total assets on average. Its lowest value equals 0 and highest value stands at 0.642, accompanied by a SD of 0.050, suggesting substantial variation among firms. The core independent variable, VAT refund policy (Policy), has a mean of 0.279, suggesting that 27.9% of firm-year observations were affected by the policy. Overall, all variables display reasonable distributions consistent with prior studies, confirming the data's reliability for empirical analysis.

Table 2. Descriptive statistics of variables

VarName	Obs	Mean	SD	Min	Max
Invest	15345	0.053	0.050	0	0.642
policy	15345	0.279	0.449	0	1
Size	15345	22.094	1.089	19.959	25.392
Lev	15345	0.433	0.196	0.071	0.962
Roa	15345	0.028	0.130	-3.307	8.441
Top1	15345	30.612	13.264	8.157	67.491
Board	15345	2.087	0.185	1.609	2.485
Dual	15345	1.633	0.482	1	2
Grow	15345	0.146	0.596	-0.803	3.417
Tang	15345	0.197	0.139	0	0.872
CF	15345	0.042	0.071	-0.762	0.600
SA	15345	-3.846	0.239	-4.488	-3.348
Debt_Struct	15345	0.133	0.149	0	0.951

4.2. Baseline regression

As shown in Column (1) of Table 3, without controlling for any confounding variables, the fixed-asset investment intensity of firms in the treatment group is 0.5% higher than that of their counterparts in the control group, and this result is statistically significant at the 1% level. Column (2) reports that after incorporating firm-level control variables, the coefficient of $Treat \times Post$ is 0.009, maintaining significance at the 1% level. This implies that after mitigating the impact of potential confounding factors, the policy contributes to a significant 0.9% rise in the fixed-asset investment intensity of the affected firms. In Column (3), with the inclusion of firm and year fixed effects, the coefficient of $Treat \times Post$ is 0.005 and remains significant at the 1% level. This demonstrates that even when accounting for observable characteristics, unobservable time-invariant firm heterogeneity, and macroeconomic time trends, the policy still induces a statistically significant 0.5% increase in firms' fixed-asset investment intensity. Overall, these baseline regression results provide support for H1.

Table 3. Baseline regression results

	(1)	(2)	(3)
	Invest	Invest	Invest
Treat×Post	0.005*** (6.01)	0.009*** (10.27)	0.005*** (4.61)
Size		-0.000 (-1.25)	-0.000 (-0.25)
Lev		-0.014*** (-6.17)	-0.013*** (-5.68)
Roa		0.035*** (11.24)	0.031*** (10.29)
Top1		0.000*** (8.31)	0.000*** (8.29)
Board		-0.006*** (-2.96)	-0.004* (-1.66)
Dual		-0.008*** (-9.56)	-0.006*** (-7.24)
Grow		-0.000 (-0.61)	-0.000 (-0.67)
Tang		0.113*** (40.94)	0.114*** (37.61)
Constant	0.052*** (108.49)	0.063*** (7.07)	0.046*** (4.87)
Individual and Time Fixed Effects	×	×	√
N	15,345	15,345	15,326
R ²	0.002	0.125	0.202

Note: *** indicates significance at the 1% level; t-statistics are reported in parentheses.

4.3. Robustness tests

4.3.1. Parallel trends test

An event study methodology was adopted to verify the parallel trends assumption. The results are presented in Figure 1. To avoid multicollinearity, the year when the policy was rolled out is designated as the reference period.

As observed, the estimated coefficients of Treat×Post fluctuate closely around zero and are statistically insignificant in all pre-treatment periods, indicating no significant differences in fixed-asset investment the levels of the intervention group and the control group were comparable prior to the policy's rollout. This meets the parallel trends premise. During the policy's rollout year implementation and subsequent periods, the coefficients exhibit a fluctuating upward trend. The coefficient further increases in the first post-treatment period, reflecting that firms actively initiated

preliminary work on new fixed-asset investment projects as value-added tax credit refund funds were received. A temporary decline occurs in the second period, potentially due to the cyclical nature of fixed-asset investment projects, leading to a relative slowdown in cash disbursement at that stage. The estimated coefficients for the third and fourth periods are significantly greater than zero, indicating that the promotive effect of the policy on fixed-asset investment gradually materialized after implementation, demonstrating certain persistence and lag.

4.3.2. Placebo test

For placebo test, a “fictitious treatment group” was randomly selected from the full sample, with the remaining firms constituting the “pseudo-control group.” A unified “pseudo-treatment year” was also randomly drawn from the sample period. The DID estimation was then performed using the dependent variable fixed-asset investment. After conducting 500 random replications for assigning the treatment group, the distribution of the placebo effect estimates was obtained and is presented in Figure 2. The randomly generated estimated coefficients of $Treat \times Post$ exhibit a Gaussian distribution centered on a value of zero, and the estimated treatment impact lies within the rightmost tail of the sham effect distribution. Therefore, based on the above distribution characteristics, The null hypothesis that the treatment effect is zero is rejectable.

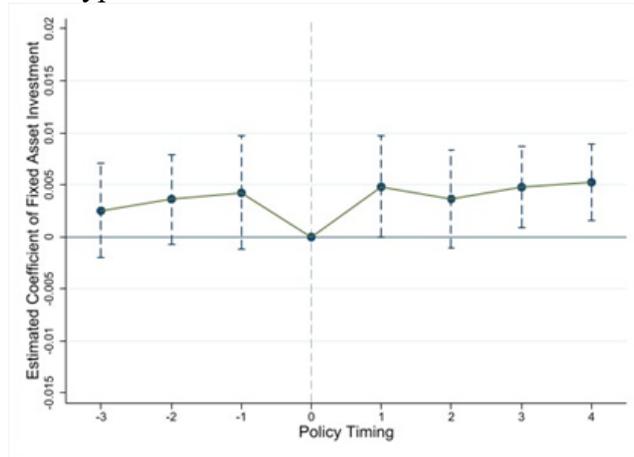


Figure 1. Parallel trends test

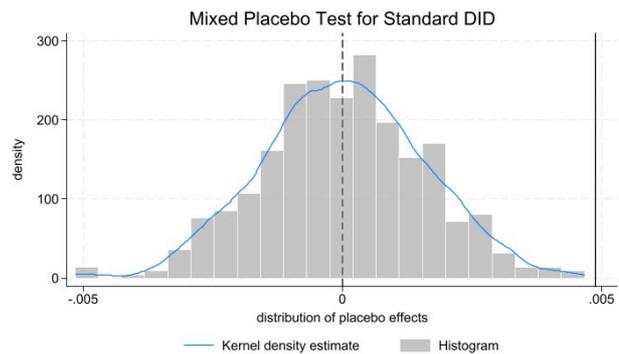


Figure 2. Placebo test

4.3.3. Entropy balancing test

To address potential selection bias, entropy balancing is applied to match covariates across the treated sample and the control sample without losing samples. The results of matched regression (Table 4, Column 1) remain significant and directionally consistent with baseline findings.

4.3.4. Other robustness tests

Further robustness checks confirm the validity of results: replacing the dependent variable with its logarithmic form, excluding municipalities directly under the central government, and removing data from 2020 (to eliminate COVID-19 shocks) all yield consistent results (Table 4). Overall, these analyses confirm that the VAT credit refund promotes the fixed-asset investment in the firm.

Table 4. Robustness test

	(1)	(2)	(3)	(4)
	Invest	lnInvest1	lnInvest	lnInvest
Treat×Post	0.005*** (4.61)	0.238*** (9.54)	0.236*** (8.81)	0.229*** (7.88)
Constant	0.046*** (4.87)	-4.891*** (-21.89)	-4.894*** (-20.33)	-4.892*** (-19.33)
Control Variables	√	√	√	√
Individual and Time Fixed Effects	√	√	√	√
N	15,326	15,326	12,921	11,738
R ²	0.202	0.282	0.287	0.288

Note: Consistent with Table 3.

4.4. Heterogeneity analysis

4.4.1. Firm size

Firm size significantly shapes firms' resource endowment, risk tolerance, and investment behavior, leading to heterogeneous policy responses. Based on total asset averages, firms are classified into large and small groups (see Table 5). The results show that large firms benefit most from the VAT credit refund policy, Treat×Post is positively significant at the 1% confidence level, demonstrating a notable rise in fixed-asset investment. While small firms also show a positive but weaker response, the magnitude and significance are lower. This implies that large enterprises can more effectively convert tax refunds into investment due to stronger financial capacity and management efficiency, whereas small firms may be limited by financing constraints and lower investment flexibility.

4.4.2. Geographical region

The influence exerted by the VAT credit refund policy on fixed-asset investment intensity exhibits clear regional heterogeneity. Based on China's the National Bureau of Statistics classification, firms are categorized into Eastern, Central, Western, and Northeastern regions (see Table 5). In Eastern China, the Treat×Post is positively significant at the 1% level. It reveals that a marked rise in fixed-asset investment following the polic. As China's most market-oriented and developed region, Eastern firms respond more efficiently to policy signals, converting refunds into investment momentum. The Central region shows a weaker positive effect, while the Western and Northeastern regions display insignificant or even negative responses, likely due to their industrial structures, slower market adjustment, and limited innovation capacity. The results presented herein suggest that the policy exerts a stronger stimulative impact in areas with mature markets and more active private investment.

Table 5. Heterogeneity analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	Large	Small	Eastern	Central	Western	Northeastern
	Invest	Invest	Invest	Invest	Invest	Invest
Treat×Post	0.006*** (0.002)	0.005** (0.002)	0.006*** (0.002)	0.008* (0.005)	0.002 (0.007)	-0.018 (0.013)
Constant	0.039*** (0.010)	0.038*** (0.010)	0.043*** (0.007)	0.049* (0.027)	0.004 (0.018)	0.113** (0.043)
Control Variables	√	√	√	√	√	√
Individual and Time Fixed Effects	√	√	√	√	√	√
N	7,061	8,237	11,164	1,951	1,354	555
R ²	0.298	0.187	0.200	0.277	0.224	0.226

Note: Consistent with Table 3.

4.5. Mechanism tests

We examine the underlying mechanisms via which The VAT credit refund policy influences fixed-asset investment intensity [14]. As shown in Table 6, the parameter estimate corresponding to Treat×Post in Column (1) is significant and negative at the 1% level, which suggests that the policy reduces corporate financing constraints by about 0.027 units. Eased financing constraints enhance firms' investment capacity, aligning with the financing constraint theory, which posits that higher external financing costs suppress investment, while improved liquidity and credit access stimulate capital expansion [15]. Thus, financing constraints serve as an important mediating channel, supporting Hypothesis 2. Column (2) suggests that the policy also promotes fixed-asset investment by optimizing firms' debt structure and reducing financial risk. Excessive short-term debt increases liquidity pressure and limits long-term investment, whereas a higher share of long-term debt ensures stable funding and strengthens investment sustainability [16-17]. Hence, debt structure is another key mediating mechanism.

Table 6. Regression results of mediation effects

	(1)	(2)
	SA	Debt_Struct
Treat×Post	-0.027*** (0.009)	-0.005 (0.003)
Constant	3.211*** (0.091)	-0.589*** (0.028)
Control Variables	√	√
Individual and Time Fixed Effects	√	√
N	15,326	15,326
R ²	0.306	0.227

Note: Consistent with Table 3.

5. Conclusion and implications

By treating VAT credit refund policy by adopting a quasi-natural experiment, we apply a DID framework, leveraging data pertaining to A-share listed firms during 2013 to 2022 to examine its effects on fixed-asset investment intensity and underlying mechanisms. The results show that the policy significantly boosts firms' fixed-asset investment by about 0.5%, confirming its real-economy stimulus effect. Heterogeneity analysis indicates that large firms and those in eastern regions benefit more, while smaller firms and those in central and western areas respond less, reflecting differences in resource endowment and market environment. Mechanism analysis reveals that the policy promotes investment mainly by easing financing constraints and optimizing debt maturity structures—enhancing liquidity, credit access, and long-term funding capacity.

Policy recommendations include: (1) expanding the VAT refund scope and refund ratio to further release capital constraints; (2) improving precision implementation through differentiated support for smaller firms and lagging regions; and (3) strengthening fiscal–financial coordination to link tax refunds with credit and guarantee mechanism.

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