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VAT Credit Refunds and Firms' Export Development Evidence from Chinese A-Share Listed Companies

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Abstract

This study examines whether China's value-added tax (VAT) credit refund policy supports firms' export development through financing relief and productivity improvements. Using an unbalanced panel of 6014 firm-year observations covering 821 A-share listed firms during 2013–2023, we estimate difference-in-differences models with firm and year fixed effects. The fully controlled policy coefficient on log overseas operating revenue is 0.2202 and is significant at the 1% level. Event-study estimates do not reject parallel pre-policy trends, while placebo, propensity score matching, weighting, and sample-period checks support the positive association. Additional estimates show an improvement in firm resilience. Mechanism regressions yield positive indirect effects through reduced financing constraints and higher total factor productivity, with firm-clustered bootstrap confidence intervals excluding zero. The point estimate is larger for non-state-owned firms, although the difference between ownership groups is not formally tested. The findings are consistent with liquidity and productivity channels supporting overseas business activity. Because overseas revenue is a scale-based proxy, the results do not directly establish improvements in export product quality or domestic value added.

Keywords

vat credit refunds, export development, financing constraints, total factor productivity, difference-in-differences

1. Introduction

High-quality export development requires firms to sustain foreign-market participation while improving productive capabilities and resilience. Export revenue is an important part of this process, but it does not capture all dimensions of competitiveness. Ceglowski [1] shows that assessments based on gross exports can differ from those based on domestic value added. This distinction is relevant when firm-level financial data are used to study trade-related outcomes: stronger overseas sales may reflect greater scale, changing prices, or a different composition of activities rather than product upgrading alone.

Financial frictions provide one explanation for uneven international performance across firms. Entering and serving foreign markets requires expenditure on production, distribution, customer acquisition, and working capital before sales proceeds are received. Bellone et al. [2] find that financially healthier firms are more likely to become exporters, whereas Greenaway et al. [3] emphasize that export participation can itself

improve financial health. These findings suggest that liquidity and exporting may be jointly determined, making policy-related changes in available funds a useful setting for examining their relationship.

VAT credit refunds release funds tied up in unutilized input tax credits. Unlike a reduction in the statutory tax rate, a refund changes the timing and availability of liquidity associated with tax credits. It may allow firms to maintain production, reduce reliance on costly external finance, and undertake productivity-enhancing expenditure. Related evidence from China links VAT export rebates to product upgrading through credit constraints [4]. However, export rebates and refunds of accumulated input VAT credits are distinct policy instruments and should not be treated as interchangeable. Research on China's VAT credit refund reform also documents a reduction in corporate financing constraints [5].

This study examines VAT credit refunds and firms' export development using 6014 firm-year observations from 821 Shanghai and Shenzhen A-share listed firms over 2013–2023. The analysis combines firm and year fixed effects, an event study, placebo exercises, matching and weighting checks, mechanism regressions, and ownership-specific estimates. The contribution is to connect overseas operating revenue with both financing constraints and total factor productivity in a common empirical framework, while using firm resilience as a complementary outcome. The evidence concerns overseas business performance; it does not provide a direct measure of product quality, export sophistication, or supply chain resilience.

The baseline policy coefficient is positive and remains statistically significant across the reported alternative specifications. The mechanism estimates are consistent with financing relief and productivity improvements, and the ownership results suggest a larger point estimate among non-state-owned firms. These findings are interpreted subject to the policy assignment, parallel trends, and mediation assumptions discussed below. Section 2 develops the institutional background and hypotheses, Section 3 describes the research design, Section 4 presents the results, and Section 5 concludes.

2. Policy Background and Research Hypotheses

The proposed transmission mechanism links the release of accumulated tax credits to firms' financing conditions and productive capacity. The policy background also matters for interpreting comparisons over a period in which refund eligibility expanded.

2.1 Institutional Background

China's 2018 reform permitted refunds of end-of-period VAT credits for selected advanced manufacturing industries, modern services such as research and development, and eligible power-grid enterprises. The national notice specified industry coverage and additional eligibility conditions, including tax credit ratings [6]. Industry membership therefore represents potential exposure rather than proof that every covered firm actually received a refund. This distinction motivates interpreting an industry-based DID indicator as policy exposure rather than the amount of refund received.

The policy subsequently broadened. An incremental VAT credit refund system was introduced across industries from April 2019, subject to eligibility requirements [7]. In 2022, refund support expanded further for qualifying small and micro enterprises and specified industries [8]. Consequently, a long post-reform window may reflect evolving relative exposure rather than a permanent comparison between recipients and firms wholly unaffected by refund policies. Firm and year fixed effects absorb persistent firm differences and common annual shocks, but they do not automatically remove differential exposure to later reforms.

2.2 Liquidity and Financing Constraints

Unrefunded input VAT credits tie up cash that firms could otherwise use for working capital. Returning these credits can reduce the need for short-term borrowing and ease the funding of production and overseas orders. For firms facing a wedge between internal and external financing costs, the release of liquidity may support activities that would otherwise be delayed or scaled back. This reasoning connects the financial barriers to exporting documented in the trade literature with the financing relief associated with VAT credit refunds.

H1. Exposure to the VAT credit refund policy is associated with higher overseas operating revenue.

If financing relief is part of the transmission process, policy exposure should reduce the WW financing constraints index, while tighter constraints should be associated with weaker overseas performance conditional on policy exposure and firm characteristics. The analysis treats this channel as financing-constraint relief; the WW index is not a direct measure of working capital turnover or operating-cycle efficiency.

H2. Reduced financing constraints mediate the positive relationship between VAT credit refund exposure and overseas operating revenue.

2.3 Productivity and Ownership

Liquidity may also affect longer-term productive capacity. Firms able to fund equipment maintenance, process improvement, and complementary inputs can improve production efficiency and their ability to meet foreign demand. VAT-related trade research links additional cash flow to upgrading investment, suggesting a possible productivity channel. Whether these opportunities translate into higher productivity is an empirical question, since refunds may also be used to repay liabilities or accumulate cash.

H3. Higher total factor productivity mediates the positive relationship between VAT credit refund exposure and overseas operating revenue.

The marginal value of released liquidity may differ by ownership. Where non-state-owned firms face tighter external financing constraints, a refund could have a larger influence on their overseas activity. Ownership-specific regressions therefore provide an exploratory extension. A significant coefficient in one group and an insignificant coefficient in another, however, do not by themselves establish a statistically significant difference between groups.

3. Research Design

The empirical analysis links firm-year financial information, overseas operating revenue, and industry-based policy exposure. The model specifications distinguish the overall policy coefficient from the statistical evidence on potential channels.

3.1 Sample and Data

The sample comprises Shanghai and Shenzhen A-share listed firms over 2013–2023. Firm financial information is matched with overseas operating revenue and policy-related industry classifications. Observations with missing core variables are excluded, and continuous variables are winsorized within each year at the 1st and 99th percentiles. The final unbalanced panel contains 6014 firm-year observations from 821 firms. Coverage differs across years, with relatively few observations in 2013 and 2014, so early event-study estimates warrant particular caution.

3.2 Variables

The dependent variable, Overseas_Rev, is the log overseas operating revenue measure in the estimation sample. It captures the scale of overseas business activity and serves as a limited indicator of export development. Overseas revenue may include activities beyond customs-recorded exports and does not identify product quality, domestic value added, or export prices separately. The analysis therefore interprets changes in this outcome as changes in overseas operating performance.

The core explanatory variable is DID, the interaction between Treat and Post. Treat equals one when a firm's industry in the current year falls within the designated policy coverage and zero otherwise. Post indicates the post-implementation period. Since current-year industry membership is used, changes in industry classification may alter exposure within a firm. This coding differs from a treatment group fixed using pre-policy industry membership.

WW measures financing constraints, with larger values indicating tighter constraints, following the interpretation of the Whited–Wu index [9]. TFP_LP measures total factor productivity using the Levinsohn–Petrin approach, which uses intermediate inputs to address the correlation between input choices and unobserved productivity [10]. Resilience1 is an alternative outcome measuring firm resilience, not supply

chain resilience. The control variables are tax refund intensity (Rebates), firm size (Size), the debt-to-asset ratio (Lev), and return on assets (ROA). Table 1 summarizes the variables.

Table 1: Variable definitions

Variable type	Variable name	Symbol	Definition and description
Dependent variable	Overseas operating performance	Overseas_Rev	Log of overseas operating revenue
Core explanatory variable	Policy shock	DID	Treat×Post; Treat is determined by whether the firm's industry in the current year is covered by the policy
Mechanism variable	Financing constraints	WW	WW financing constraints index
Mechanism variable	Total factor productivity	TFP_LP	Total factor productivity estimated using the LP method
Alternative dependent variable	Firm resilience	Resilience1	Firm resilience measure
Controls	Tax refund intensity	Rebates	Firm tax refund intensity measure
Controls	Firm size	Size	Firm size measure
Controls	Debt-to-asset ratio	Lev	Firm leverage
Controls	Return on assets	ROA	Firm profitability

Note: Variable symbols are retained throughout. Overseas_Rev is a scale-based overseas revenue measure. Resilience1 denotes firm resilience.

3.3 Baseline Specification

The baseline difference-in-differences model includes firm and year fixed effects:

$$\text{Overseas\_Rev}_{it} = \alpha_0 + \beta \text{DID}_{it} + \gamma' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

Here, i indexes firms and t indexes years. X contains Rebates, Size, Lev, and ROA; μ and λ denote firm and year fixed effects, respectively. The coefficient β measures the differential change in log overseas operating revenue associated with policy exposure, conditional on the included controls. Standard errors are clustered at the firm level to allow serial dependence within firms, an important concern in panel DID inference [11]. Because policy exposure is defined by industry, residual dependence across firms within industries remains an additional inference concern.

A causal interpretation requires parallel counterfactual trends, no relevant anticipation, and the absence of unaccounted differential shocks or spillovers. Industry-specific demand movements and subsequent refund reforms could challenge these conditions. Moreover, contemporaneous controls such as Rebates may themselves respond to the policy. The specification without firm controls and the fully controlled specification are therefore both reported, rather than assuming that their coefficients necessarily identify the same total effect.

3.4 Mechanism and Ownership Specifications

For each mechanism variable M, the analysis estimates a policy-to-mediator equation and an outcome equation conditional on the mediator:

$$M_{it} = a_0 + a_1 \text{DID}_{it} + \delta' X_{it} + \mu_i + \lambda_t + \nu_{it} \quad (2)$$

$$\text{Overseas\_Rev}_{it} = c_0 + c' \text{DID}_{it} + bM_{it} + \theta' X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

M denotes WW or TFP_LP in separate models. The estimated indirect effect is $a_1 b$. Percentile and bias-corrected confidence intervals are obtained from 1000 bootstrap replications clustered by firm. An interval excluding zero supports a nonzero indirect association under the specified linear model. It does not by itself establish causal mediation: interpreting the product as a causal pathway requires additional assumptions about mediator–outcome confounding [12].

Ownership heterogeneity is examined by estimating the baseline equation separately for state-owned and non-state-owned enterprises:

$$\text{Overseas\_Rev}_{it} = \alpha_0 + \beta^g \text{DID}_{it} + \gamma' X_{it} + \mu_i + \lambda_t + \varepsilon_{it}, g \in \{\text{SOE}, \text{non} - \text{SOE}\} \quad (4)$$

The group-specific coefficients describe the estimated policy relationship within each ownership category. Their point estimates and within-group significance are reported without treating them as a formal test of cross-group equality.

4. Empirical Results

The results are presented in the order of descriptive evidence, baseline estimates, identification diagnostics, robustness checks, potential mechanisms, and ownership differences. The discussion distinguishes the evidence on overseas revenue from broader claims about product quality and export upgrading.

4.1 Descriptive Statistics and Diagnostic Checks

Table 2 reports substantial variation in overseas business activity: Overseas_Rev has a mean of 19.376 and a standard deviation of 2.038. The mean of DID is 0.599, indicating that 59.9% of firm-year observations are coded as policy-exposed. The means of WW and TFP_LP are −1.017 and 8.650, respectively. Resilience1 has a mean of 0.011 and a standard deviation of 0.102. These distributions provide variation for the subsequent regressions, but do not establish a policy effect.

Table 2: Descriptive statistics

Variable	Observations	Mean	Std. dev.	Min.	Max.	P1	P99
Overseas_Rev	6014	19.376	2.038	12.164	24.094	13.609	23.630
DID	6014	0.599	0.490	0.000	1.000	0.000	1.000
WW	6014	-1.017	0.061	-1.207	-0.863	-1.179	-0.885
TFP_LP	6014	8.650	0.892	6.521	12.220	6.821	11.202
Rebates	6014	0.011	0.013	0.000	0.078	0.000	0.064
Size	6014	22.213	1.046	20.065	26.215	20.186	25.261
Lev	6014	0.408	0.180	0.061	0.953	0.082	0.861
ROA	6014	0.029	0.080	-0.528	0.235	-0.325	0.183
Resilience1	6014	0.011	0.102	-0.483	0.492	-0.286	0.346

Note: P1 and P99 denote the 1st and 99th percentiles, respectively.

The correlation between DID and Overseas_Rev is 0.050 and is significant at the 1% level (Table 3). This positive unconditional association is consistent with the proposed relationship but may reflect other firm characteristics. The baseline variance inflation factors are all below 1.5, with a mean of 1.196 (Table 4). These values do not indicate serious multicollinearity in the baseline covariate set. They do not cover the additional mechanism variables: WW, TFP_LP, and Size exhibit relatively high pairwise correlations, which should be considered when interpreting the mechanism regressions.

Table 3: Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Overseas_Rev	1								
(2) DID	.050***	1							
(3) WW	-.459***	-.002	1						
(4) TFP_LP	.540***	.059***	-.711***	1					
(5) Rebates	.349***	.042***	.005	.102***	1				
(6) Size	.514***	.071***	-.813***	.817***	-.041***	1			
(7) Lev	.229***	.038***	-.161***	.389***	.010	.402***	1		
(8) ROA	.102***	-.070***	-.379***	.164***	.067***	.071***	-.347***	1	
(9) Resilience1	.012	.070***	-.083***	.051***	.007	-.010	-.081***	.244***	1

*Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.*

Table 4: Variance inflation factors

Variable	VIF	1/VIF	Variable	VIF	1/VIF
Lev	1.441	0.694	Size	1.283	0.779
ROA	1.227	0.815	DID	1.014	0.986
Rebates	1.013	0.987	Mean	1.196	—

Note: VIFs apply to DID and the control variables in the baseline model.

4.2 Baseline Estimates

Table 5 presents the baseline results. With firm and year fixed effects only, the DID coefficient is 0.3921 with a standard error of 0.0683. Adding the firm controls reduces the coefficient to 0.2202, with a standard error of 0.0592; both estimates are significant at the 1% level. The positive coefficient supports H1 as an empirical association between policy exposure and overseas operating revenue. The fully controlled estimate is expressed in log points, rather than being read directly as a percentage change.

Table 5: VAT credit refund exposure and overseas operating revenue

Variable	(1)	(2)
DID	0.3921***	0.2202***
	(0.0683)	(0.0592)
Rebates		22.6524***
		(2.0445)
Size		0.8549***
		(0.0546)
Lev		0.1693
		(0.1793)
ROA		0.7739***
		(0.2070)
Constant	19.1415***	-0.0878
	(0.0409)	(1.1908)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	6014	6014
Adjusted R^2	0.8746	0.8966

*Note: The dependent variable is Overseas_Rev. Firm-clustered robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Rebates, Size, and ROA have positive coefficients significant at the 1% level, whereas Lev is not significant at conventional levels. Adjusted R^2 increases from 0.8746 to 0.8966 when the controls are included. This improvement in fit does not resolve identification concerns, but the positive DID coefficient in both specifications shows that the result is not confined to the specification without firm controls.

4.3 Event-study and Placebo Evidence

Figure 1 normalizes the period immediately before policy implementation to zero. The pre-policy confidence intervals include zero, and the joint pre-policy test has a p-value of 0.2519. Thus, the test does not reject equal pre-policy trends. This finding is compatible with the identifying assumption, although wide early confidence intervals and sparse initial-year coverage limit the power to detect departures. Post-policy point estimates are positive and generally remain above zero, with intervals generally excluding zero from the first subsequent period onward.

Figure 1: Event-study estimates of overseas operating revenue

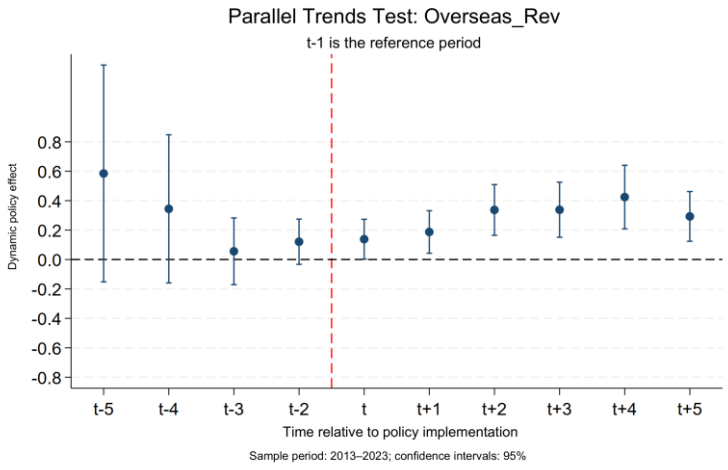
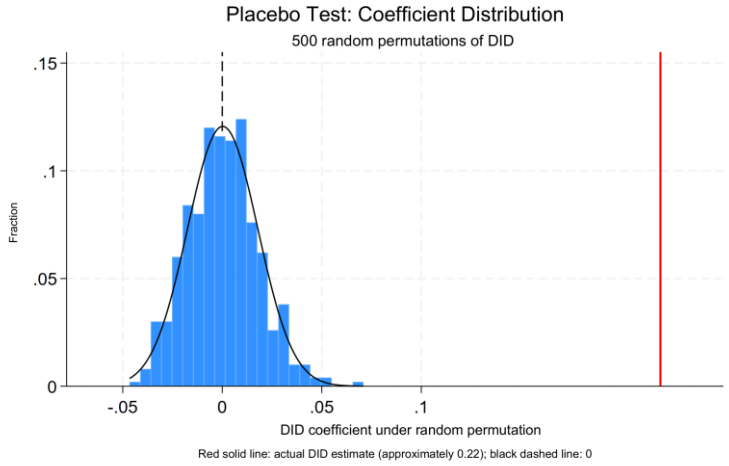


Figure 2 summarizes 500 random permutations of the policy indicator. The placebo coefficients are concentrated around zero, while the actual DID coefficient of approximately 0.22 lies to the right of the placebo distribution. This pattern reduces concern that an arbitrary assignment mechanically reproduces the baseline result. The graphical evidence does not supply an exact empirical p-value and cannot rule out systematic industry-specific confounding.

Figure 2: Distribution of placebo policy coefficients



4.4 Matching Weighting and Alternative Outcomes

Propensity score methods address differences in observed characteristics between treatment and comparison units, subject to overlap and an appropriate assignment model [13]. Table 6 reports the matching and weighting estimates. With controls included, the matched-sample DID coefficient is 0.2280 and the weighted coefficient is 0.2210; both are significant at the 1% level and close to the baseline estimate of 0.2202. The corresponding estimation samples contain 4868 observations. Matching and weighting do not address selection on unobserved characteristics or exposure to other policies.

Table 6: Matching and weighting estimates

Variable	Before matching	After matching	Matched + controls	Weighted	Weighted + controls
DID	0.2200***	0.4180***	0.2280***	0.3400***	0.2210***
	(3.716)	(5.807)	(3.726)	(4.759)	(3.539)
Rebates	22.6520***		24.1840***		22.6650***
	(11.080)		(10.723)		(9.639)
Size	0.8550***		0.8610***		0.7740***
	(15.647)		(14.563)		(7.103)
Lev	0.1690		0.3850**		0.6280*
	(0.944)		(2.059)		(1.901)
ROA	0.7740***		0.7090***		0.4780
	(3.739)		(3.298)		(1.034)
Constant	-0.0880	19.2690***	-0.2630	19.3320***	1.6510
	(-0.074)	(460.059)	(-0.202)	(777.926)	(0.700)
Controls	Yes	No	Yes	No	Yes
Firm/year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6014	4868	4868	4868	4868
R^2	0.897	0.873	0.897	0.893	0.912

*Note: Parentheses contain t-statistics, not standard errors. All models include firm and year fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 7 examines a complementary outcome and an alternative sample period. When Resilience1 is the dependent variable, the DID coefficient is 0.0208 with a standard error of 0.0066, significant at the 1% level. This result concerns firm resilience and does not establish supply chain resilience or validate overseas revenue

as a direct product-quality measure. Excluding 2018 yields a DID coefficient of 0.2433 with a standard error of 0.0642, also significant at the 1% level. The reported reduced-sample result is consistent in sign with the baseline estimate.

Table 7: Firm resilience and alternative sample period

Variable	Firm resilience	Excluding 2018
DID	0.0208***	0.2433***
	(0.0066)	(0.0642)
Rebates	-0.2354	24.5651***
	(0.1952)	(2.4005)
Size	-0.0299***	0.8527***
	(0.0055)	(0.0572)
Lev	0.0315	0.3090*
	(0.0209)	(0.1851)
ROA	0.4643***	1.0186***
	(0.0403)	(0.2490)
Constant	0.6385***	-0.1328
	(0.1201)	(1.2483)
Firm/year fixed effects	Yes	Yes
Observations	6014	5269
R^2	0.1036	0.8955

*Note: Column (1) uses Resilience1; column (2) uses Overseas_Rev and excludes 2018. Firm-clustered robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

4.5 Financing Constraints and Productivity Channels

Table 8 reports the mechanism regressions. In column (1), the DID coefficient on WW is −0.0054 and is significant at the 5% level. In column (2), WW has a coefficient of −2.7272, significant at the 1% level, while the DID coefficient remains positive at 0.2054. The pattern is consistent with H2: policy exposure is associated with lower financing constraints, and lower constraints are associated with stronger overseas operating performance.

Table 8: Financing constraints and productivity regressions

Variable	WW	Overseas_Rev	TFP_LP	Overseas_Rev
DID	-0.0054**	0.2054***	0.0718**	0.1764***
	(0.0025)	(0.0588)	(0.0300)	(0.0564)
WW		-2.7272***		
		(0.5008)		
TFP_LP				0.6089***
				(0.0826)
Rebates	0.0323	22.7405***	4.4992***	19.9126***
	(0.0591)	(2.0412)	(0.9732)	(1.9829)
Size	-0.0577***	0.6974***	0.5255***	0.5349***
	(0.0016)	(0.0601)	(0.0238)	(0.0636)
Lev	0.0110*	0.1993	0.2927***	-0.0090
	(0.0063)	(0.1771)	(0.0860)	(0.1688)
ROA	-0.1644***	0.3255	1.1487***	0.0744
	(0.0098)	(0.2214)	(0.1248)	(0.2163)
Constant	0.2685***	0.6445	-3.2691***	1.9029*
	(0.0356)	(1.1869)	(0.5139)	(1.1364)
Firm/year fixed effects	Yes	Yes	Yes	Yes
Observations	6014	6014	6014	6014
R^2	0.8317	0.8977	0.9299	0.9015

*Note: Columns (1)–(4) use WW, Overseas_Rev, TFP_LP, and Overseas_Rev, respectively. Firm-clustered robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

For productivity, the DID coefficient on TFP_LP is 0.0718 and is significant at the 5% level. When TFP_LP enters the overseas-revenue equation, its coefficient is 0.6089 and is significant at the 1% level; the remaining DID coefficient is 0.1764 and is also significant at the 1% level. This pattern is consistent with H3 and a

productivity channel, although the contemporaneous mediator regressions cannot exclude reverse causality or common shocks to productivity and overseas sales.

Table 9 reports the bootstrap results. The WW indirect effect is 0.0147152, with a percentile 95% confidence interval of [0.0007610, 0.0315808] and a bias-corrected interval of [0.0011601, 0.0317664]. The TFP_LP indirect effect is 0.0437362, with corresponding intervals of [0.0075793, 0.0836514] and [0.0112591, 0.0908695]. All four intervals exclude zero. Together with the remaining positive DID coefficients, these estimates are consistent with partial mediation within each separate model.

Table 9: Firm-clustered bootstrap mechanism estimates

Mechanism variable	Path	Observed coefficient	Bootstrap SE	Percentile 95% CI	Bias-corrected 95% CI	Conclusion
WW	a	-0.0053957	0.0026701	[-0.0109360, -0.0003004]	[-0.0109295, -0.0000276]	Excludes 0
WW	b	-2.7272214	0.5056615	[-3.7453980, -1.7412440]	[-3.7077290, -1.7352180]	Excludes 0
WW	ab	0.0147152	0.0078329	[0.0007610, 0.0315808]	[0.0011601, 0.0317664]	Excludes 0
TFP_LP	a	0.0718231	0.0297719	[0.0125791, 0.1286949]	[0.0168722, 0.1309467]	Excludes 0
TFP_LP	b	0.6089431	0.0820797	[0.4504982, 0.7795874]	[0.4486414, 0.7788323]	Excludes 0
TFP_LP	ab	0.0437362	0.0194064	[0.0075793, 0.0836514]	[0.0112591, 0.0908695]	Excludes 0

Note: N = 6014; 821 firm clusters; 1000 bootstrap replications. a is the policy-to-mediator coefficient, b is the mediator coefficient conditional on DID, and ab is their product. Values retain seven decimal places. Both types of 95% confidence interval are reported.

The two products should not be added to construct a total mediated share because the channels are estimated separately and may overlap. Nor does either interval resolve the additional identification assumptions required for causal mediation. These findings provide mechanism-consistent evidence rather than a definitive decomposition of the policy's causal effect.

4.6 Ownership Heterogeneity

Table 10 compares ownership groups. The DID coefficient is 0.2645 for non-state-owned enterprises and is significant at the 1% level. For state-owned enterprises, it is 0.0980 and is not significant at conventional levels. The larger point estimate for non-state-owned firms is compatible with a higher marginal value of liquidity where financing frictions are more pronounced. However, the table does not include a formal test of the cross-group coefficient difference, so it cannot establish statistically significant ownership heterogeneity.

Table 10: Estimates by ownership

Variable	Full sample	SOEs	Non-SOEs
DID	0.2202***	0.0980	0.2645***
	(0.0592)	(0.1204)	(0.0672)
Rebates	22.6524***	24.3199***	21.6491***
	(2.0445)	(5.8375)	(2.1714)
Size	0.8549***	0.7819***	0.8584***
	(0.0546)	(0.1280)	(0.0626)
Lev	0.1693	-0.1447	0.1555
	(0.1793)	(0.5592)	(0.1981)
ROA	0.7739***	0.5858	0.7641***
	(0.2070)	(0.5189)	(0.2161)
Constant	-0.0878	1.9591	-0.2104
	(1.1908)	(2.7748)	(1.3573)
Firm/year fixed effects	Yes	Yes	Yes
Observations	6014	1153	4850
R^2	0.8966	0.9188	0.8902

*Note: Firm-clustered robust standard errors are in parentheses. All models include firm and year fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels. Reported group-specific sample sizes are retained; no cross-group coefficient-equality test is reported.*

5. Conclusion

This study links VAT credit refund exposure to firms' overseas operating performance using an unbalanced panel of 6014 observations from 821 Chinese listed firms over 2013–2023. The fully controlled DID coefficient is 0.2202 log points and is significant at the 1% level. The event-study test does not reject parallel

pre-policy trends, and the placebo, matching, weighting, and reduced-period estimates are consistent with the positive baseline result. A complementary regression also finds a positive relationship with firm resilience.

The mechanism results connect the policy with lower financing constraints and higher total factor productivity. Firm-clustered bootstrap intervals exclude zero for both estimated indirect effects. These patterns complement the evidence on financial barriers to export participation and VAT credit refunds as a source of financing relief. They also relate to research on VAT export rebates and upgrading, while examining a different refund instrument and a broader overseas-revenue outcome. The contribution is therefore evidence on financial and productive conditions supporting export development, rather than direct identification of product-quality improvements.

The policy implications concern both liquidity provision and the productive use of released funds. Predictable and timely refunds can support working capital planning and reduce financing pressure. Complementary services that help firms evaluate investment projects, improve production processes, and manage overseas operations may strengthen the link between short-term liquidity and longer-term capability. The larger point estimate among non-state-owned firms suggests that access barriers deserve attention, although the present results do not justify claiming a statistically established ownership difference.

Several limitations define the scope of the findings. First, overseas operating revenue is a scale-based outcome, and future work should use customs-linked product quality, export prices, domestic value added, or export survival measures. Second, the long sample spans later refund expansions and other changes in the trading environment; alternative exposure definitions and policy-specific windows would strengthen identification. Current-year industry coding should also be compared with a treatment group fixed before the reform. Third, sparse early observations, industry-level dependence, and potentially policy-responsive controls warrant further sensitivity checks. Finally, the mechanism evidence requires additional assumptions for causal interpretation, while ownership differences require a direct statistical test. These extensions would clarify how far improved overseas performance translates into high-quality export development.

References

[1] Ceglowski J. Assessing export competitiveness through the lens of value added. The World Economy. 2017; 40(2):275-296.

[2] Bellone F, Musso P, Nesta L, Schiavo S. Financial constraints and firm export behaviour. The World Economy. 2010; 33(3):347-373.

[3] Greenaway D, Guariglia A, Kneller R. Financial factors and exporting decisions. Journal of International Economics. 2007; 73(2):377-395.

[4] Pernet T. Value-added export tax policy, credit constraints, and quality: Evidence from China. Review of Development Economics. 2024; 28(2):499-526.

[5] Yue S, Xiao C. Can VAT credit refunds alleviate corporate financing constraints? Empirical evidence based on cash–cash flow sensitivity. Finance & Trade Economics. 2023; 44(1):51-67. [In Chinese].

[6] Ministry of Finance, State Taxation Administration. Notice on tax policies concerning the refund of VAT credits in selected industries in 2018 (Cai Shui [2018] No. 70). 2018. Available from: https://www.chinatax.gov.cn/chinatax/n810341/n810765/n3359382/201807/c3730844/content.html [Accessed 11 September 2026].

[7] State Taxation Administration. Trial implementation of the VAT credit refund system from April 1: Eligibility requirements. 2019. Available from: https://www.chinatax.gov.cn/n810356/n3255681/c4177366/content.html [Accessed 11 September 2026].

[8] State Taxation Administration. Explanation of the 2022 VAT credit refund policy. 2022. Available from: https://www.chinatax.gov.cn/chinatax/c102191/c5177225/content.html [Accessed 11 September 2026].

[9] Whited T M, Wu G. Financial constraints risk. The Review of Financial Studies. 2006; 19(2):531-559.

[10] Levinsohn J, Petrin A. Estimating production functions using inputs to control for unobservables. The Review of Economic Studies. 2003; 70(2):317-341.

[11] Bertrand M, Duflo E, Mullainathan S. How much should we trust differences-in-differences estimates? The Quarterly Journal of Economics. 2004; 119(1):249-275.

[12] Imai K, Keele L, Yamamoto T. Identification, inference and sensitivity analysis for causal mediation effects. Statistical Science. 2010; 25(1):51-71.

[13] Rosenbaum P R, Rubin D B. The central role of the propensity score in observational studies for causal effects. Biometrika. 1983; 70(1):41-55.

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Conflicts of Interest

The authors declare no conflict of interest.

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