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Research on the Impact of Fixed Asset Technology Depreciation Policy on Digital Transformation

Yuxuan Xia, Hongli Zhang *

Anhui University of Finance and Economics, Bengbu, China

*2827025930@qq.com

Abstract

This paper investigates the impact of the accelerated depreciation policy for fixed assets on the digital transformation of enterprises. By constructing a multi-period difference – in -differences model and using data from Shanghai and Shenzhen A-share listed companies from 2011 to 2020, it is found that the accelerated depreciation policy for fixed assets significantly promotes the digital transformation of enterprises. The study also verifies the reliability of the results through robustness tests and heterogeneity analysis, and explores the differentiated impacts of the policy on enterprises in different regions, ownership attributes, and scales. Additionally, the mechanism effect analysis reveals that the policy indirectly promotes the digital transformation of enterprises by alleviating financing constraints and enhancing enterprise performance levels.

Keywords

Policy of accelerated depreciation for fixed assets, Digital transformation of enterprises, Multi-period difference-in-differences model, Mechanism effects.

1. Introduction

1.1. Research background

With the continuous expansion of the global digital economy, the scale of China's digital economy will reach 50.2 trillion yuan in 2022, accounting for 41.5% of GDP and becoming the core engine of economic growth. In this context, enterprises have become an inevitable choice to enhance their competitiveness by introducing digital technologies such as artificial intelligence, big data, and cloud computing to reconstruct business processes and models. Digital transformation not only involves the application of technological tools, but also requires the construction of a fully aware and connected digital ecosystem to achieve production automation, management intelligence, and business model innovation.

China's fixed asset depreciation policy has undergone multiple adjustments and gradually formed a policy system with accelerated depreciation as its core. Since the 1980s, when Sino foreign joint ventures were allowed to implement accelerated depreciation, the policy coverage has gradually expanded to key industries such as manufacturing and information technology, and a dual incentive model of "shortening depreciation period+accelerating depreciation method" has been formed. For example, since 2014, the depreciation period of newly purchased fixed assets by enterprises in six major industries has been shortened or accelerated. After 2018, equipment and appliances below 5 million yuan will be further included in the scope of one-time pre tax deduction. Such policies directly enhance the liquidity of funds for enterprise technological transformation and equipment updates by increasing pre tax deductions and reducing current tax burdens.

The overall layout plan for China's construction in 2023 stated in the "Digital China Construction Overall Layout Plan" that China needs to further achieve modernization. Accelerating digital construction and providing new momentum for enterprises and social

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development is an urgent task and an important direction for future development. Therefore, digital development should be taken as a strategy to enhance international competitiveness. The important measures of the national economic development blueprint are to develop the digital economy, promote digital transformation, and contribute new momentum to the enhancement of national competitiveness.

China has actively introduced a series of policies such as tax incentives to further promote the digital transformation of enterprises. Tax preferential policies often incentivize enterprises to innovate and achieve digital transformation through tax preferential policies, which is in contrast to the pre incentive characteristics and wider coverage of fiscal subsidy policies. An important part of tax incentives is the policy of accelerated depreciation of fixed assets. Helps accelerate the process of digital transformation, make rational use of fixed assets to accelerate depreciation tax incentives, and reduce the tax burden on enterprises.

Based on the above background, this article conducts multidimensional analysis and research on the heterogeneity of the impact of fixed asset accelerated depreciation policy on enterprise digital transformation by studying the relationship between fixed asset accelerated depreciation policy and enterprise digital transformation. This provides logical evidence for the optimization of tax preferential policies and the development of digital transformation in China. In the process of accelerating the transformation of tax incentive policies in China, it is necessary to fully explain the heterogeneity of fixed asset accelerated depreciation policies driving the digital transformation of enterprises.

1.2. Research question

However, although tax preferential policies have experienced rapid development and changes in digital transformation, the related issues of digital transformation have gradually become prominent due to the influence of social, economic, and technological factors. While it has attracted widespread attention in the academic community, it has also deeply affected practical applications. Researchers have been investing in this field to better understand and address these issues.

1.3. Research objective

(1) Research on the relationship between accelerated depreciation policy of fixed assets and digital transformation. Through the study of domestic and foreign literature, this paper considers the help and resistance of accelerated depreciation policy of fixed assets to digital transformation, and proposes a theoretical analysis framework for the relationship between accelerated depreciation policy of fixed assets and digital transformation of enterprises. The impact mechanism between the two is studied.

(2) Firstly, a benchmark regression model is constructed to study the relationship between the accelerated depreciation policy of fixed assets and digital transformation. Then, through benchmark regression analysis and robustness testing, heterogeneity analysis is further conducted to investigate the degree of impact and related influencing factors of the accelerated depreciation policy of fixed assets on digital transformation.

(3) Empirical analysis was conducted on the current policy of accelerating depreciation of fixed assets, and corresponding policy recommendations were proposed based on theoretical foundations. Using the theory of tax incentives, this paper analyzes several issues related to the current accelerated depreciation policy of fixed assets on digital transformation from the perspective of tax incentives, and provides a certain policy research basis for promoting the digital transformation of enterprises.

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1.4. Research significance

1.4.1. Theoretical significance

This project starts with the channel of promoting enterprise digital transformation through the policy of accelerated depreciation of fixed assets, attempts to construct a theoretical analysis framework between the policy of accelerated depreciation of fixed assets and enterprise digital transformation, studies the impact mechanism of the two, explores tax preferential policies for accelerated depreciation of fixed assets, in order to promote the process of enterprise digital transformation and provide certain theoretical reference for solving the problem of hindered enterprise digital transformation process. At the same time, it also serves as a reference for China

This topic takes the accelerated depreciation policy of fixed assets as an example and enriches the literature on the impact of tax incentives on digital transformation of enterprises. It further enriches the literature on the mechanism of the impact of tax incentives on digital transformation and reveals the degree of influence of tax incentives on digital transformation.

1.4.2. Practical significance

This topic explores the relationship between the policy of accelerated depreciation of fixed assets and the digital transformation of enterprises, which is beneficial for local governments to understand the policy of accelerated depreciation of fixed assets and further strengthen the regulatory role of tax incentives in the process of digital transformation of enterprises. Therefore, in-depth research can be conducted on the impact and direction of the policy of accelerated depreciation of fixed assets.

This project uses heterogeneity testing to reveal the degree to which different types of enterprises are affected by accelerated depreciation policies for fixed assets during the process of digital transformation, providing new theoretical ideas for designing tax incentives for enterprise digital transformation and conducting impact analysis on enterprises of different classifications.

2. Literature Review

2.1. Relevant research on accelerated depreciation policy for fixed assets

The policy of accelerated depreciation of fixed assets transfers the time value of money to enterprises through advance provision of fixed asset depreciation, which not only reduces the cost of capital expenditure, but also accelerates the process of capital expenditure being transferred to production costs, effectively promoting enterprises to increase investment. It is a tax preferential policy with capital bias characteristics (Zhao Can and Liu Qiren, 2022).

In the United States (Zwick and Mahon, 2017; Ohrn, 2019), UK (Maffini et al., 2019), and China (Liu Xing et al., 2019; Fan and Liu, 2020); Under the policy background of Zhao Dezhao et al. (2023), scholars have generally found that the accelerated depreciation policy of fixed assets has a positive incentive effect on corporate investment.

The policy of accelerated depreciation of fixed assets is considered an important policy tool in relevant theoretical research that can stimulate corporate investment and innovation, and promote economic growth. By delving into the theoretical basis of the policy of accelerated depreciation of fixed assets, we can better understand the mechanism and impact path of the policy, and thus guide the formulation and implementation of the policy.

2.2. Related research on digital transformation

Enterprise digitization refers to the process in which enterprises utilize emerging technologies (Zhang Yongjun et al., 2021) for industrial upgrading and transformation. In fact, for enterprises themselves and for the development of the Chinese economy, the significance and

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necessity of digital transformation for enterprises are very significant. For enterprises themselves, digital transformation is also a necessary measure to combat risks, stabilize the market, and maintain competitiveness (Wu et al., 2021). It is an effective path for enterprises to fully utilize production and market resources and improve their own operational efficiency.

For macroeconomics, enterprises are a highly dynamic and important micro component, and their digital transformation is the only way for China's economic development. It is also an inherent requirement of the 14th Five Year Plan for the development of China's digital economy.

2.3. Research on Accelerated Depreciation Policies for Fixed Assets

In recent years, China has introduced many tax incentive policies and government subsidy policies to overcome market failures and drive enterprise transformation and development. Among numerous tax incentives, the accelerated depreciation policy for fixed assets is an indirect tax incentive policy. Although it does not affect the overall tax burden, it reduces the tax burden pressure on enterprises in the early stage, helps them break through resource boundaries and solve the problem of insufficient investment, and creates positive conditions for the digital transformation of enterprises. Therefore, the policy of accelerating depreciation of fixed assets can effectively assist enterprises in their digital transformation.

On the one hand, the policy of accelerated depreciation of fixed assets uses the method of "providing more depreciation in the early stage and less depreciation in the later stage" to deduct the taxable amount of the enterprise from the accelerated depreciation in the early stage of asset purchase, which increases the after tax profit in the early stage, accelerates the return of funds, optimizes the financial situation of the enterprise, motivates the enterprise to increase research and development investment, and consolidates the hardware matching foundation for digital transformation.

On the other hand, enterprises supported by the policy of accelerated depreciation of fixed assets can send a positive signal that the government is willing to support small and medium-sized enterprises (Cao Yue and Chen Wenrui, 2017; Fan Wenlin and Hu Mingsheng, 2020; Deng Feng and Yang Guoanthem, 2021), making them highly favored in the capital market, thereby reducing their financing costs, easing their financing pressure, and providing relevant financial support for their digital transformation. However, it is worth noting that the policy of accelerated depreciation of fixed assets may not significantly increase the willingness of enterprises to engage in breakthrough innovation, and may even induce "catering" behavior of enterprises, prompting them to violate market rules.

In the research of innovation theory, the policy of accelerated depreciation of fixed assets is regarded as a policy tool that can promote technological innovation and digital transformation of enterprises. According to innovation theory, accelerated depreciation policies can reduce the cost of digital transformation for enterprises, increase their acceptance of new technologies, and promote industrial upgrading and economic transformation.

3. Empirical Analysis

3.1. Data source

The research topic of this article is the impact of accelerated depreciation policies for fixed assets on the digital transformation of enterprises. The research object of this article is A-share listed companies in Shanghai and Shenzhen. Based on considerations of data availability and timeliness, this article selects annual data from 2011 to 2020 as sample data. The data in this article mainly comes from the CSMAR database and WIND database. This article has processed the data in the following ways: excluding samples of listed companies in the financial industry;Exclude samples of financially abnormal enterprises such as ST and * ST; Exclude enterprise samples with missing values; Shrink the tail of continuous variables.

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3.2. Variable description

(1) Enterprise digital transformation (Digit). This article selects the frequency of keywords related to digital transformation (artificial intelligence technology, big data technology, cloud computing technology, blockchain technology, and digital technology application) in the annual reports of listed companies as proxy variables. Considering the large scale of this data, this article takes it from natural logarithm processing.

(2)Target of accelerated depreciation policy for fixed assets. Firstly, based on the content of the 2014 document Caishui [2014] No. 75 "Notice of the Ministry of Finance and the State Administration of Taxation on Improving the Enterprise Income Tax Policy for Accelerated Depreciation of Fixed Assets", this article selects six industries as pilot objects, including biopharmaceutical manufacturing, specialized equipment manufacturing, railway, shipbuilding, aerospace and other transportation equipment manufacturing, computer, communication and other electronic equipment manufacturing, instrument and meter manufacturing, and information transmission, software and information technology services. Secondly, based on the 2015 document Caishui [2015] No. 106, the scope of application of this policy has been expanded to four key industries including light industry, textiles, machinery, and automobiles as pilot objects. Finally, based on the 2019 Caishui [2019] No. 66 document, this article expands the scope of application of this policy to all manufacturing sectors.

(3) Accelerated depreciation policy for fixed assets (post). This article is based on three financial and tax documents from 2014, 2015, and 2019, and selects the timing of the accelerated depreciation policy for fixed assets as 2014, 2015, and 2019, respectively.

The specific selection of dependent variables, explanatory variables, mechanism variables, and control variables in this article is shown in Figure 1.

Table 1. Selection of Variables

Variable type	Variable Symbol	Variable	Explanation of Variable Meaning
Explained Variable	Digit	Enterprise digital transformation	The natural logarithm of the frequency of keywords related to digital transformation in the annual reports of listed companies
explanatory variable	post_treat	Accelerated Depreciation Policy for Fixed Assets	The interaction term between the target and policy time of accelerated depreciation policy for fixed assets
Intermediary variable	SA	Corporate financing constraints	Corporate Financing Constraints SA Index
	ROE	Enterprise performance level	Net profit/owner's equity
control variable	Size	Enterprise size	Natural logarithm of total assets of the enterprise
	Lev	Enterprise asset liability ratio	Total liabilities/total assets of the enterprise
	Cashflow	Enterprise cash flow ratio	Net cash flows from operating activities/total assets
	Growth	Enterprise revenue growth rate	Current year's operating income/previous year's operating income -1

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	Board	Number of corporate directors	The natural logarithm of the number of board members
	Indep	Proportion of independent directors in enterprises	Independent directors/number of directors
	Dual	Enterprise dual employment integration	If the chairman and general manager are the same person, it is 1; otherwise, it is 0
	TOP1	Enterprise equity structure	Number of shares held by the largest shareholder/total number of shares
	Big4	Is the enterprise subject to the Big Four audits	Enterprises audited by the Big Four (PwC, Deloitte, KPMG, Ernst&Young) are rated as 1, otherwise they are rated as 0
	ListAge	Number of years the company has been listed	The natural logarithm of (current year - listing year+1)

3.3. Model setting

On the one hand, in order to effectively identify the impact of accelerated depreciation policies on the digital transformation of enterprises, this article draws on the approach of previous literature and chooses to construct a multi time point double difference model for empirical analysis. The general expression of the model is as follows.

$$Digit_{it} = \beta_0 + \beta_1 post_i * treat_t + \sum_j \alpha_j \, control_{it}^j + \delta_c + \gamma_t + \varepsilon_{it} \quad (1)$$

On the other hand, in order to further verify the intrinsic mechanism of the accelerated depreciation policy of fixed assets on the digital transformation of enterprises, this paper constructs a mediation effect model, and the general expression of the model is as follows.

$$M_{it} = \beta_0 + \beta_1 post_i * treat_t + \sum_j \alpha_j \, control_{it}^j + \delta_c + \gamma_t + \varepsilon_{it} \quad (2)$$

$$Digit_{it} = \beta_0 + \beta_1 post_i * treat_t + \beta_2 M_{it} + \sum_j \alpha_j \, control_{it}^j + \delta_c + \gamma_t + \varepsilon_{it} \quad (3)$$

In the above expression, i represents the individual enterprise and t represents the year; δ_c represents industry fixed effects; γ_t represents fixed time effects; A set of $control_{it}^j$ are control variables, ε_{it} represents a random interference term.

3.4. Descriptive statistics

The following table shows the full sample descriptive statistics of the variables. The table provides specific information on the mean, standard deviation, minimum value, maximum value, and sample size of each variable. It can be seen from the table that the sample size of this article is 25885.

Table 2. Descriptive Statistics

Variable	Variable Symbol	mean value	standard deviation	minimum value	Maximum value	Sample size
Enterprise digital transformation	Digit	1.246	1.198	0	3.466	25885
Accelerated Depreciation Policy for Fixed Assets	post_treat	0.392	0.488	0	1	25885
Enterprise size	Size	22.205	1.285	19.866	26.155	25885
Enterprise asset liability ratio	Lev	0.428	0.207	0.051	0.894	25885

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Enterprise cash flow ratio	Cashflow	0.046	0.069	-0.16	0.238	25885
Enterprise revenue growth rate	Growth	0.164	0.411	-0.569	2.612	25885
Number of corporate directors	Board	2.128	0.198	1.609	2.708	25885
Proportion of independent directors in enterprises	Indep	37.583	5.366	33.33	57.14	25885
Enterprise dual employment integration	Dual	0.271	0.445	0	1	25885
Enterprise equity structure	TOP1	34.705	14.754	8.787	74.658	25885
Is the enterprise subject to the Big Four audits	Big4	0.058	0.234	0	1	25885
Number of years the company has been listed	ListAge	2.153	0.801	0	3.296	25885

3.5. Benchmark regression analysis

Table 3 shows the regression results of the benchmark model, where N represents the sample size, represents the goodness of fit, t statistic is in parentheses, Industry represents industry fixed effects, and Year represents year fixed effects. Columns 1 to 6 are regression results with gradually added control variables. From the regression results in column 6, it can be found that the coefficient of the fixed asset accelerated depreciation policy (post_treat) is 0.060, and this coefficient is significant at the 1% significance level, indicating that the fixed asset accelerated depreciation policy has a significant positive promoting effect on the digital transformation of enterprises.

Table 3. Regression Results of Benchmark Model

	(1)	(2)	(3)	(4)	(5)	(6)
	Digit	Digit	Digit	Digit	Digit	Digit
post_treat	0.056***	0.064***	0.061***	0.061***	0.060***	0.060***
	(2.640)	(3.071)	(2.939)	(2.917)	(2.864)	(2.880)
Size		0.148***	0.149***	0.149***	0.156***	0.164***
		(26.909)	(26.916)	(26.154)	(26.902)	(26.418)
Lev		-0.160***	-0.186***	-0.185***	-0.183***	-0.172***
		(-4.819)	(-5.502)	(-5.484)	(-5.417)	(-4.979)
Cashflow			-0.328***	-0.328***	-0.303***	-0.296***
			(-3.839)	(-3.829)	(-3.531)	(-3.453)
Growth			0.086***	0.086***	0.082***	0.078***
			(6.293)	(6.286)	(6.030)	(5.726)
Board				-0.012	0.002	0.003
				(-0.327)	(0.065)	(0.073)
Indep				0.003**	0.002*	0.002*
				(2.043)	(1.727)	(1.827)
Dual					0.102***	0.095***
					(7.874)	(7.281)
TOP1					-0.001***	-0.001***
					(-2.953)	(-3.210)
Big4						-0.067***
						(-2.619)

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ListAge						-0.022***
						(-2.634)
_cons	1.224***	-1.987***	-2.004***	-2.085***	-2.234***	-2.361***
	(122.486)	(-17.017)	(-17.110)	(-14.615)	(-15.559)	(-15.801)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	25885	25885	25885	25885	25885	25885
R2	0.439	0.456	0.457	0.457	0.459	0.459

Note: *, * *, * * * represent significance levels of 10%, 5%, and 1%, respectively. The t-test is indicated in parentheses.

3.6. Robust testing

3.6.1. Parallel trend test

Figure 1 shows the graph of the parallel trend test. The figures before 3, before 2, and before 1 represent the dummy variables of the experimental group for the first 3, first 2, and first 1 periods of the policy, respectively; Current represents the virtual variable of the current policy period; After1, after2, after3, and after4 respectively represent the dummy variables of the experimental group in the first, second, third, and fourth periods after the policy. From the results shown in the figure below, it can be observed that the confidence intervals of the three coefficients before 3, before 2, and before 1 intersect with a value of 0, indicating that none of these coefficients are significant. This suggests that there is no significant difference in the digital transformation of enterprises between the experimental group and the control group before the policy, meeting the requirements of parallel trends.

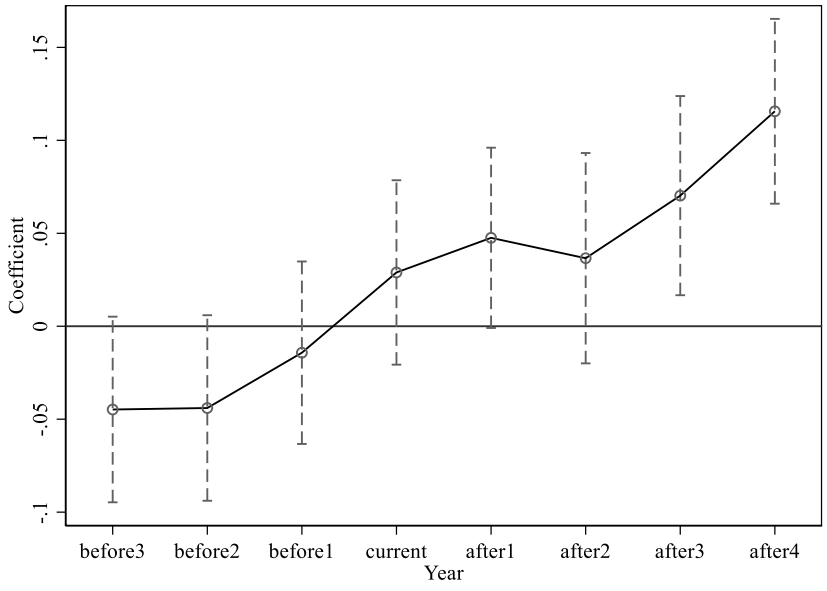

Figure 1. Parallel Trend Test Chart

3.6.2. Tendency score matching

This section chooses propensity score matching (PSM) to address the issue of sample selection bias. This section selects the nearest neighbor matching method to match the experimental group and the control group. From the balance test results before and after covariate matching in Table 4, it can be found that the absolute value of the covariate T-statistic significantly decreases after matching, reflecting that the difference in covariates between the experimental group and the control group after matching is very small. In addition, the deviation rate after

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matching also reflects the small difference between the experimental group and the control group.

Table 4. Balance Test

Variable	Matching situation	Experimental group mean	Mean value of control group	Deviation	Deviation reduction rate	t-values	P value
Size	Before matching	22.005	22.566	-43.3	96.3	-34.39	0
	After matching	22.005	21.984	1.6		1.6	0.109
Lev	Before matching	0.39608	0.48462	-43.1	97.8	-33.69	0
	After matching	0.3961	0.39411	1		0.91	0.364
Cashflow	Before matching	0.04868	0.04108	10.9	80.8	8.53	0
	After matching	0.04868	0.04722	2.1		1.92	0.055
Growth	Before matching	0.15912	0.17152	-2.9	60.4	-2.32	0.02
	After matching	0.15913	0.16403	-1.2		-1.09	0.276
Board	Before matching	2.1171	2.1474	-15.1	89.2	-11.76	0
	After matching	2.1172	2.1139	1.6		1.5	0.134
Indep	Before matching	37.531	37.678	-2.7	28.8	-2.12	0.034
	After matching	37.531	37.636	-2		-1.83	0.068
Dual	Before matching	0.30381	0.21288	20.9	91.7	15.82	0
	After matching	0.30377	0.29622	1.7		1.51	0.132
TOP1	Before matching	33.972	36.032	-13.7	55.9	-10.78	0
	After matching	33.973	33.064	6.1		5.7	0
Big4	Before matching	0.04485	0.08255	-15.5	97.9	-12.43	0
	After matching	0.04485	0.04563	-0.3		-0.34	0.732
ListAge	Before matching	2.047	2.3437	-37.7	92.3	-28.99	0
	After matching	2.0471	2.0701	-2.9		-2.56	0.01

Table 5 shows the regression results of the model after propensity score matching. From the regression results, it can be found that the coefficient of the fixed asset accelerated depreciation policy (post_treat) is significantly positive, indicating that the fixed asset accelerated depreciation policy has a significant positive promoting effect on the digital transformation of enterprises. This conclusion is consistent with the benchmark regression results mentioned earlier.

Table 5. Regression results after propensity score matching

	(1)	(2)	(3)	(4)	(5)	(6)
	Digit	Digit	Digit	Digit	Digit	Digit
post_treat	0.092***	0.102***	0.100***	0.100***	0.098***	0.098***

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	(2.947)	(3.321)	(3.266)	(3.251)	(3.207)	(3.203)
Size		0.143***	0.144***	0.141***	0.148***	0.156***
		(19.152)	(19.022)	(18.028)	(18.697)	(18.391)
Lev		-0.079*	-0.087*	-0.088*	-0.089*	-0.066
		(-1.707)	(-1.861)	(-1.869)	(-1.902)	(-1.395)
Cashflow			-0.142	-0.143	-0.107	-0.110
			(-1.191)	(-1.198)	(-0.894)	(-0.921)
Growth			0.040**	0.041**	0.038**	0.033*
			(2.140)	(2.227)	(2.037)	(1.773)
Board				0.067	0.078	0.077
				(1.351)	(1.576)	(1.558)
Indep				0.005***	0.005***	0.005***
				(2.933)	(2.756)	(2.825)
Dual					0.093***	0.081***
					(4.898)	(4.214)
TOP1					-0.002***	-0.002***
					(-3.224)	(-3.726)
Big4						-0.032
						(-0.927)
ListAge						-0.041***
						(-3.389)
_cons	1.292***	-1.875***	-1.882***	-2.153***	-2.289***	-2.364***
	(98.885)	(-11.691)	(-11.688)	(-11.013)	(-11.629)	(-11.554)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	11972	11972	11972	11972	11972	11972
R2	0.505	0.521	0.522	0.522	0.523	0.524

Note: *, * *, * * * represent significance levels of 10%, 5%, and 1%, respectively. The t-test is indicated in parentheses.

3.6.3. Sample screening

Considering that the COVID-19 epidemic may have a certain impact on the research of this paper, this paper will eliminate the sample data of the epidemic year (2020) and conduct model regression. The following table reports the regression results of sample screening. From the regression results, it can be found that the coefficient of the fixed asset accelerated depreciation policy (post_treat) is significantly positive, indicating that the fixed asset accelerated depreciation policy has a significant positive promoting effect on the digital transformation of enterprises. This conclusion is consistent with the benchmark regression results mentioned earlier.

Table 6. Regression Results of Sample Screening

	(1)	(2)	(3)	(4)	(5)	(6)
	Digit	Digit	Digit	Digit	Digit	Digit
post_treat	0.068***	0.076***	0.074***	0.074***	0.073***	0.073***
	(2.991)	(3.373)	(3.317)	(3.299)	(3.256)	(3.265)
Size		0.146***	0.148***	0.148***	0.154***	0.163***

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		(24.953)	(25.073)	(24.288)	(24.925)	(24.718)
Lev		-0.184***	-0.215***	-0.215***	-0.211***	-0.202***
		(-5.246)	(-6.030)	(-6.014)	(-5.892)	(-5.537)
Cashflow			-0.388***	-0.387***	-0.363***	-0.350***
			(-4.304)	(-4.296)	(-4.022)	(-3.882)
Growth			0.089***	0.089***	0.085***	0.081***
			(6.178)	(6.181)	(5.938)	(5.650)
Board				0.000	0.015	0.015
				(0.008)	(0.381)	(0.387)
Indep				0.003**	0.002*	0.003*
				(2.127)	(1.821)	(1.941)
Dual					0.103***	0.098***
					(7.501)	(7.015)
TOP1					-0.001**	-0.001**
					(-2.384)	(-2.541)
Big4						-0.093***
						(-3.367)
ListAge						-0.019**
						(-2.161)
_cons	1.155***	-2.003***	-2.030***	-2.136***	-2.282***	-2.442***
	(117.548)	(-16.134)	(-16.309)	(-14.132)	(-15.008)	(-15.434)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
N	22564	22564	22564	22564	22564	22564
R2	0.440	0.457	0.458	0.458	0.460	0.460

Note: *, * *, * * * represent significance levels of 10%, 5%, and 1%, respectively. The t-test is indicated in parentheses.

3.6.4. Placebo test

This article uses Bootstrap technology to randomly allocate samples into experimental or control groups and regress according to the model, repeating the process 500 times. According to Figure 2, it can be observed that the impact ±coefficient of the accelerated depreciation policy for fixed assets follows an approximately normal distribution, mostly concentrated around 0 and rarely distributed around 3. This indicates that in the random 500 experiments, the proportion of regression coefficients for the constructed accelerated depreciation policy for fixed assets that are significantly positive and significantly negative is relatively small, indicating a low probability event. The false treatment effect of the accelerated depreciation policy for fixed assets does not exist.

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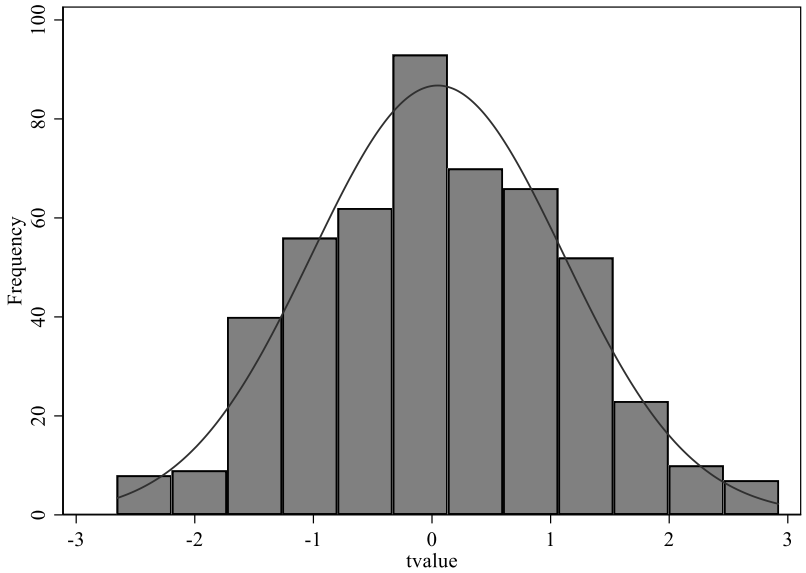

Figure 2. Placebo test chart

3.7. Heterogeneity analysis

To explore the differences in the effects of accelerated depreciation policies on fixed assets among enterprise samples in different regions, this study divided the samples into eastern, central, and western regions according to the provinces where the enterprises are located, and conducted regression analysis on each region. Columns 1 to 3 in Table 7 report the results of the regional heterogeneity regression of the enterprises. From the regression results, it can be found that the accelerated depreciation policy of fixed assets has a more significant promoting effect on the digital transformation of enterprises in the central region.

To explore the differences in the effects of accelerated depreciation policies on fixed assets among a sample of enterprises with different ownership attributes, this study divided the sample into state-owned enterprises and non-state-owned enterprises according to their ownership attributes, and conducted separate regressions. Columns 4 to 5 in Table 7 report the results of the heterogeneity regression of enterprise ownership attributes. From the regression results, it can be found that the accelerated depreciation policy of fixed assets has a more significant promoting effect on the digital transformation of state-owned enterprises.

To explore the differences in the effects of the accelerated depreciation policy on fixed assets among samples of different enterprise sizes, this paper divides samples below the median of total assets into small-scale enterprises and samples above the median into large-scale enterprise samples, and conducts regression separately. Columns 6 to 7 in Table 7 report the regression results of enterprise size heterogeneity. From the regression results, it can be found that the accelerated depreciation policy of fixed assets has a more significant promoting effect on the digital transformation of large-scale enterprises.

Table 7. Heterogeneity Analysis Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Eastern region enterprise	Central region enterprise	Western Region enterprise	state-owned enterprise	Non-state enterprise	small-scale enterprise	large-scale enterprise
post_treat	0.048*	0.105**	0.068	0.077**	0.028	0.057*	0.066**
	(1.883)	(2.294)	(1.133)	(2.392)	(1.020)	(1.935)	(2.169)
Size	0.164***	0.152***	0.179***	0.149***	0.192***	-	-

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	(21.584)	(10.215)	(10.398)	(17.157)	(21.687)	-	-
Lev	-0.173***	-0.328***	-0.098	-0.145***	-0.145***	-0.013	-0.003
	(-4.063)	(-4.126)	(-0.985)	(-2.769)	(-3.145)	(-0.284)	(-0.054)
Cashflow	-0.313***	-0.455**	-0.299	-0.097	-0.411***	-0.225*	-0.189
	(-3.020)	(-2.327)	(-1.173)	(-0.727)	(-3.704)	(-1.886)	(-1.502)
Growth	0.077***	0.083***	0.060*	0.076***	0.051***	0.087***	0.088***
	(4.474)	(2.849)	(1.700)	(3.459)	(2.929)	(4.237)	(4.793)
Board	-0.065	-0.015	-0.013	0.064	0.048	0.103*	0.156***
	(-1.411)	(-0.192)	(-0.116)	(1.262)	(0.930)	(1.839)	(3.324)
Indep	0.002	-0.005*	0.003	0.003*	0.004**	0.005***	0.005***
	(1.355)	(-1.864)	(0.879)	(1.828)	(2.013)	(2.663)	(3.118)
Dual	0.100***	0.107***	0.012	0.040	0.082***	0.072***	0.106***
	(6.488)	(3.435)	(0.271)	(1.427)	(5.355)	(4.148)	(5.211)
TOP1	-0.001***	-0.004***	0.003**	-0.001*	0.000	-0.001	0.000
	(-2.658)	(-4.297)	(2.464)	(-1.665)	(0.543)	(-1.477)	(0.391)
Big4	-0.027	-0.125*	-0.097	-0.062**	-0.005	0.131	0.078***
	(-0.893)	(-1.834)	(-1.079)	(-2.046)	(-0.124)	(1.636)	(2.998)
ListAge	0.004	-0.026	-0.031	-0.013	0.008	-0.018	0.000
	(0.423)	(-1.260)	(-1.197)	(-0.818)	(0.663)	(-1.575)	(0.014)
_cons	-2.163***	-1.848***	-3.100***	-2.506***	-3.050***	0.780***	0.717***
	(-11.632)	(-5.344)	(-7.533)	(-11.903)	(-13.616)	(4.409)	(4.896)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	18175	4653	2670	9473	16412	12943	12942
R2	0.460	0.463	0.484	0.479	0.449	0.465	0.450

Note: *, * *, * * * represent significance levels of 10%, 5%, and 1%, respectively. The t-test is indicated in parentheses.

3.8. Mechanism Effect Analysis (Mediating Effect)

Table 8 reports the regression results of mechanism effect analysis, where columns 1 and 2 report the mediation effect regression results of corporate financing constraints, and columns 3 and 4 report the mediation effect regression results of corporate performance levels.

From the regression results of column 1, it can be found that the accelerated depreciation policy of fixed assets has a significant negative inhibitory effect on corporate financing constraints; From the regression results in column 2, it can be found that financing constraints have a significant negative inhibitory effect on the digital transformation of enterprises. Based on the above analysis, it can be found that there is an intermediary effect of corporate financing constraints, that is, the accelerated depreciation policy of fixed assets can promote digital transformation of enterprises by suppressing corporate financing constraints.

From the regression results in column 3, it can be found that the accelerated depreciation policy of fixed assets has a significant positive promoting effect on the performance level of enterprises; From the regression results in column 4, it can be found that the level of corporate performance has a significant positive promoting effect on the digital transformation of enterprises. Based on the above analysis, it can be found that there is a mediating effect on the performance level of enterprises, that is, the accelerated depreciation policy of fixed assets can promote the digital transformation of enterprises by improving their performance level.

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Table 8. Regression Results of Mechanism Effect Analysis

	(1)	(2)	(3)	(4)
	SA	Digit	ROE	Digit
post_treat	-0.014***	0.059***	0.018***	0.057***
	(-3.292)	(2.836)	(6.708)	(2.759)
SA		-0.066**		
		(-2.112)		
ROE				0.140***
				(2.841)
Size	0.029***	0.166***	0.026***	0.160***
	(23.627)	(26.445)	(32.951)	(25.311)
Lev	-0.009	-0.172***	-0.169***	-0.148***
	(-1.311)	(-4.996)	(-38.969)	(-4.169)
Cashflow	-0.070***	-0.301***	0.476***	-0.363***
	(-4.068)	(-3.506)	(44.063)	(-4.083)
Growth	-0.004	0.078***	0.073***	0.068***
	(-1.538)	(5.705)	(42.321)	(4.813)
Board	-0.024***	0.001	0.005	0.002
	(-3.328)	(0.029)	(1.039)	(0.054)
Indep	0.001***	0.002*	-0.000**	0.002*
	(4.264)	(1.883)	(-2.336)	(1.869)
Dual	0.008***	0.096***	0.001	0.095***
	(3.132)	(7.321)	(0.680)	(7.270)
TOP1	0.000***	-0.001***	0.001***	-0.001***
	(4.525)	(-3.149)	(12.341)	(-3.419)
Big4	0.054***	-0.064**	-0.004	-0.067***
	(10.464)	(-2.476)	(-1.172)	(-2.598)
ListAge	-0.135***	-0.031***	-0.015***	-0.020**
	(-79.573)	(-3.299)	(-14.003)	(-2.378)
_cons	-4.156***	-2.634***	-0.463***	-2.296***
	(-138.850)	(-13.335)	(-24.589)	(-15.191)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	25885	25885	25885	25885
R2	0.399	0.459	0.258	0.459

Note: *, * *, * * * represent significance levels of 10%, 5%, and 1%, respectively. The t-test is indicated in parentheses.

4. Conclusion

Under the current policy background, the accelerated depreciation policy of fixed assets has a significant positive promoting effect on the digital transformation of enterprises. This article uses the annual data of A-share listed companies in Shanghai and Shenzhen from 2011 to 2020 as sample data to construct a multi period double difference model,. The benchmark regression

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found that the accelerated depreciation policy of fixed assets has a positive promoting effect on the digital transformation of enterprises, and it still holds true after a series of robustness tests.

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