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Can Mixed Ownership Reform Enhance the "Blood-Making" Ability of Enterprises?

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Abstract

Cash flow control is an important link in the process of enterprise operation and development, just like the "blood" of the enterprise. This paper selects the equity transfer data of state-owned listed companies from 2013 to 2022, and analyzes the impact of mixed-ownership reform on the "blood-making" ability of enterprises from the perspectives of enterprise vitality and efficiency. It is found that state-owned enterprises can improve the efficiency of their employees and enhance their innovation ability through mixed reform, which in turn improves their cash flow growth ability. Further analysis reveals that the mixed reform of SOEs in small and medium-sized enterprises, high-tech enterprises and enterprises in the central region has a stronger effect on the growth of corporate cash flow. The results of this paper provide empirical evidence and policy recommendations for expanding the theoretical literature related to SOE reform, and accordingly deepening the promotion of SOE mixed reform and improving corporate governance practices.

1. Introduction

After 2022, China's mixed ownership reform has entered a period of deepening, in the process of mixed ownership reform of state-owned enterprises (SOEs), the "mixing" of equity is only a means and a starting point, while the "improvement of governance" is the basis for the breakthrough of mechanism innovation, and the "strengthening of incentives" is the basis for the promotion of SOEs' mixed ownership reform, as well as the "improvement of corporate governance". Strengthening incentives" is the key mechanism to promote the vitality of SOEs, "highlighting the main business" is the basic requirement for resource allocation, and "improving efficiency" is one of the key objectives of the mixed reform. At this stage, SOEs need to closely focus on the overall

requirements of the "sixteen words" of the mixed reform, choose the right time to promote the mixed reform project, deepen and improve the mechanism of the mixed reform enterprise, and ultimately implement the reform goal of improving the vitality and efficiency of SOEs. On the other hand, in recent years, China's state-owned enterprise system reform has made certain achievements, and many scholars have shown that mixed ownership reform can enhance enterprise value. The embodiment of enterprise value is not only based on the profit data in the enterprise statement, investors are more concerned about the ability of enterprises to obtain operating cash flow. Specifically, cash flow from operating activities is an important source of enterprise value accumulation（Chang et al.,2018）[], cash flow control of operating activities is the core of enterprise fund management, but also the main focus of enterprise vitality and efficiency, and few studies have combined the mixed ownership reform with the creation of cash flow from operating activities of enterprises, which has a certain degree of influence on the deepening of the mixed ownership reform, and the further enhancement of the vitality and efficiency of state-owned enterprises. degree of influence.

In order to verify the positive effect of mixed ownership reform from the perspective of optimizing cash flow generation from operating activities of state-owned enterprises, and to better achieve the purpose of improving the efficiency and vitality of state-owned enterprises. Based on the indirect method of cash flow from operating activities, cash flow from operating activities can be divided into two major parts according to the source of funds and management requirements: the first part is the net profit plus the reversal of all kinds of impairment provisions, financial expenses, depreciation and amortization, and non-cash forms of losses; the second part is the reduction of inventory, operating receivables, and increase in operating payables, as well as the decrease in deferred tax assets and increase in deferred tax liabilities. The former can be interpreted as profit before interest, depreciation and amortization from operating activities, which reflects the dynamic process of creating cash flow through operating activities, and reflects the level of revenue enhancement, cost reduction and efficiency enhancement of the enterprise, and is therefore defined as the enterprise's "blood-forming" ability. "Ability," the concept of "blood" ability coincidentally makes up for the existing research cannot measure the defects of the ability to create cash flow from operating activities, but also for this paper to further explore the relationship between mixed ownership reform and cash flow from operating activities of enterprises to provide an important theoretical support. Therefore, this paper verifies the positive effect of mixed ownership reform from the perspective of whether state-owned enterprises can improve their "blood-forming" ability, i.e., optimize the creation of cash flow from operating activities after mixed ownership reform. We hope to provide certain reference ideas for China's state-owned enterprises to turn from emptiness to reality, enhance investor confidence and cultivate long-term competitiveness.

The possible contributions of this paper include, first, enriching and developing the research literature on mixed ownership reform. Innovatively, it studies the role of mixed ownership reform from the perspective of management of enterprises' access to cash flow from operating activities, better meets investors' concern about enterprises' ability to access cash flow from operating activities, and provides theoretical and empirical experience for enhancing investor confidence and promoting the real economy to move away from emptiness to reality. Secondly, the research is conducted from the perspective of enhancing the "blood-forming" ability of state-owned enterprises. It analyzes the impact of the deepening period of mixed ownership reform on the cash flow from operating activities of enterprises, and supplements and deepens the research related to the

management of cash flow from operating activities of enterprises. Thirdly, we link the mixed ownership reform with the realization of cost reduction and efficiency enhancement of state-owned enterprises, analyze the logical relationship and transmission path, and provide empirical evidence for the better mobilization of state-owned enterprises to improve their efficiency during the period of deepening the mixed ownership reform.

2. Theoretical Analysis and Research Assumptions

By combing and summarizing the relevant studies on mixed ownership and cash flow management, it is found that mixed ownership reform and enterprise development have become an important concern in the academic world. Regarding the main effects of enterprise mixed ownership reform, existing studies have mainly verified and analyzed from the perspectives of enhancing innovation （Wehrheim et al.,2020；Zhang et al.,2024）, enterprise value（Gong and Janssen,2019）, total factor productivity and investment efficiency of state-owned enterprises （ Boggio and Margherita,2016 ）. Regarding the impact of mixed ownership reform on enterprise fund management, existing scholars mainly focus on investment and financing mismatch, profitability level, distribution mechanism and other perspectives. From the current research status of enterprise cash flow management, scholars at home and abroad mainly conduct research from the perspectives of enterprise internal talent management, enterprise R&D investment, cash flow sensitivity, deficit problem and working capital control. Regarding the research question of whether the mixed ownership reform can promote the enhancement of enterprise vitality, existing scholars mainly conduct research from the perspectives of enterprise operating efficiency, control and employee vitality enhancement. From the perspective of mixed-ownership reform and enterprise efficiency, many scholars have conducted research on the topics of mixed-ownership reform to improve enterprise investment efficiency（Wang et al.,2019）, internal control quality（Berg et al.,2021）, and capital operation（Zhu et al.,2024）, etc. In addition, the current research on the relationship between mixed-ownership reform and enterprise efficiency has not yet been finalized. In addition, the current research on mixed ownership reform and enterprise cash flow management mainly focuses on the intensity of dividend distribution（Kumar and Pathak,2024）, dividend payment （Khan and Shamim,2017）, and surplus management（Avis and Dent,2004）.

And a large number of studies have shown that cash flow is the basis for creating vitality of enterprises, and the full utilization and control of cash flow plays an indispensable role in the high-quality development of listed companies（Hu et al.,2019）. However, when analyzing the influencing factors of mixed-ownership reform, scholars focus on the output level of mixed enterprises, such as business performance, total factor productivity, enterprise value, etc. The research conducted mainly focuses on the path of mixed-ownership reform to improve the use of funds of state-owned enterprises through increasing government subsidies, reducing management costs, optimizing cash holding behavior, improving corporate governance structure, and reducing the policy burden. However, there is little literature linking mixed ownership reform and cash flow from operating activities, that is, the perspective of mixed ownership reform and changes in cash flow from operating activities has rarely been the attention of scholars, and no scholars have analyzed the logical relationship and conduction path, while cash flow plays an indispensable role in enterprise development, so this paper turns its attention to the mechanism between mixed ownership reform and cash flow from operating activities of enterprises. Therefore, this paper turns its attention to the analysis of the mechanism between mixed ownership reform and cash flow from

operating activities.

In short, since the research of scholars on this aspect is very rare, it still needs to synthesize the theoretical basis and empirical evidence for argumentation. Therefore, this paper starts from the perspective of cash flow generation from operating activities to explore the impact of mixed-ownership reform on the "blood-forming" ability of enterprises, with a view to enriching the literature on the effectiveness of mixed-ownership reform.

Based on agency theory, the separation of ownership and operation of state-owned enterprises causes high agency costs between the agent and the principal due to information asymmetry, as well as inconsistency of goals. The agent is usually directly assigned by the government, in order to take into account a series of political factors such as social benefits, which easily leads to the existence of over-investment or improper investment decisions and other problems, so that the enterprise's operating activities are not enough to invest in capital, which prevents the enterprise from investing in high-yield and high-return business projects, and then there is the problem of poor cash flow of the return from the operating activities, which ultimately leads to the formation of a vicious circle. After the mixed ownership reform, mutual constraints between the shareholders' equity are generated, which can reduce the problems of opportunistic behavior and high consumption, and keep the enterprise's cash holdings at a relatively sufficient and reasonable level, so that the enterprise is able to apply more sufficient funds to its daily operating activities. In addition to this, corporate agents may implement decisions based on their own interests rather than pursuing the maximization of shareholders' interests, displaying risk-averse behaviors that are prone to the loss of investment opportunities, thus reducing the possibility of value-added cash flows from the enterprise's operating activities. After the introduction of non-state capital, the board of directors appointed by non-state shareholders will play a certain role in the separation of powers and checks and balances, and the "profit-seeking" attribute of non-state capital will prompt the management to optimize their decision-making behaviors and preferences, reduce the amount of investment in the projects with low expected returns, and shift their attention to the projects that can obtain higher benefits, which is conducive to the improvement of the return on investment (Morningstar). It is conducive to the improvement of the enterprise's return on investment (Hutchinson et al., 2020) , thus improving the ability to obtain cash flow from the enterprise's operating activities, i.e., enhancing the enterprise's "blood-forming" ability.

In summary, on the basis of existing theories and empirical evidence, the mixed ownership reform of state-owned enterprises can enhance the ability of enterprises to obtain cash flow from operating activities. As a result, this paper proposes research hypothesis H1:

Hypothesis H1: Mixed ownership reform is conducive to improving the enterprise's "blood-forming" ability.

3. Research Design

3.1 Sample selection and data sources

This paper selects the data of A-share state-owned listed companies from 2013 to 2022 as the research sample, and selects 2013 as the starting point of the sample, mainly because after 2013, the mixed ownership reform of state-owned enterprises has entered into the deepening stage of

reform, which is more in line with the research goal of this paper, which is to explore the mechanism of the deepening of state-owned enterprises' mixed ownership reform on the enhancement of the vitality and efficiency of enterprises. In order to ensure the reliability of the research data, the financial data in this paper mainly come from the database of Cathay Pacific, and the equity data of state-owned enterprises are supplemented and checked with the annual reports of listed companies. In the data processing stage, financial listed companies (such as banks, securities companies, insurance companies) are firstly eliminated, and secondly, samples of enterprises with abnormal operation (including ST and *ST companies), as well as samples with seriously missing data, are eliminated. In addition, in order to eliminate the interference of outliers on the research results, this paper shrinks all continuous variables with 1% upper and lower limits.

3.2 Variable Definition and Measurement

Explanatory variables. Degree of Mixed Ownership (Mix). By collecting and organizing the data of the top ten shareholders disclosed in the annual reports of SOEs and the CSMAR database, the nature and shareholding ratio of the top ten shareholders of each SOE are judged and confirmed (if the shareholders themselves are also listed companies, the judgment is based on the nature of their actual controllers). And refer to existing research, the top ten shareholders of the sample companies are categorized according to the division criteria of state-owned shares, private shares, legal person shares and foreign shares, and the proportion of the shares held by the above four types of shareholders in the top ten shareholders is calculated on this basis. The Herfindahl index is utilized to measure the degree of equity diversity of the sample firms, which is denoted as Mix, and the larger the value, the greater the equity diversity of the sample firms, and the greater the degree of mixed ownership reform.

Explained variables. "Blood-making" ability (CREATEC). Refer to the practices of existing research. "Blood-creation" capacity = net profit + provision for asset impairment + depreciation of fixed assets + amortization of intangible assets + amortization of long-term amortization expenses + loss on disposal of fixed assets, intangible assets and other long-term assets + loss on retirement of fixed assets + loss on change in fair value + financial expenses + investment loss.

Control variables. This paper incorporates a series of variables of corporate characteristics and corporate governance characteristics that may have an impact on the degree of mixing and cash flow from operating activities of SOEs in the model. Specifically, we control for firm size (Size), gearing ratio (Lev), net profit margin on total assets (Roa), growth rate of operating income (Growth), cashflow ratio (Cashflow), fixed asset share (Fixed), growth rate of total assets (Asset Growth), and size of board of directors (Board). In addition, we include industry and year fixed effects in order to control for the effects of industry and time factors. Among them, the industry division standard refers to the industry classification issued by the China Securities Regulatory Commission in 2012, and it is set as 16 industry dummy variables.

Mediating variables. This paper selects monetary pay incentives and equity pay incentives as the proxy variables for the level of executive pay incentives. Among them, monetary compensation incentive (Pay) is measured by the natural logarithm of the total monetary compensation of the top three executives; equity compensation incentive (Stock) is measured by the proportion of executives' shareholding, and the larger the value of the indicator, the higher the level of executive compensation incentive of the enterprise. Innovation ability: innovation efficiency can reflect the

efficiency of enterprises' utilization of R&D investment, mainly focusing on the number of patents granted that unit R&D expenditure is converted into. Referring to the existing related literature, this paper uses the ratio of patent authorization to the logarithm of R&D investment to construct the innovation ability index, and the larger the index value, the stronger the innovation ability of the enterprise.

Table 1 Definition and description of main variables

Variable Type	Variable Name	Variable Symbol	Variable Definition
Explained variable	"Hematopoietic" capacity	*CREATEC*	"Capacity = Net income + Provision for asset impairment + Depreciation of fixed assets + Amortization of intangible assets + Amortization of long-term amortization expenses + Loss on disposal of fixed assets, intangible assets and other long-term assets + Loss on retirement of fixed assets + Loss on change in fair value + Financial expenses + Loss on investment
Explanatory Variables	Degree of Mixed Ownership Reform	*Mix*	The Herfindahl index is selected to measure the degree of equity diversity of the sample firms
Intermediation Variables	Monetary compensation incentives	*Pay*	Natural logarithm of total monetary compensation for top three executives
	Equity compensation incentives	*Stock*	Executive shareholding ratio = number of shares held by executives/total share capital
	Corporate Innovation Capability	*CX*	Ratio of Patent Granted to Log R&D Investment
Control Variables	Firm Size	*Size*	Natural logarithm of total assets
	Gearing ratio	*Lev*	Total liabilities at year-end / Total assets at year-end
	Net Profit Margin on Total Assets	*Roa*	Net Profit / Average Balance of Total Assets
	Operating Income Growth Rate	*Growth*	(Operating income - previous period's operating income) / previous period's operating income
	Cashflow Ratio	*Cashflow*	Net cash flow from operating activities / Total assets
	Fixed Assets	*Fixed*	Net Fixed Assets / Total Assets

Asset Growth	*Asset Growth*	Current year's total assets / Previous year's total assets-1
Board Size	*Board*	Natural logarithm of the number of board members

3.3 Modeling

Benchmark regression model. This paper constructs a fixed-effects model to verify the hypothesis H1, that is, to test the impact of mixed ownership reform on the "blood-forming" ability of state-owned enterprises, the specific model is as follows:

$$CREATEC_{i,t} = \alpha_0 + \beta_0 Mix_{1i,t} + \gamma_0 Controls + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (1)$$

Mechanism testing model. This paper draws on (Wen Zhonglin, 2004) for the mediation effect of the test method, to explore the mixed ownership reform through executive compensation incentives, corporate innovation to enhance the role of the "blood" ability of the mechanism, the construction of the following model, in which $M_{i,t}$ represents the mediating variable:

$$CREATEC_{i,t} = \alpha_1 + \beta_1 Mix_{i,t} + \gamma_1 Controls + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

$$M_{i,t} = \alpha_2 + \beta_2 Mix_{i,t} + \gamma_2 Controls + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (3)$$

$$CREATEC_{i,t} = \alpha_3 + \beta_3 Mix_{i,t} + \delta_3 M_{i,t} + \gamma_3 Controls + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (4)$$

3.4 Descriptive statistics

The descriptive statistics of the main variables in this paper are shown in Table 2. The results show that the average value of the degree of mixed ownership reform (Mix) indicator is about 32.2%, with a standard deviation of 0.186, and a difference of 0.777 between the maximum value and the minimum value. From the viewpoint of blood-creation ability (CREATEC) indicator, the cash flow creation ability of state-owned enterprises, with the maximum value of 23.564 and the minimum value of only 11.076, in combination with the median of this indicator, 19.926, with a The standard deviation is 1.62, which indicates that there is a large difference in the cash flow creation capacity of state-owned listed companies in China. In addition, the rest of the control variables are more consistent with existing studies.

Table 2 Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. dev.*	*Min*	*Max*
CREATEC	12235	19.926	1.620	11.076	23.564
Mix	12235	0.322	0.186	0.000	0.777
Lev	12235	0.487	0.203	0.046	0.908
Size	12235	22.794	1.407	19.585	26.452
ROA	12235	0.031	0.059	-0.373	0.247
Growth	12235	0.138	0.424	-0.658	4.024
Cashflow	12235	0.046	0.067	-0.196	0.267
Fixed	12235	0.231	0.182	0.002	0.719
AssetGrowth	12235	0.135	0.344	-0.383	5.116
Board	12235	2.171	0.190	1.609	2.708

4. Empirical Analysis

4.1 Benchmark regression

The panel fixed-effects regression analysis method is used to carry out empirical research on the changes in equity structure of SOEs' mixed reform and enterprises' "blood-forming" ability, with the diversification of equity ratio to measure the mixed ownership reform as the explanatory variable, and enterprises' "blood-forming" ability as the explanatory variable, fixed year and industry effects, and then regression analysis on the sample data to test hypothesis H1. Fixed year and industry effects, and then regression analysis of the sample data to test the hypothesis H1. Preliminary results are shown in Table 3, column (1) is the result without controlling the industry, year and control variables, column (2) is the result of controlling the industry and year fixed effects but not controlling the control variables, and column (3) is the result of controlling the industry, year and control variables, which shows that the degree of mixed ownership reform of state-owned enterprises and the ability of enterprises to "make blood" are not related to the degree of mixed ownership reform of state-owned enterprises and the ability of enterprises to "make blood". Column (3) shows the results after controlling for industry, year and control variables, and it can be seen that the degree of mixed ownership reform of SOEs has a significant positive correlation with the "blood-forming" ability of the enterprises.

Table 3 Basic regression results

	(1)	(2)	(3)
Variables	*CREATEC*	*CREATEC*	*CREATEC*
Mix	0.305***	0.123**	0.098**
	(4.655)	(1.993)	(2.571)
Controls	No	No	Yes
_cons	19.719***	18.776***	-4.083***
	(453.075)	(57.176)	(-19.891)
Year	No	Yes	Yes
Industry	No	Yes	Yes
N	12235	12235	12235
R^2	0.113	0.161	0.561

Note: ***, **, and * indicate significant at 1%, 5%, and 10% significance levels, respectively, with robust t-values in parentheses (below)

4.2 Robustness test

4.2.1 Endogeneity test

Considering that the level of enterprises' access to cash flow from operating activities will vary with different years, the empirical results of this paper are obtained from regression analysis based on the data from 2013-2022, in order to ensure the robustness of the core causality and to avoid the problem of reciprocal causality between the mixing reform and the enterprise's cash flow from operating activities. This paper lags the explanatory variable by one period as a substitute variable for mixed ownership reform, and re-conducts multiple regression analysis on the sample data, and the results show that for every unit increase in mixed ownership reform, the blood-forming ability

of enterprises will be improved by 0.06 units, and the results are significant at the 5% significance level.

4.2.2 Replacement of the sample interval

Due to fluctuations in the business environment and situation of enterprises in 2020 due to the impact of the epidemic, in order to avoid the interference of changes in the market economic environment on the regression results, the sample data for the period of 2013-2019 are selected to be regressed again. The results are shown in column (2) of Table 4, and the results show that there is still a positive correlation between the mixed ownership reform and the blood-forming ability of enterprises, and the regression coefficient is 0.101, so the reliability of the research conclusions of this paper can be guaranteed.

4.2.3 Variable substitution

Considering that there are many ways to measure the degree of mixed ownership reform of enterprises, in order to verify whether the different ways of measuring variables will have an impact on the regression results and improve the reliability of empirical results. Drawing on the practice of (Yu et al., 2023), this paper measures the degree of mixed ownership reform with the degree of participation of non-state shareholders Mix2, the sum of the proportion of shareholding of non-state shareholders Mix3, and re-regresses. The results are shown in columns (3) and (4) of Table 4, and the results hold at the 1% significance level, which indicates that the findings of this paper are more robust and credible.

Table 4 Robustness test

	(1)	(2)	(3)	(4)
	CREATEC	*CREATEC*	*CREATEC*	*CREATEC*
Mix		0.101*		
		(1.873)		
Mix_lag	0.060**			
	(2.099)			
Mix2			0.092***	
			(3.215)	
Mix3				0.002***
				(5.472)
Lev	0.090*	-0.113	-0.108	-0.091
	(1.867)	(-1.244)	(-1.372)	(-1.172)
Size	1.001***	1.031***	1.023***	1.021***
	(183.300)	(84.832)	(101.508)	(101.836)
ROA	7.844***	6.643***	7.357***	7.335***
	(27.424)	(16.196)	(21.473)	(21.448)

Growth	0.144***	0.170***	0.174***	0.173***
	(6.810)	(7.859)	(8.728)	(8.727)
Cashflow	1.938***	1.279***	1.383***	1.387***
	(15.120)	(9.145)	(10.859)	(10.895)
Fixed	1.117***	0.970***	1.107***	1.113***
	(23.901)	(11.411)	(13.930)	(14.040)
AssetGrowth	-0.160***	-0.223***	-0.232***	-0.238***
	(-6.426)	(-9.114)	(-10.013)	(-10.189)
Board	0.091***	0.091*	0.068	0.067
	(3.332)	(1.917)	(1.568)	(1.553)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
_cons	-3.832***	-4.378***	-4.181***	-4.145***
	(-26.190)	(-14.245)	(-14.346)	(-14.333)
N	12235	8339	12198	12198
R^2	0.876	0.525	0.556	0.557

5. Testing the mechanism of action

In order to test the indirect effect of changes in SOEs' mixed reform on the "blood-forming" ability of enterprises, this paper draws on the test method of (Wen Zhonglin, 2004) for the mediation effect, analyzes the role mechanism of mixed-ownership reform through executive compensation incentives, enterprise innovation ability to improve the "blood-forming" ability, and tests the hypotheses H2 and H3 proposed in this paper, as shown in Table 5 below. This paper draws on (Wen Zhonglin, 2004) to analyze the mechanism of mixed ownership reform through executive compensation incentives, corporate innovation ability to enhance the "blood" ability to test the hypotheses proposed in this paper H2 and H3, the results of the test are shown in Table 5 below:

Table 5 Intermediary effect regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	*CREATEC*	*CX*	*CREATEC*	*Pay*	*CREATEC*	*Stock*	*CREATEC*
Mix	0.098**	0.275***	0.134***	0.556***	0.051*	0.030***	0.085***
	(2.571)	(4.271)	(4.335)	(20.373)	(1.695)	(10.095)	(2.798)
CX			0.065***				
			(13.618)				
Pay					0.113***		
					(11.877)		
Stock							0.786***
							(8.544)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

_cons	-4.083***	-4.073***	-3.221***	7.936***	-4.744***	0.170***	-3.900***
	(-19.891)	(-14.739)	(-23.790)	(69.131)	(-32.259)	(13.544)	(-29.428)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	12235	12235	12235	12235	12235	12235	12235
R^2	0.11	0.638	0.890	0.448	0.877	0.113	0.876

6. Further Analysis

6.1 Enterprise size

In order to investigate whether the size of the enterprise will have an impact on the relationship between the degree of mixed ownership reform and the enterprise's "blood-forming" ability, this paper takes the median of the sample enterprises as the dividing line. This paper takes the median size of the sample enterprises as the dividing line, defines the enterprises below the dividing line as small-scale SOE samples, and defines the enterprises above the dividing line as large-scale SOE samples, and then carries out regression analysis on the model again. The results are shown in columns (1) and (2) of Table 6, under the sample of large-scale enterprises and small-scale enterprises, the degree of mixed-ownership reform can enhance the "blood-forming" ability of enterprises, of which the coefficient of variation of small-scale enterprises is 0.219, which is significantly higher than that of large-scale enterprises, which indicates that the policy effectiveness of mixed-ownership reform is more prominent in small-scale enterprises. This indicates that the policy effectiveness of mixed ownership reform is more prominent in small-scale enterprises.

6.2 Enterprise categories

In 2015, the State-owned Assets Supervision and Administration Commission (SASAC), the Ministry of Finance (MOF) and the National Development and Reform Commission (NDRC) jointly issued the Guiding Opinions on the Functional Definition and Classification of State-owned Enterprises (SOEs), which suggests that, because of the different constraints on different categories of enterprises and the resulting differences in behavior, differentiated governance mechanisms should be implemented to achieve the goal of "one enterprise, one policy". Therefore, in order to explore whether different types of enterprises have an impact on the relationship between mixed ownership reform and the "blood-forming" ability of state-owned enterprises, and classifies the sample into high-tech enterprises and ordinary enterprises, and again tests the model. and ordinary enterprises, and again regression analysis is performed on the model. The results, as shown in columns (3) and (4) of Table 6, show that in both high-tech enterprises and ordinary enterprises, the increase in the degree of mixed-ownership reform can enhance the "blood-forming" ability of enterprises, in which the coefficient of variation of high-tech enterprises is 0.110, which is slightly higher than that of ordinary enterprises, which suggests that the effectiveness of the mixed-ownership reform is more prominent in high-tech enterprises. This indicates that the policy effectiveness of mixed ownership reform is more prominent in high-tech enterprises.

6.3 Geographic location

Existing literature shows that the increase in the level of regional economic development will have an impact on the cash flow acquisition ability of state-owned enterprises. When SOEs are located in regions with a higher degree of economic development, they have a stronger ability to generate cash flow from operating activities. In this paper, with reference to (Zhou et al., 2021) , the sample of state-owned enterprises is divided into the eastern region, the central region and the western region, and the model is regressed and analyzed again. The results are shown in columns (5), (6) and (7) of Table 6, under the samples of the three regions, the degree of mixed-ownership reform can enhance the "blood-forming" ability of enterprises, but the enhancement of enterprises in the western region does not reflect the significance of the situation, the reason is that the western region's economic development situation is weaker, and the effectiveness of the reform may not be highlighted, and further reform is still needed. The reason for this is that the economic development of the western region is weaker, and the effectiveness of the reform may not be highlighted yet, and further reform and optimization are still needed, which indicates that the policy effectiveness of the mixed ownership reform is more prominent in the state-owned enterprises in the eastern and central regions.

Table 6 Further test results

	(1) Large-scale	(2) Small scale	(3) High-tech	(4) General	(5) Eastern	(6) Central	(7) Western
				CREATEC			
Mix	0.088***	0.219***	0.110***	0.105**	0.087**	0.139**	0.079
	(2.664)	(3.464)	(2.736)	(2.498)	(2.299)	(2.300)	(1.076)
Lev	0.281***	-0.147	-0.041	0.237***	0.094	0.091	0.182
	(5.448)	(-1.617)	(-0.600)	(3.457)	(1.448)	(0.886)	(1.633)
Size	0.972***	1.127***	1.002***	1.000***	1.000***	1.019***	0.974***
	(155.968)	(44.538)	(126.680)	(133.195)	(143.416)	(74.459)	(73.241)
ROA	9.019***	6.420***	7.340***	8.381***	7.749***	8.535***	7.580***
	(29.333)	(13.761)	(18.425)	(20.681)	(21.117)	(13.600)	(13.190)
Growth	0.132***	0.151***	0.140***	0.151***	0.149***	0.177***	0.110**
	(6.167)	(3.525)	(4.828)	(5.131)	(5.671)	(4.295)	(2.033)
Cashflow	1.585***	2.404***	2.231***	1.691***	1.670***	1.812***	2.539***
	(11.424)	(9.629)	(11.439)	(10.229)	(10.770)	(6.417)	(8.561)
Fixed	1.172***	1.101***	1.023***	1.189***	1.246***	0.795***	1.061***
	(24.262)	(10.603)	(13.901)	(19.437)	(19.088)	(8.780)	(10.509)
AssetGrowth	-0.169***	-0.165***	-0.124***	-0.208***	-0.156***	-0.243***	-0.133**
	(-6.490)	(-2.819)	(-3.974)	(-5.572)	(-5.454)	(-3.623)	(-2.006)

Board	0.084***	0.067	0.050	0.120***	0.133***	-0.058	-0.009
	(2.765)	(1.059)	(1.324)	(3.039)	(3.580)	(-1.075)	(-0.119)
_cons	-3.166***	-6.512***	-3.678***	-3.935***	-4.116***	-3.568***	-3.224***
	(-20.450)	(-11.660)	(-18.776)	(-21.409)	(-18.759)	(-12.189)	(-9.826)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8738	3497	5676	6559	7514	2527	2190
r2	0.850	0.586	0.879	0.872	0.878	0.891	0.875

7. Conclusion and Inspiration

This paper takes the policy effect of mixed ownership reform of state-owned enterprises as an entry point to analyze the vitality and efficiency of state-owned enterprises after the reform. The results of the study show that, firstly, the mixed ownership reform can improve the "blood-forming" ability of enterprises. Secondly, the mixed ownership reform enhances the "blood-forming" ability of enterprises mainly through two mechanisms, namely, enhancing the management efficiency of executives and innovation vitality. Third, in the samples of smaller scale, high-tech industry and central region, the role of mixed-ownership reform in enhancing the "blood-forming" ability of enterprises is more prominent.

Based on the above conclusions, the corresponding research conclusions are drawn: first, the government should strengthen the support for mixed ownership reform and encourage the development of enterprises to enhance the efficiency and vitality of the economic market; second, state-owned enterprises and private enterprises should actively explore the integration of mixed ownership reform to better utilize the efficiency and vitality of the state-owned enterprises after the mixing reform; third, smaller state-owned enterprises can try to enhance the efficiency and vitality of the enterprises through the mixing reform to give full play to the reform; third, state-owned enterprises can try to enhance the efficiency and vitality of the enterprises through the mixing reform to give full play to the reform. to enhance the efficiency and vitality of enterprises, to play the reform utility, and to better realize the high-quality development of enterprises.

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