"Reverse Mixed Reform", Marketization Process and Internal Pay Gap

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Abstract. Common prosperity is the essential requirement of socialism and the common aspiration of the people, and improving the income distribution system is an important path to achieving common prosperity. However, there are still problems in the field of distribution, which hinder the pace of achieving common prosperity. Based on this, this paper takes listed companies from 2007 to 2022 as samples to empirically test the impact of "reverse mixed reform" on the internal pay gap of private enterprises and the moderating effect of marketization process. It is found that "reverse mixed reform" can significantly reduce the internal pay gap, while the marketization process negatively moderates the effect of "reverse mixed reform" on the internal pay gap, and this result still holds in the robustness test. This study helps to enrich the research on the economic consequences of "reverse mixed reform" and the factors affecting the internal pay gap.

Keywords: Reverse Mixed Reform; Internal Pay Gap; Marketization Process.

1. Introduction

Common prosperity is the essential requirement of socialism and the common aspiration of the people, and the report of the Twentieth National Congress of the CPC puts the realization of the common prosperity of all the people in a more important position, making it one of the five major features and essential requirements of Chinese-style modernization. Fair and reasonable income distribution is an important guarantee for optimizing the allocation of factors of production and promoting the balance between efficiency and fairness in social and economic development, and improving the income distribution system is an important path for realizing common prosperity. At the 10th meeting of the Financial and Economic Commission of the CPC Central Committee, it was clearly emphasized that the basic institutional arrangements for primary distribution, redistribution and tertiary distribution should be established to form an olive-shaped distribution structure with large middle and small two ends, and the order of income distribution should be rectified. However, problems remain in the area of distribution, such as the small size of the middle-income group and the fact that the income gap in society as a whole has yet to show a marked reduction, impeding the realization of common prosperity.

To improve the socialist market economy, we must firmly uphold the dominant role of public ownership and the common development of diverse forms of ownership. In recent years, the trend of "reverse mixed reform", in which state-owned shareholders buy into private enterprises, has become more and more obvious. At the same time, the marketization process, as one of the important environmental factors, may also play a role in the process of "reverse mixed reform" affecting the internal pay gap. However, the existing studies pay more attention to the impact of " reverse mixed reform" on the internal pay gap of private enterprises [1] , and pay insufficient attention to the moderating role of the marketization process, which provides a research space for this paper.

Based on this, this paper empirically examines the impact of "reverse mixed reform" on the internal pay gap of private enterprises and the moderating effect of the marketization process using a sample of listed companies from 2007 to 2022. It is found that "reverse mixed reform" can significantly reduce the internal pay gap, while the marketization process negatively moderates the effect of "reverse mixed reform" on the internal pay gap, and this result still holds in the robustness test.

The research contribution of this paper is mainly reflected in the following two aspects: first, existing studies on the economic consequences of "reverse mixed reform" mainly focus on financial behavior [2-4] , corporate performance [5,6] and strategic decision-making [7-9] , etc. Few literatures have explored the relationship between "reverse mixed reform" and internal pay gap and the moderating effect of the marketization process, while this paper studies how "reverse mixed reform" affects the internal pay gap and how the marketization process moderates the relationship between the two, which helps to enrich the understanding of the relationship between the two and the marketization process. This paper examines how "reverse mixed reform" affects the internal pay gap and how the marketization process regulates it from the perspective of the internal pay gap, which helps to enrich the research on the economic consequences of "reverse mixed reform".

Second, the existing research on the factors affecting the internal pay gap mainly focuses on the personal characteristics of executives [10-12] and the external environment of enterprises [13,14] , with less attention paid to the aspect of the mixed-ownership reform, and the only research has not paid attention to the impact of the marketization process on the relationship between the two. Therefore, based on the "reverse mixed reform", this paper studies how state-owned shareholders affect the internal pay gap in private enterprises and the moderating role of the marketization process, expanding the research on the factors affecting the internal pay gap.

2. Literature Review and Theoretical Analysis

2.1. Literature Review

2.1.1 Factors affecting the internal pay gap

Regarding the influencing factors of the pay gap within the enterprise, existing studies have fully explored from the aspects of executives' personal traits and the external environment of the enterprise.

Regarding the personal traits of executives, Liu and Kong pointed out that executives' overseas experience can significantly improve the pay gap [10] . They also found that executives' managerial educational background can also improve the internal pay gap [11] . Wei and Li found that management's experience of poverty can reduce the internal pay gap [12] .

In terms of the external environment of enterprises, Yu et al. pointed out that red culture can reduce the internal pay gap [13] . The study of Yu and Jiang shows that the fair competition review system can reduce the internal pay gap of enterprises [14] .

Based on the review of the above literature, it can be found that the internal pay gap is affected by the personal traits of executives [10-12] and the external environment of the firm [13,14] and the mixed-ownership reform can affect the internal pay gap of the firm in many ways.

2.1.2 Economic consequences of "reverse mixed reform"

Mixed-ownership reform mainly includes three aspects: private enterprises taking shares in state-owned enterprises, employees of state-owned enterprises taking shares, and state-owned enterprises taking shares in private enterprises.([15]) . Among them, the entry of state-owned capital into private enterprises (i.e., "reverse mixed reform") will lead to changes in their governance structure and values. The economic consequences of "reverse mixed reform" have been studied mainly from the aspects of financial behavior, enterprise performance and strategic decision-making.

On the impact of "reverse mixed reform" on the financial behavior of enterprises. From the perspective of financing constraints, He et al. found that state-owned capital participation can enhance the social reputation of private enterprises, send positive signals to the capital market, and reduce the cost of debt financing of private enterprises [2] . Zeng et al. based on the dual perspectives of cooperative advantages and competitive checks and balances, pointed out that state-owned capital participation can significantly improve the cash holding level of private enterprises [3] .

With regard to the relationship between "reverse mixed reform" and firm performance, Chen et al. studied the profitability index, productivity index and TobinQ value of Chinese listed companies, and found that enterprises controlled by state-owned enterprises directly under the central government

perform best, while enterprises controlled by state-owned assets administration bureau and privately held enterprises perform worst [5] . However, Dong and Liu found that state-owned shareholders bring policy burdens that negatively affect firms' factor productivity and profitability [6] .

Aiming at the influence of "reverse mixed reform" on strategic decision-making. Specifically, Chen and Xiong showed that the strategic risk-taking level of private firms rises and then falls as the number of state-owned shares increases [7] . Zhai et al. took tax evasion as a vision and found that state-owned equity participation could significantly reduce the degree of tax evasion of private enterprises [8] .

The above literature review shows that the economic consequences of "reverse mixed reform" have been extensively explored, but mostly from the perspectives of financial behavior [2-4] , corporate performance [5,6] and strategic decision-making [7-9]. Little literature has focused on the internal pay gap and marketization process.

2.1.3 Studies related to the marketization process

The level of marketization is one of the important external environmental factors, and studies have been conducted to explore the impact of the marketization process in terms of both internal pay gaps and mixed ownership reforms.

Regarding the influencing factors of the internal pay gap, Yang et al. studied from the perspective of female directors and executive-employee pay gap, pointed out that the existence of female directors can reduce the pay gap, and the marketization process negatively regulates the role of female directors [16] . Based on the perspective of government ownership and internal pay gap, Wang found that government ownership of enterprises can reduce the pay gap between executives and employees, and this effect is stronger in regions with a higher degree of marketization [17] .

With regard to the economic consequences of mixed ownership reform, Liu et al. showed that the actual controller of SOEs positively affects firm performance and that the degree of marketization has a positive moderating effect [18] . Zhou et al. showed that private equity participation can significantly enhance the market competitiveness of SOEs and that the marketization process helps to strengthen this effect [19] .

The above literature review suggests that the marketization process can influence the factors affecting the internal pay gap [16,17] as well as the economic consequences of mixed-ownership reforms [18,19] , but there is little literature that examines how it moderates the impact of "reverse mixed reform" on the internal pay gap.

2.2. Theoretical Analysis

2.2.1 The impact of "reverse mixed reform" on the internal pay gap

Compensation is an important benefit distribution within a firm, and under a certain amount of total compensation, an increase in the share of compensation between one side of management and one side of employees will lead to a decrease in the compensation received by the other side. This paper argues that "reverse mixed reform" may reduce the pay gap within private firms by enhancing the bargaining power of ordinary employees and curbing management pay manipulation such as earnings management.

First, the "reverse mixed reform" can enhance the ordinary employees' salary by strengthening the bargaining power of workers. At present, the executives of private enterprises in China have strong power, and can control most of the internal resource allocation of the enterprise, which makes the ordinary employees in the salary negotiation in a weak position, and can only passively accept the program formulated by the executives [20] . State-owned enterprises themselves have social obligations and should set an example in promoting employment and protecting employee welfare, etc. This policy obligation is likely to affect private enterprises with the entry of state-owned capital and guide private enterprises receiving capital injection to pay more attention to employee treatment from the perspective of value. Specifically, the entry of state-owned shareholders into private enterprises gives them a new identity label, which makes them have deeper value recognition of the

state's policy guidelines [21] , pay more attention to the proportion of labor remuneration in the initial distribution, and pay attention to the distribution of employees' income. At the same time, state-owned shareholders may also check and balance the management's decision-making by allocating seats in the board of directors [22] , and support the employees' reasonable demands in negotiations and consultations to improve their welfare. In addition to this, "reverse mixed reform" can also alleviate the financing constraints of private enterprises, help them approach government resources and enter monopolistic industries, thus strengthening the economic basis for private enterprises to pay higher salaries to their employees. At the same time, financing constraints are also one of the influencing factors on the bargaining power of laborers, when private enterprises face a more serious degree of financing constraints, their capital is relatively scarce and labor is relatively abundant, according to the theory of comparative advantage, the bargaining power of the side of the scarce capital is stronger, and the enterprises are very likely to suppress the labor remuneration in order to save the cost of operation [23] . Therefore, "reverse mixed reform" can influence the decision-making of private enterprises, alleviate their financing constraints, enhance the bargaining power of ordinary employees, and enable private enterprises to give higher wages to their employees [24] and reduce the internal pay gap.

Second, "reverse mixed reform" can reduce management excess compensation by reducing management's ability to manipulate compensation. When the total amount of compensation is fixed, if the management obtains excess compensation through manipulation, the ordinary employees will be allocated less compensation accordingly. Therefore, when the management's ability to capture excess pay through earnings management and interference in pay contracts is stronger, the internal pay gap will be larger. On the one hand, under the performance-based compensation system, management's compensation is linked to corporate performance, and when the corporate performance is better, the management can obtain higher compensation, so some of the management has incentives to use information asymmetry to whitewash the statements, to achieve higher corporate performance through earnings management, so as to obtain higher compensation [25] , or to manipulate the share price to profit from the use of earnings management around the date of the announcement of the equity incentive plan [26]) ; on the other hand, more powerful executives are likely to use their positions to influence the board of directors to set pay contracts in their favor [27] and thus capture excess compensation. However, too large a pay gap can cause expected unfavorable reactions from inequality-averse employees, customers, or governments, reducing firm value [28] . Therefore, when the internal pay gap is too large, according to the pay defense hypothesis, management has an incentive to justify its pay through such means as increased pay-performance sensitivity and earnings management [29] . State-owned shareholders are able to monitor management's opportunistic behavior, inhibit management's ability to obtain excess pay through manipulating performance and setting pay contracts in their favor, and make it difficult for them to rationalize large pay gaps through, for example, earnings management. In addition, the management of private enterprises may also be influenced in the process of contact with the relevant personnel of state-owned shareholders, and conceptually agree with the value concept of common prosperity [21] , so as to take the initiative to reduce the opportunistic behavior and reduce the excess compensation. Therefore, "reverse mixed reform" can reduce the internal pay gap by suppressing management earnings management and other pay manipulation behaviors.

In summary, this paper proposes the following hypothesis:

H1: "Reverse mixed reform" can reduce the internal pay gap.

2.2.2 The moderating role of the marketization process

The external environment is an important factor influencing on the internal pay gap of enterprises. This paper argues that the marketization process can negatively moderate the relationship between "reverse mixed reform" and the internal pay gap in private enterprises.

First, marketization reduces the need for state shareholders to weaken internal pay gaps by enhancing the voice of employees. Marketization strengthens the competitive environment [30] , prompting firms to pay more attention to their employees. Treating employees well as a long-term

strategy can improve corporate competitiveness in a highly competitive environment. Taking responsibility for employees can help mobilize employees' initiative, stimulate employees' sense of belonging [31] , increase employees' loyalty, and further enhance the value of the enterprise [32] . For private enterprises, taking the initiative to improve employee welfare and giving employees more voice is a good response strategy to face fierce market competition. At the same time, the marketization process also includes the soundness of the economic and legal system [33] , which provides a legal way for employees to protect their own rights and interests. Therefore, the process of marketization has weakened the demand of state-owned shareholders to enhance the bargaining power of employees and reduce the internal pay gap.

Second, marketization reduces the need for State shareholders to reduce internal pay gaps by improving corporate governance and strengthening the link between performance and management effort. Along with the process of marketization, enterprises face stronger competition, and the market information that can be used to supervise management is more adequate, which prompts private enterprises to improve their own systems and corporate governance level to cope with the market competition, and can also play a more effective supervisory constraint on management's use of earnings management to manipulate compensation [34] . Moreover, the marketization process can also enhance the incentive effect of internal pay gap [30] . The pay gap caused by management's power to seize benefits is not conducive to enterprise development, while a reasonable pay gap can improve enterprise performance [35] . For state-owned shareholders, maintaining a reasonable pay gap can promote enterprise development without jeopardizing the legitimate rights and interests and motivation of employees, and help promote common prosperity. Thus, the marketization process reduces the need for state-owned shareholders to participate in the decision-making of private enterprises and reduce the internal pay gap.

In summary, this paper proposes the following hypothesis:

H2:The marketization process negatively moderates the effect of "reverse mixed reform" on the internal pay gap.

3. Research Design

3.1. Sample Selection and Data Sources

This paper examines the impact of "reverse mixed reform" on the internal pay gap of private enterprises by taking listed private companies from 2007 to 2022 as the research object. The total number of original samples is 22,901, and 21,917 samples are obtained after eliminating ST and *ST companies, financial industry companies and samples with missing data. In order to minimize the influence of outliers, this paper winsorized the continuous variables form 1% to 99% .

"Marketization Index" is from "China Sub-Provincial Marketization Index Report (2021)". Data on executive and employee compensation, personnel information, and information on the top ten shareholders were obtained from the CSMAR database.

Table 1. Sample selection process

2007-2022 listed private companies	22,901
Less: ST and *ST	650
Financial industry	97
Missing data	237
Total	21,917

3.2. Definition of Variables

3.2.1 Dependent variable

Regarding the internal pay gap, this paper defines the internal pay gap (*Gap*) as the ratio between the average executive pay and the average common employee compensation with reference to the

studies of Gao and Lu [36], Miao and Hu [37] and Wu et al. [38]. The average executive pay is defined as the average of the top three executives' pay, i.e., the total pay of the top three executives divided by three. Average common employee compensation is defined as the ratio of total common employee compensation ("cash paid to and for employees" minus total supervisory compensation) to the number of common employees (number of employees minus total supervisory staff).

3.2.2 Independent variable

In this paper, we draw on the studies of Liu and Li [39], Sun and Liu [15], and Li et al. [40] in measuring "reverse mixed reform", and choose whether the aggregate shareholding of state-owned shareholders in the top ten shareholders reaches 10% (*StateDum*) and the sum of the top ten state-owned shareholders' shareholding (*StateNum*) as the main explanatory variables.

3.2.3 Moderate variable

Referring to the studies of Yan and Jing [41], Wu et al. [42], and Sun et al. [43], this paper chooses the natural logarithm of the "Marketization Index" in the "Report on China's Sub-Provincial Marketization Index (2021)" as the moderate variable for measuring the process of marketization in the region of where the enterprises are located (*Market*).

3.2.4 Control variable

Referring to the studies of Xu et al. [44], Wu et al. [38] and Wei et al. [27], this paper controls for the following factors that may affect the internal pay gap: firm size (*SIZE*), return on total assets (*ROA*), growth capacity (*Growth*), cash flow (*Cash*), gearing ratio (*LEV*), shareholding ratio of the largest shareholder (*TOP1*), whether or not the two positions are combined (*DUAL*), board size (*BOARD*), age of the enterprise (*Age*).

In addition, this paper controls for year and industry fixed effects. Considering the possible impact of the heteroskedasticity problem among firms, the standard errors in this paper are adjusted for firm-level clustering in the regressions to obtain more robust inference. The specific definitions of the variables are shown in Table 2.

Table 2. Definitions of main variables

Variable symbol	Variable Definition
Gap	The ratio between the average executive pay and the average common employee compensation.
StateDum	If the sum of shareholding of state-owned shareholders in the top ten shareholders reaches 10%, the value will be 1, otherwise it will be 0.
StateNum	Among the top ten shareholders, the sum of the proportion of shares held by state-owned shareholders
Market	Natural logarithm of the marketability index
Size	Natural logarithm of total assets
Lev	Total liabilities to total assets
ROA	Net profit to total assets
Growth	Revenue growth rate
TOP1	Shareholding ratio of the largest shareholder
Dual	If the chairman of the board of directors and general manager is the same person then take the value of 1, otherwise 0
Board	Natural logarithm of the number of directors on the board
INDEP	Ratio of the number of independent directors to the total number of directors
Age	Natural logarithm of the number of years the enterprise has been in existence
Cash	Net cash flow from operating activities to total assets

3.3. Modeling

In order to test the impact of "reverse mixed reform" on the internal pay gap, the model to be tested is set as follows, with reference to the studies of He et al. [2] and Lin et al. [46] :

$$Gap_{i,t}=\beta_0 + \beta_1 State_{i,t} + \beta_2 Controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

In the above equation, *Gap* is the dependent variable, *State* is the independent variables *StateDum* and *StateNum*, and Controls are control variables.

In order to test the moderating role of the marketization process, this paper draws on the studies of Zhang and Jiang [47] and Zhao and Yu [48] and sets the model to be tested as follows:

$$Gap_{i,t}=\beta_0 + \beta_1 State_{i,t} + \beta_2 Market_{i,t} + \beta_3 State * Market_{i,t} + \beta_2 Controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where *Market* is the moderating variable. All the tests in this paper are regression analyzed using OLS model.

4. Empirical Results

4.1. Descriptive Statistics

Table 3 shows the results of descriptive statistics for the main variables. The table shows that the standard deviation of *Gap* is 6.452, indicating that the internal pay gap varies greatly among different samples. The mean value of *StateDum* is 0.068, indicating that only 6.8% of the samples have more than 10% of the combined shareholding of state-owned shareholders among the top ten shareholders. The mean value of *StateNum* is 0.024, indicating that the shareholding of state-owned shareholders is relatively low among the top ten shareholders in the private enterprises. The standard deviation of Market is 0.251, indicating that the marketization process varies greatly among different samples.

Table 3. Descriptive statistics

Variable	N	Mean	SD	Min	P25	P50	P75	Max
Gap	21917	8.215	6.452	1.224	4.347	6.384	9.752	41.213
StateDum	21917	0.068	0.251	0.000	0.000	0.000	0.000	1.000
StateNum	21917	0.024	0.063	0.000	0.000	0.000	0.017	0.394
Market	21917	2.293	0.175	1.556	2.221	2.326	2.410	2.554
Size	21917	21.746	1.022	19.803	20.994	21.630	22.357	24.881
Lev	21917	0.367	0.194	0.045	0.209	0.349	0.504	0.861
ROA	21917	0.039	0.070	-0.317	0.018	0.044	0.073	0.197
Growth	21917	0.181	0.370	-0.562	-0.014	0.130	0.301	2.079
TOP1	21917	0.317	0.134	0.082	0.214	0.299	0.403	0.679
Dual	21917	0.407	0.491	0.000	0.000	0.000	1.000	1.000
Board	21917	2.080	0.187	1.609	1.946	2.197	2.197	2.485
INDEP	21917	0.378	0.052	0.333	0.333	0.364	0.429	0.571
Age	21917	2.802	0.387	0.693	2.565	2.833	3.091	4.174
Cash	21917	0.043	0.069	-0.167	0.005	0.043	0.084	0.239

4.2. Baseline Regression Results

Table 4 reports the results of the regression of "reverse mixed reform" on the internal pay gap. The coefficients of *StateDum* and *StateNum* are both significant at the 1% level after controlling for industry and year effects. The results show that "reverse mixed reform" significantly reduces the internal pay gap, and hypothesis H1 is confirmed.

Table 4. Baseline regression results

	Gap	
	(1)	(2)
StateDum	-1.031***	
	(-3.109)	
StateNum		-4.729***
		(-3.437)
Size	2.548***	2.566***
	(15.086)	(15.100)
Lev	-0.016	-0.008
	(-0.034)	(-0.017)
ROA	8.166***	8.137***
	(8.644)	(8.623)
Growth	0.377**	0.375**
	(2.557)	(2.543)
TOP1	0.676	0.713
	(0.927)	(0.979)
Dual	-0.288*	-0.298*
	(-1.891)	(-1.954)
Board	1.316**	1.351**
	(1.990)	(2.047)
INDEP	2.878	2.926
	(1.251)	(1.273)
Age	0.104	0.131
	(0.363)	(0.457)
Cash	9.343***	9.359***
	(8.683)	(8.707)
Constant	-51.845***	-52.254***
	(-11.555)	(-11.610)
Year	YES	YES
Industry	YES	YES
N	21,917	21,917
Adj.R²	0.226	0.226

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

4.3. Moderating Effects Test

Table 5 reports the results of the moderating effect of the marketization process. After controlling the effect of industry and year, the coefficients of cross-multiplication terms are significantly positive, indicating that the marketization process has a significant negative moderating effect on the relationship between “reverse mixed reform” and the internal pay gap of private enterprises. The hypothesis H2 is confirmed.

Table 5. Moderating effects

	Gap	
	(1)	(2)
StateDum	-5.424**	
	(-2.381)	
StateNum		-33.318**
		(-2.455)
StateD_Market	1.955*	
	(1.929)	
StateN_Market		12.745**
		(2.145)
Market	0.194	-0.009
	(0.261)	(-0.012)
Size	2.545***	2.561***
	(15.078)	(15.093)
Lev	-0.024	-0.013
	(-0.050)	(-0.027)
ROA	8.139***	8.113***
	(8.624)	(8.598)
Growth	0.384***	0.381***
	(2.610)	(2.585)
TOP1	0.684	0.733
	(0.939)	(1.007)
Dual	-0.290*	-0.299**
	(-1.915)	(-1.972)
Board	1.342**	1.362**
	(2.026)	(2.062)
INDEP	2.984	3.011
	(1.296)	(1.310)
Age	0.105	0.132
	(0.366)	(0.461)
Cash	9.294***	9.307***
	(8.621)	(8.628)
Constant	-51.762***	-51.624***
	(-10.621)	(-10.613)
Year	YES	YES
Industry	YES	YES
N	21,917	21,917
Adj.R²	0.226	0.227

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

4.4. Robustness Tests

4.4.1 Endogeneity

(1) Lagged one-period regression of independent variables

When determining investment targets, state-owned shareholders may choose firms with smaller pay gap, which creates a potential problem of reverse causality. Here, considering that the internal pay gap in the current period is unlikely to affect the shareholding ratio of state-owned shareholders in the previous period, this paper uses lagging the independent variables by one period to control the potential reverse causality problem.

The regression results are shown in Table 6, where the coefficients of *L.StateDum* and *L.StateNum* are both significant at the 1% level, and the results in Columns (3) and (4) show that the coefficients on the cross-multiplication terms are both significant, suggesting that the results for Hypotheses H1 and H2 are still robust to controlling for reverse causality.

Table 6. Independent variables lagged one period

	Gap			
	(1)	(2)	(3)	(4)
L.StateDum	-1.124***		-5.749**	
	(-3.088)		(-2.334)	
L.StateNum		-4.730***		-37.683***
		(-3.071)		(-2.933)
L.StateD_Market			2.059*	
			(1.863)	
L.StateN_Market				14.698***
				(2.620)
Market			-0.082	-0.314
			(-0.100)	(-0.382)
Size	2.614***	2.632***	2.610***	2.624***
	(14.641)	(14.644)	(14.629)	(14.630)
Lev	-0.206	-0.205	-0.209	-0.206
	(-0.401)	(-0.398)	(-0.407)	(-0.402)
ROA	7.240***	7.206***	7.228***	7.185***
	(7.467)	(7.438)	(7.456)	(7.407)
Growth	0.372**	0.368**	0.376**	0.373**
	(2.362)	(2.334)	(2.389)	(2.369)
TOP1	0.759	0.808	0.763	0.827
	(0.964)	(1.027)	(0.969)	(1.053)
Dual	-0.347**	-0.353**	-0.344**	-0.350**
	(-2.118)	(-2.154)	(-2.109)	(-2.147)
Board	1.383*	1.407**	1.405**	1.416**
	(1.942)	(1.979)	(1.969)	(1.989)
INDEP	2.994	3.051	3.107	3.149
	(1.232)	(1.256)	(1.276)	(1.294)
Age	0.297	0.321	0.296	0.321
	(0.888)	(0.959)	(0.887)	(0.959)

Cash	9.936***	9.965***	9.910***	9.938***
	(8.349)	(8.375)	(8.314)	(8.334)
Constant	-53.741***	-54.137***	-53.562***	-53.364***
	(-10.313)	(-10.366)	(-9.545)	(-9.513)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	18,733	18,733	18,733	18,733
Adj.R²	0.233	0.233	0.233	0.234

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

(2) Treatment effects model

If the introduction of state-owned shareholders by private firms is affected by firm characteristics, then the baseline regression results may not reflect the role of "reverse mixed reform", but rather the results of the self-selection behavior of private firms. Here, this paper adopts the treatment effect model to alleviate the self-selection problem. Referring to the research of Wang et al. [9] , this paper firstly takes the average shareholding ratio of state-owned shareholders of other private enterprises in the same industry and same year as an instrumental variable, and adopts the probit model to estimate the probability that the sum of the shareholding ratio of state-owned shareholders of the top ten shareholders of the enterprise in the same year reaches 10% (*StateDum*), and calculates the inverse mills ratio (lambda*)*. Then, model (1) is re-regressed in the second stage after adding the inverse mills ratio (*lambda*) as a control variable.

The results of the second-stage regression are shown in column (2) of Table 7, where the coefficient on *StateDum* is significant at the 1% level, a result that supports Hypothesis H1.

Table 7. Results of the treatment effects model

	StateDum	*Gap*
	(1)	(2)
MeanState	-15.602***	
	(-9.862)	
StateDum		-2.607***
		(-3.087)
Size	0.049***	2.558***
	(2.923)	(53.006)
Lev	0.418***	0.068
	(4.460)	(0.252)
ROA	-0.447*	8.071***
	(-1.895)	(11.636)
Growth	0.026	0.380***
	(0.678)	(3.375)
TOP1	-1.027***	0.518*
	(-8.826)	(1.653)
Dual	-0.118***	-0.311***
	(-3.893)	(-3.826)
Board	1.246***	1.522***
	(11.325)	(5.146)

INDEP	-0.631*	2.805***
	(-1.712)	(2.925)
Age	0.557***	0.201
	(11.959)	(1.532)
Cash	-0.350	9.304***
	(-1.574)	(15.016)
Constant	-6.489***	-55.253***
	(-12.542)	(-37.370)
hazard		
lambda		0.807*
		(1.899)
Year	YES	YES
Industry	YES	YES
N	21,917	21,917

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

(3) Instrumental variable

This paper uses the two-stage least square method of instrumental variables to test the baseline regression results, and refers to the study of Wang et al. [9] to use the average state-owned shareholder shareholding ratio of other private firms in the same industry and same year (*MeanState*) as the instrumental variable. The regression results are shown in Table 8, and the coefficient of *StateNum* is significant at the 5% level, indicating that the results of hypothesis H1 are still robust.

Table 8. Results of the instrumental variable regression

	StateNum	*Gap*
	(1)	(2)
MeanState	-0.873***	
	(-5.477)	
StateNum		-17.341**
		(-2.361)
Size	0.005***	2.631***
	(4.181)	(14.819)
Lev	0.014**	0.160
	(2.335)	(0.322)
ROA	-0.017	7.895***
	(-1.587)	(8.342)
Growth	-0.000	0.375**
	(-0.088)	(2.542)
TOP1	-0.014	0.538
	(-1.589)	(0.729)
Dual	-0.005***	-0.364**
	(-3.196)	(-2.287)
Board	0.035***	1.802**
	(4.293)	(2.439)

INDEP	0.000	2.926
	(0.001)	(1.268)
Age	0.019***	0.373
	(5.352)	(1.187)
Cash	-0.003	9.337***
	(-0.272)	(8.646)
Constant	-0.193***	-57.754***
	(-4.472)	(-11.175)
Year		YES
Industry		YES
N	21,917	21,917
Adj.R²		0.212

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

4.4.2 Replacement of dependent variable

In the previous test, the dependent variable *Gap* is the ratio of the average compensation of executives to the average compensation of ordinary employees. Here, this paper refers to the studies of Zheng et al. [49] and Yu et al. [13] , and selects the cash paid to and for employees in the current year plus the difference between employee compensation payable at the end of the year and the beginning of the year and minus the total supervisory compensation as a remeasurement of the total compensation of the ordinary employees, and calculates the internal pay gap (*Gap_A*).

Table 9 shows the results, with the coefficients of *StateDum* and *StateNum* both significant at the 1% level and the coefficients of the cross-multiplication terms all significant, in keeping with the above findings.

Table 9. Replacement of dependent variable

	Gap_A			
	(1)	(2)	(3)	(4)
StateDum	-1.024***		-5.238**	
	(-2.983)		(-2.231)	
StateNum		-4.423***		-34.446**
		(-3.165)		(-2.457)
Market			0.008	-0.224
			(0.010)	(-0.279)
StateD_Market			1.868*	
			(1.791)	
StateN_Market				13.347**
				(2.178)
Size	2.554***	2.570***	2.551***	2.565***
	(14.400)	(14.399)	(14.395)	(14.395)
Lev	-0.184	-0.183	-0.190	-0.183
	(-0.368)	(-0.364)	(-0.380)	(-0.365)
ROA	7.069***	7.059***	7.051***	7.043***
	(7.582)	(7.575)	(7.558)	(7.542)

Growth	-0.076	-0.082	-0.070	-0.076
	(-0.530)	(-0.568)	(-0.489)	(-0.525)
TOP1	0.725	0.776	0.735	0.800
	(0.942)	(1.009)	(0.955)	(1.042)
Dual	-0.333**	-0.342**	-0.332**	-0.338**
	(-2.082)	(-2.137)	(-2.083)	(-2.126)
Board	1.421**	1.447**	1.442**	1.450**
	(2.034)	(2.076)	(2.059)	(2.077)
INDEP	3.148	3.194	3.250	3.267
	(1.319)	(1.339)	(1.360)	(1.368)
Age	0.323	0.347	0.322	0.346
	(0.993)	(1.065)	(0.990)	(1.064)
Cash	9.233***	9.241***	9.196***	9.205***
	(7.953)	(7.965)	(7.911)	(7.912)
Constant	-43.849***	-44.207***	-43.861***	-43.627***
	(-8.995)	(-8.984)	(-8.277)	(-8.206)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	18,843	18,843	18,843	18,843
Adj.R²	0.230	0.230	0.230	0.230

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

4.4.3 Replacement of independent variable

In the previous test, this paper measures *StateDum* as whether the aggregate state-owned shareholders' shareholding of the top ten shareholders reaches 10%. Here, this paper refers to He et al. [2] to remeasure the independent variable by the criterion of whether the shareholding of the first large state-owned shareholder reaches 10% (*StateDum_A*).

The regression results are shown in Table 10, where the coefficient of *StateDum_A* is significant at the 1% level and the coefficient of the cross-multiplier term is significant at the 10% level, and the results of the previous test remain robust.

Table 10. Replacement of independent variable

	Gap	
	(1)	(2)
StateDum_A	-1.021***	-5.347**
	(-2.807)	(-2.205)
Market		0.235
		(0.317)
StatedA_Marke		1.928*
		(1.786)
Size	2.549***	2.546***
	(15.079)	(15.072)
Lev	-0.021	-0.028

	(-0.043)	(-0.059)
ROA	8.143***	8.120***
	(8.628)	(8.613)
Growth	0.378**	0.384***
	(2.560)	(2.607)
TOP1	0.726	0.735
	(0.995)	(1.008)
Dual	-0.286*	-0.289*
	(-1.876)	(-1.908)
Board	1.308**	1.332**
	(1.976)	(2.009)
INDEP	2.918	3.010
	(1.268)	(1.306)
Age	0.100	0.100
	(0.350)	(0.350)
Cash	9.350***	9.308***
	(8.690)	(8.632)
Constant	-51.865***	-52.391***
	(-11.551)	(-10.781)
Year	YES	YES
Industry	YES	YES
N	21,917	21,917
Adj.R²	0.226	0.226

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

5. Further Test

5.1. Heterogeneity Test of the Role of Different State-owned Entities

State-owned enterprises participating in “reverse mixed reform” can be categorized into financial institutions and non-financial institutions. Among them, financial institutions often hold shares in a number of enterprises at the same time, and the proportion of shares they hold in each enterprise is mostly small. Therefore, due to cost considerations, financial institutions will not actively participate in corporate governance after buying shares, which makes it difficult for them to play the role of a voice for ordinary employees and curb management's earnings manipulation. However, the shareholding behavior of financial institutions has a good signaling effect and can improve the debt financing structure of private enterprises [2] . In this case, the resources brought by state-owned shareholders are very likely to be used by management to improve their own compensation due to the lack of supervision [50] . As a result, it is inferred that non-financial institutions’ equity participation can significantly reduce the internal pay gap in private firms, while financial institutions reduce the internal pay gap to a much lesser extent, and may even increase the internal pay gap. In order to verify this inference, This paper refers to the research of Liu and Li [39] , which categorizes state-owned shareholding into financial institution shareholding (*FIN*) and non-financial institution shareholding (*NonFIN*), and examines the effects of different types of SOEs’ shareholding participation on the internal pay gap of private enterprises.

Table 11 reports the resulsts, with significantly positive coefficients for *FIN* and significantly negative coefficients for NonFIN, suggesting that financial institutions' equity participation significantly raises the internal pay gap in private firms, while non-financial institutions' equity participation can significantly reduce the internal pay gap in private firms, which is in line with the expectations of this paper.

Table 11. Heterogeneity test results

	Gap	
	(1)	(2)
FIN	0.107**	
	(2.153)	
NonFIN		-0.062***
		(-4.218)
Size	2.516***	2.559***
	(14.964)	(15.124)
Lev	-0.055	0.025
	(-0.115)	(0.053)
ROA	8.163***	8.079***
	(8.663)	(8.586)
Growth	0.384***	0.379***
	(2.606)	(2.581)
TOP1	0.856	0.749
	(1.170)	(1.030)
Dual	-0.281*	-0.311**
	(-1.852)	(-2.044)
Board	1.162*	1.382**
	(1.768)	(2.101)
INDEP	3.007	2.964
	(1.303)	(1.291)
Age	0.016	0.141
	(0.056)	(0.493)
Cash	9.352***	9.338***
	(8.688)	(8.702)
Constant	-51.011***	-52.111***
	(-11.384)	(-11.646)
Year	YES	YES
Industry	YES	YES
N	21,917.	21,917
Adj.R²	0.225	0.227

Note: ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, with t value in parentheses.

6. Conclusion

Based on the samples of listed companies from 2007 to 2022, this paper empirically examines the impact of "reverse mixed reform" on the internal pay gap of private enterprises and the moderating effect of the marketization process. The following conclusions are obtained: "reverse mixed reform" can significantly reduce the internal pay gap, and the marketization process negatively moderates the effect of "reverse mixed reform" on the internal pay gap, and this result still holds in the robustness test; the participation of financial institutions in private firms significantly increases the internal pay gap of private firms, while the participation of non-financial institutions in private firms significantly reduces the internal pay gap of private firms.

The findings of this paper have the following insights: for government departments, it is necessary to accelerate the deepening of mixed ownership reform, promote the redistribution of state-owned capital, and promote the fair distribution of income; for private enterprises, they should actively participate in the mixed-ownership reform, and at the same time, they should also raise their awareness of social responsibility and contribute to social equity.

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