

The Impact of Executive Compensation External Fairness on Corporate Innovation

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Abstract. In a competitive market environment, the innovation ability of an enterprise is not only crucial for its sustainable development but also essential for enhancing its core competitiveness among numerous competitors. As decision-makers and executives of an enterprise, the perceived external fairness of their compensation directly influences their attitudes towards risk and their willingness to engage in innovative activities. This paper focuses on A-share listed companies in Shanghai and Shenzhen from 2013 to 2022 as the research subject. The aim is to conduct an in-depth exploration of the potential relationship between external fairness of executive compensation and corporate innovation. Additionally, it will analyze the role of corporate strategic risk-taking as a bridge in this relationship, as well as the heterogeneous characteristics of the impact of executive compensation fairness on corporate innovation based on corporate property rights, regional differences, and industry characteristics. The study reveals that: (1) external fairness of executive compensation significantly promotes corporate innovation levels, particularly in non-state-owned enterprises, eastern regions, and high-tech industries; (2) corporate strategic risk-taking partially mediates the relationship between executive compensation fairness and corporate innovation. Based on these findings, this paper proposes improvements to listed companies' executive compensation incentive systems, internal oversight and governance systems within enterprises, as well as deeper market-oriented reforms for state-owned enterprises. These proposals aim to provide new insights for enhancing enterprise innovation levels..

Keywords: External Fairness in Executive Compensation; Corporate Strategy Risk Taking; Corporate Innovation.

1. Introduction

From Ping An of China and Huaxia Bank to the five major investment banks on Wall Street in the United States, public attention has once again turned to the issue of fairness in executive compensation. Moreover, governments have fully recognized the importance of pay equity for social cohesion and economic transformation. As early as 2002, the government set limits on the ratio between annual income of senior executives in state-owned enterprises and the average wages of employees. However, with economic growth, these limits were eventually breached. In 2009, the government issued a "salary cap order" to strengthen regulations further. Although the Chinese government has actively formulated and implemented a series of policies aimed at addressing significant income disparities and unequal distribution, the specific provisions of these policies primarily focus on wage differences between executives and employees within individual firms. There are still no targeted restrictions or regulations regarding salary differences among executives holding equivalent positions across different companies within the same industry. Executive compensation is not only a reward for managerial performance but also a crucial tool for motivating executives to work diligently and drive corporate development. However, due to various factors such as market conditions, company size, and performance levels, executive pay varies significantly across firms. Such disparities may alter executives' psychological perceptions and behavioral choices, thereby affecting their willingness to take risks and innovate.

A firm's capacity to assume strategic risk reflects its confidence in future development and its ability to respond to uncertainty. As key decision-makers, executives are responsible not only for daily operations but also for making thoughtful decisions about long-term strategy and future growth.

In these decisions, executives' perception of external pay fairness often serves as an important reference point. When executives perceive external pay inequity, they may experience feelings of envy, which could influence their assessment of strategic risks and their willingness to take them. This effect might manifest as overly conservative decision-making—avoiding high-risk, high-reward projects and missing valuable opportunities for innovation. More seriously, some executives may seek inefficient investments or decisions to compensate for this perceived injustice. Such actions often harm long-term corporate development, leading to resource waste and reduced efficiency.

In a highly competitive market environment, a company's level of innovation is not only essential for sustainable long-term growth but also a core source of competitive advantage that enables firms to stand out among rivals. Innovation activities differ from other strategic initiatives in that they typically involve long cycles, high investment risks, and uncertain profitability. The high risks associated with innovation require executives to possess sufficient courage and determination. Executives' perception of external pay fairness can affect their motivation and investment in innovation, thus influencing the firm's innovation performance. When executives perceive external pay unfairness, they may reduce their commitment and enthusiasm toward innovation, undermining the firm's innovative capabilities and core competitiveness.

Based on the above analysis, this study aims to examine the impact of external pay fairness for executives on corporate innovation, while incorporating strategic risk-taking into the research framework. It seeks to explore whether strategic risk-taking plays a mediating role in the relationship between external pay fairness and innovation. The findings are expected to provide valuable insights and references for firms seeking to optimize executive incentive mechanisms, enhance strategic risk-taking capacity, and strengthen innovation capabilities.

2. Literature Review

2.1. The economic consequences of external fairness in executive compensation

2.1.1 The Impact of External Fairness of Executive Compensation on Enterprise Performance

When examining the economic effects of external equity in executive compensation, its impact on firm performance has consistently been a primary focus in academic research. Werner and Mero (1999) found that high levels of compensation promote firm performance, whereas low levels hinder performance improvement [1]. Wu Liansheng et al. (2010) discovered that positive additional pay significantly enhances firm performance in non-state-owned enterprises, while negative additional pay has no significant effect on performance in either state-owned or non-state-owned firms [2]. Fong (2010) found that positive external pay gaps encourage executives to place greater emphasis on stakeholder management, thereby improving firm performance [3]. Huang Hui (2012) conducted an empirical analysis from the perspective of external pay inequity and found that positive external pay inequity reduces managers' motivation and creativity, thus lowering firm performance; conversely, negative external pay inequity motivates executives to work harder and improve their capabilities, leading to enhanced firm performance [4]. Qi Huaixin and Zou Yan (2014) found a nonlinear inverted U-shaped relationship between external pay gaps for executives and firm performance, with interval effects present [5]. When external pay gaps fall within a moderate range, they positively stimulate performance improvement. However, once these gaps exceed a certain threshold—reaching a critical point—further increases in external pay disparities begin to hinder performance growth. Luo Huawei et al. (2015), using listed real estate companies as samples, found significant differences in the impact of external pay fairness on firm performance before and after the financial crisis [6]. Prior to the crisis, there was no clear correlation between external pay fairness and firm performance. After the crisis, however, this relationship changed dramatically, with external pay fairness beginning to significantly affect performance. Banker et al. (2016) quantified external pay fairness by comparing a firm's average compensation with the industry median, finding that external pay fairness exerts a positive influence on enhancing firm performance [7].

2.1.2. The Impact of External Fairness of Executive Compensation on Enterprise Innovation

Yang Jian (2017) studied Chinese high-tech listed companies from the dual perspectives of risk and return, finding that external equity in executive compensation affects corporate innovation. Positive additional pay is negatively correlated with R&D investment, while negative additional pay shows a positive correlation, with these relationships being particularly pronounced in non-state-owned enterprises [8]. Jin Jing and Wang Yanmin (2018) found that enhancing the external fairness of executive compensation effectively strengthens executives' capabilities and confidence, thereby encouraging them to favor innovative projects with higher risks and returns in investment decisions [9]. Mu Jianbo (2019), from a psychological perspective, discovered that widening the gap in executive pay can boost executives' self-confidence and improve corporate innovation efficiency [10]. Guo Shujuan et al. (2019) found that when an executive's salary exceeds those of peers in the same industry, a significant pay gap increases job satisfaction and enhances the positive impact of overseas experience on corporate technological innovation investment [11]. Luan Fugui and Ji Yafang (2020) also demonstrated that when executive compensation surpasses industry norms, this external pay advantage becomes a key driver for corporate innovation; conversely, if executive pay falls below the industry average, the resulting external disadvantage may significantly hinder innovation momentum [12].

2.2. Influencing Factors of Enterprise Innovation

2.2.1. External influencing factors

Regarding the external influencing factors of enterprise innovation, this article mainly reviews the relevant studies on macro policies, government subsidies, market factors, and institutional environment. Zhang Qianxiao and Feng Lei (2018) found that the volatility of macroeconomic policies significantly increases the explicit level of bank credit risks, thereby intensifying the strict restrictions and constraints that enterprises encounter when seeking financing [13]. The strengthening of these constraints significantly weakens the motivation and ability of enterprises to innovate and has a significant hindering effect on technological innovation activities. This inhibitory effect is particularly prominent and significant in non-state-owned enterprises and enterprises in the central and western regions. Bai Junhong (2011) conducted in-depth research on large and medium-sized industrial enterprises in China, and found that government subsidies, as a key source of innovation funds, have a significant effect on promoting enterprise innovation activities [14]. Yang Yang et al. (2015) confirmed the positive effect of government subsidies on enterprise innovation from the perspective of resource acquisition and signal transmission [15]. However, the research by Xiao Wen and Lin Gaobang (2014) discovered a different phenomenon. They pointed out that due to the government's preference for "long-term" technologies and the imperfect management of fund usage, government funding investment actually constrained the improvement of industrial enterprise technological innovation efficiency to a certain extent [16]. Aghion et al. (2005) pointed out that market competition can promote innovation through the "avoidance of competition effect" and hinder innovation through the "Schumpeter effect", jointly forming a "U-shaped" relationship between market competition and enterprise innovation [17]. Arora et al. (2022) showed that high market concentration promotes enterprises to implement innovation activities [18]. The innovation activities of enterprises are also influenced by the institutional environment in which they are located. The intellectual property protection system is one of the formal institutions that is most closely related to enterprise innovation behavior. Moser (2005) explored the impact of different levels of intellectual property protection on enterprises through an examination of the levels of intellectual property protection in various countries, and the research results showed that the emphasis on intellectual property protection could effectively promote the diversified development of innovation [19]. Wu Chaopeng and Tang Di (2016) further discovered that strengthening the enforcement of intellectual property rights not only significantly reduces the potential technological spillover losses resulting from R&D activities, but also effectively alleviates the external financing pressure faced by enterprises, thereby providing strong support for enterprise innovation [20]. In addition to the above

external influencing factors, Feng Genfu et al. (2021) also pointed out in their research that regional financial development level, industrial structure, and property rights protection level are also important external factors affecting enterprise technological innovation [21].

2.2.2. Internal influencing factors

When discussing the internal driving factors of enterprise innovation, this article mainly reviews the research results that are closely related to enterprise size, management characteristics, and equity structure configuration. Fisher and Temin (1973) empirically found that large-scale enterprises, due to having more abundant resources, tend to increase innovation investment compared to small-scale enterprises [22]. Zhou Li'an and Luo Kai (2005) based on data analysis of provincial-level enterprises in China, confirmed that this positive relationship is more significant in non-state-owned enterprises and not obvious in state-owned enterprises [23]. Yu Changhong and Yuan Yijun (2017) pointed out that the relationship between enterprise size and innovation presents a non-linear inverted U-shaped pattern [24]. Before reaching the critical value of enterprise size, the expansion of the enterprise is beneficial to innovation, but once exceeding the maximum value, the further development of the enterprise will have an inhibitory effect on innovation. Hirshleifer et al. (2012) found that overconfident executives will invest more in research and development projects, promoting patent output and enterprise innovation capabilities [25]. Yi Jingtao et al. (2015) using A-share listed companies as samples, also found that the overconfidence of the executive team has a positive promoting effect on enterprises' investment in increasing innovation projects [26]. Equity structure also affects enterprise innovation to a certain extent. Francis and Smith (1995) showed that compared with companies with a high proportion of management shareholding and important external major shareholders, companies with dispersed equity have lower innovativeness [27]. Shapiro et al. (2015) argued that excessive concentration of equity may cause major shareholders to reduce investment in high-risk innovation projects to avoid innovation risks, thereby inhibiting enterprise innovation [28].

2.3. The role of enterprise strategic risk assumption

2.3.1. Factors influencing the undertaking of strategic risks

Firstly, at the enterprise level. Xue (2014) conducted an empirical study and found that when having more decision-making power, the IT department with more business knowledge and knowledge creation capabilities would encourage enterprises to undertake more strategic risks in the digitalization of supply chains, thereby bringing operational and strategic benefits to the enterprises [29]. Guo Rong and Wen Qiaotian (2019) analyzed in depth the driving factors of strategic risk undertaking from the dual perspectives of retrospective and forward-looking performance feedback. The research results showed that when the actual performance of the enterprise failed to meet expectations, the negative feedback increased, and the level of strategic risk undertaking by the enterprise rose [30].

Secondly, at the managerial level, Liu Zhenjie et al. (2019) believed that strategic risk undertaking includes debt, technological innovation and capital investment. They used specific indicators to measure these risks and based on the higher-order and imprint theories, studied the impact of the poor experience of the chairman on these risk undertakings. It was found that the poor-experience chairman was more conservative in debt and R&D investment risks, while more active in capital investment [31]. Lu Wendong et al. (2020) selected various best business leaders selected by authoritative media as research samples and found that CEOs with celebrity status would inhibit the risk undertaking of enterprises at the strategic level [32]. Fu Junhui et al. (2022) found that managers with strong research capabilities were more likely to reduce the company's strategic risk undertaking [33]. Campbell et al. (2019) believed that the birth order of the chief executive officer was positively correlated with their strategic risk undertaking behavior. In other words, compared with late-born chief executive officers, early-born chief executive officers performed more cautiously in strategic risk undertaking [34]. Lei Xinghui et al. (2024) studied the influence of humility of managers under the context of performance expectation gap. Through empirical research, it was shown that when facing a large performance

expectation gap, managers with humble traits could significantly promote the improvement of the strategic risk undertaking level [35].

2.3.2. The economic consequences of strategic risk-taking

Most scholars examine the connotation of risk-taking from a financial perspective and believe that there is a positive correlation between risk-taking and enterprise performance. Barger et al. (2009) pointed out that enterprises tend to undertake high risks to maintain high levels of capital expenditures and reduce cash reserves accordingly, which reflects the efficiency of their capital utilization and makes them more likely to bring about substantial wealth growth [36]. Mao et al. (2018) studied that higher risk-taking reflects high investment in R&D activities by enterprises, demonstrating stronger innovation enthusiasm [37]. Especially in the current rapidly developing social context, maintaining an innovative spirit is of great significance for enterprises to maintain long-term competitive advantages and obtain long-term benefits. Gao Lei (2018) studied the impact of risk-taking on enterprise performance from the perspective of property rights, and found that risk-taking is positively correlated with performance, and the risk-taking level of state-owned enterprises is lower than that of private enterprises [38].

Some other scholars have explored the relationship between risk-taking and enterprise performance in the field of strategic management and reached different conclusions. Bowman (1980) conducted research based on a wide sample covering 85 industries in the United States and deeply explored the relationship between risk and returns. The research results showed that there was a significant negative correlation trend between risk and returns in as many as 56 industries [39]. This might be due to enterprises' eagerness to improve their operations and blindly investing in risky projects, ultimately resulting in poor performance of the enterprises. Dong Baobao and Ge Baoshan (2014) studied 12 start-up enterprises in Changchun and found that the relationship between enterprise risk-taking and performance was inverted U-shaped, indicating that moderate risk-taking is beneficial to performance, while excessive or avoiding risks are detrimental [40].

3. Research Hypothesis

3.1. External Fairness of Executive Compensation and Firm Innovation

According to equity theory, executives' satisfaction with their compensation depends not only on the absolute level of pay they receive but also significantly on its relative value. When executives compare their own compensation with that of peers in the same industry, if they perceive that they are not being fairly rewarded, they may feel their abilities have not been adequately recognized and experience a sense of injustice. This perception inevitably reduces their motivation, hampers the full expression of their managerial talents, and leads to negative management behaviors. As a result, executives may become reluctant to take risks in pursuing innovative initiatives, thereby reducing corporate investment in research and development.

When executives find through comparison that their efforts are appropriately rewarded, first, they will feel satisfied with the current situation, perceiving that their performance and capabilities have been acknowledged and that their contributions to the company have received fair returns. The interests represented by executives and shareholders may partially overlap, thus easing agency conflicts between them. Executives will then be motivated to maintain the status quo while striving to maximize both personal and organizational benefits. They will analyze and integrate internal and external information to make business decisions more favorable to the company. This implies that, under a fair compensation system, executives receive reasonable and effective incentives that encourage them to fully utilize their talents, embrace risk-taking, and commit themselves to innovation, thereby maximizing shared value for both individuals and organizations.

Second, compared to routine operations, innovation activities typically involve longer cycles, higher risks, and uncertain returns. Therefore, creating an environment that sufficiently tolerates failure is particularly important in motivating and fostering innovation [41]. Salary rigidity increases

executives' tolerance for failure when compensation levels are perceived as fair. High salaries provide financial security, giving executives the courage and willingness to pursue innovative ventures—even if outcomes fall short of expectations—since they are mentally prepared to bear the associated risks. Furthermore, when executives earn high compensation, they are more likely to attribute it to their personal abilities, overlooking objective factors. Overestimating their individual capabilities often manifests as excessive confidence. Overconfident executives tend to have stronger motivations toward innovation investments [26], and companies led by such executives are more likely to demonstrate higher levels of innovation output [42] and greater adoption of new technologies. Compared to other business activities, implementing innovation involves higher risks and greater challenges. In such circumstances, overconfident executives usually lean toward taking risks; they approach challenges with enthusiasm, are confident in their ability to handle complex projects, and aspire to prove themselves through successful innovation. Thus, they are more inclined to promote and support innovative initiatives.

Finally, in today's highly competitive business environment, talent is undoubtedly the core force driving enterprise advancement. Talent serves not only as the engine for sustainable growth but also as the source of innovation and transformation. Through a fair and competitive compensation system, companies can significantly enhance senior managers' sense of belonging and loyalty—a key factors in ensuring long-term stability within executive teams. When these critical individuals feel their efforts and contributions are properly rewarded, they are more likely to remain in their positions rather than leave due to short-term incentives. This positive motivational effect encourages them to think more deeply about how to drive sustainable development, continuously explore new market opportunities, develop new products or services, and improve existing processes and technologies. Moreover, establishing such an incentive mechanism not only strengthens the internal talent base of a company but also continuously fuels its innovation activities. It provides innovators with a safe and reliable platform where they can freely explore new ideas and solutions. Based on this, the paper proposes the following hypothesis:

H1: The higher the external fairness of executive compensation, the higher the level of corporate innovation.

3.2. The mediating effect of enterprise strategic risk assumption

Based on the agency theory framework, executives' consideration of personal interests during decision-making significantly influences their choices regarding risky investment projects. Particularly in environments characterized by information asymmetry, executives may favor decisions that maximize their individual benefits, even if such choices harm shareholders and the long-term interests of the firm. Therefore, an effective compensation incentive system is crucial for reducing opportunistic behavior among executives in investment decisions [43]. Qiang Guo (2012) pointed out that providing managers with reasonable incentives helps reduce risk-averse behaviors they might otherwise exhibit in investment decisions, while effective compensation schemes can influence managers' risk preferences, diminish their risk aversion, and thereby enhance the firm's willingness to take risks [44]. From the perspective of strategic leadership, a firm's level of strategic risk-taking reflects the willingness of its executives to assume risk [45]. As the core actors responsible for executing key strategic decisions, executives' risk-taking tendencies play a decisive role in shaping the strategic risks ultimately faced by the enterprise [46]. When executives perceive their compensation levels as relatively fair through social comparison, they experience higher personal satisfaction and recognition, which enhances their confidence. To maintain their current pay and benefits, executives are more motivated to work harder, create greater value, and become more proactive in making high-risk strategic decisions. This positive mindset and behavioral shift directly increase executives' risk-taking propensity, thereby promoting higher levels of strategic risk-taking within the firm.

As a firm's strategic risk-taking increases, so do the intensity of market competition and uncertainty it faces. To identify new profit opportunities and gain a competitive edge in a fiercely

competitive environment, many firms tend to pursue strategies that, although riskier, offer substantial expected returns [47]. This risk-taking orientation not only encourages firms to embrace greater risk but also drives them to deeply explore and pursue innovation—developing new products, technologies, or services—to meet evolving market demands and sustain competitive advantage [40]. This demand for innovation compels firms to allocate more resources toward innovative activities, thus enhancing their innovation capabilities. Moreover, increased risk tolerance means firms are willing to invest more resources into high-risk, high-reward innovation projects. By directing capital, talent, technology, and other critical resources toward more innovative and promising areas, firms achieve optimal resource allocation, ensuring maximum return on every investment. This approach not only improves the efficiency of innovation efforts, enabling firms to respond faster and more accurately to emerging market trends and needs, but also creates more innovation opportunities. These opportunities may arise from technological breakthroughs, unmet market gaps, or novel business models, all of which open up broader development prospects and generate greater economic returns. Zhang Zhihong and Zhu Xiaolin (2018) further support this view, noting that when executive compensation exceeds industry averages, their capacity and tolerance for innovation-related risk significantly increase [48], motivating them to actively seek innovation opportunities, invest more in R&D, lead innovation initiatives, and create greater value for the firm. Based on this, we propose the following hypothesis:

H2: Strategic risk-taking plays a mediating role between external equity of executive compensation and corporate innovation.

4. Research method

4.1. Data source and sample screening

This study covers the listed companies of Shanghai and Shenzhen A-shares in China from 2013 to 2022. The relevant data mainly comes from the CSMAR database and has undergone a series of rigorous preprocessing steps. Firstly, the original data is preliminarily cleaned and matched using Excel software. Then, using Stata software, the data is further screened and organized according to the following standards: (1) Given the unique asset-liability structure of the financial industry, the meanings of financial indicators and their regulatory rules are significantly different from those of other industries. Therefore, companies classified as belonging to the financial industry in the 2012 version of the industry classification by the China Securities Regulatory Commission are excluded; (2) ST and *ST companies have financial risks, and their financial data lack reference value and may interfere with the accuracy and significance of the results. Therefore, these companies are excluded; (3) To ensure the completeness of the data and the effectiveness of the analysis, companies with missing key indicator data such as executive compensation and enterprise patents are excluded; (4) To reduce the influence of extreme values on the regression results, Winsorize tail trimming is performed on continuous variables at the 1% and 99% levels, and finally, a data set containing 3,693 companies and 20,819 valid observations is obtained.

4.2. Variable definition and research model

4.2.1. Variable Definition

(1) Dependent variable: Corporate innovation (Innovation).

This study measures corporate innovation from the innovation output dimension using patent counts. Following Zhong et al. (2014) [49] and Yan and Gao (2022) [50], we use the total number of granted invention patents, utility model patents, and design patents in the current year as the core indicator. To reduce skewness, we take the natural logarithm of one plus this total as the proxy for corporate innovation. For robustness, indicators from the innovation input dimension will be introduced in subsequent tests.

(2) Independent variable: External fairness of executive compensation (Fair).

Following Bu et al. (2010) [51] and Qi and Zou (2014) [5], we adopt the relative percentile method to measure the external fairness of executive compensation. First, we calculate the average compensation of the top three executives of the focal firm, denoted as N_i . Then, for firms in the same year and industry, we extract the average compensation of their top three executives and identify the maximum value, denoted as N_{max} . Based on these two values, we calculate the relative percentile N_i/N_{max} and the relative difference $N_i - N_{max}$. The relative percentile N_i/N_{max} ranges from 0 to 1. The closer it is to 1, the closer the focal firm's executive compensation is to the highest level in the external market, indicating higher external fairness. The relative difference $N_i - N_{max}$ is negative; a larger value indicates a smaller gap from the highest industry compensation and thus higher external fairness. In this study, the top three executives refer to the three directors, supervisors, and senior executives with the highest compensation. Compensation is measured by its natural logarithm.

(3) Mediating variable: Corporate strategic risk-taking (Capital).

Following Miller and Bromiley (1990) [52] and Schumacher et al. (2020) [45], three ratios—capital intensity, long-term debt ratio, and R&D intensity—have been used to measure corporate strategic risk. However, long-term debt data in our sample have substantial missing values, which hinders accurate measurement. In addition, R&D expenditure is directly and closely related to corporate innovation, the dependent variable. To avoid confounding the empirical results, we do not use the long-term debt ratio or R&D intensity. Instead, we use capital intensity (Capital), measured as capital expenditure divided by total assets at the end of the period, as the proxy for corporate strategic risk-taking. Capital intensity reflects the degree of financial leverage. Firms raising funds through debt reduce financing costs but bear higher financial risk. Therefore, a higher capital intensity indicates greater strategic risk-taking.

(4) Control variables.

Following Wu et al. (2010) [2], Yan and Gao (2022) [50], Li et al. (2014) [53], and Gu and Zhu (2021) [54], we control for firm size (Size), capital structure (Lev), return on total assets (Roa), firm growth (Growth), cash flow ratio (Cashflow), executive shareholding ratio (Mshare), Tobin's Q (TobinQ), ownership concentration (Top1), board size (Board), and firm age (FirmAge). We also include year (Year) and industry (Industry) dummies. Variable definitions are reported in Table 1.

Table 1. Variable definition.

Variable	Definition
Firm Innovation (Innovation)	Natural logarithm of one plus the total number of Patents Granted by the Enterprise in the Current Year
Relative index of executive compensation fairness (Fair)	Ratio of the natural logarithm of the average compensation of the top three executives in the sample enterprises to the natural logarithm of the maximum average compensation of the top three executives in the same industry in the same year
Intensity of capital (Capital)	Ratio of capital expenditure to total assets
Firm size (Size)	Natural logarithm of a firm's total assets
Leverage ratio (Lev)	Total liabilities divided by total assets
Return on assets (Roa)	Profits divided by the average balance of total assets
Growth rate of operating income (Growth)	Ratio of increase in operating income to total operating income of the previous period
Cash flow ratio (Cashflow)	Ratio of net cash flow from operating activities to total assets
Shareholding ratio of top managers (Mshare)	Number of shares held by top managers divided by the total number of shares
TobinQ (TobinQ)	Ratio of a company's market value to its asset replacement cost
Ownership concentration (Top1)	Shareholding ratio of the largest shareholder of the enterprise
Board size (Board)	Natural logarithm of the number of board members
Number of years since the firm's establishment (FirmAge)	Natural logarithm of one plus the establishment years of the firm

4.2.2. Model Specification and Mediation Test

To test H1, we estimate the following model:

$$\text{Innovation} = \alpha_0 + \alpha_1 \text{Fair} + \alpha_2 \text{Controls} + \Sigma \text{Year} + \Sigma \text{Industry} + \varepsilon \quad (1)$$

Where Innovation represents corporate innovation; a larger value indicates a higher level of innovation. Fair represents the relative measure of external fairness of executive compensation; a larger value indicates higher external fairness. Controls is a vector of control variables including Size, Lev, Roa, Growth, Cashflow, Mshare, TobinQ, Top1, Board, and FirmAge. ε is the error term. We expect α_1 to be positive, suggesting that higher external fairness of executive compensation is associated with a higher level of corporate innovation.

To test H2, that is, whether corporate strategic risk-taking mediates the relationship between external fairness of executive compensation and corporate innovation, we add Capital to the model and estimate Eq. (2) and (3):

$$\text{Capital} = \beta_0 + \beta_1 \text{Fair} + \beta_2 \text{Controls} + \Sigma \text{Year} + \Sigma \text{Industry} + \varepsilon \quad (2)$$

$$\text{Innovation} = \eta_0 + \eta_1 \text{Fair} + \eta_2 \text{Controls} + \Sigma \text{Year} + \Sigma \text{Industry} + \varepsilon \quad (3)$$

Following Wen et al. (2004) [55], the mediation test proceeds as follows. First, we test whether α_1 in Eq. (1) is significant. If it is significant, we proceed to test the mediation effect; otherwise, the mediation analysis stops. Second, we test whether β_1 in Eq. (2) is significant. Third, we test whether η_1 and η_2 in Eq. (3) are significant. If both η_1 and η_2 are significant, corporate strategic risk-taking plays a partial mediating role. If η_1 is not significant but η_2 is significant, it plays a full mediating role. If either β_1 or η_2 is not significant, the Sobel test is further used to confirm the mediation effect.

5. Baseline analyses

5.1. Descriptive statistics

This paper comprehensively reveals the basic characteristics of the sample through descriptive statistical analysis, calculates and summarizes the key statistical indicators of each variable, and the specific results are shown in Table 2. If you follow the “checklist” your paper will conform to the requirements of the publisher and facilitate a problem-free publication process.

Table 2. Descriptive statistics.

Variable	Observations	Mean	S.D.	Min.	Median	Max.
Innovation	20819	1.904	1.547	0	1.946	6.208
Fair	20819	0.879	0.053	0.760	0.876	1
Capital	20819	0.049	0.044	0.001	0.036	0.236
Size	20819	22.231	1.256	19.907	22.041	26.422
Lev	20819	0.408	0.194	0.046	0.399	0.908
Roa	20819	0.042	0.068	-0.361	0.041	0.258
Growth	20819	0.176	0.366	-0.562	0.119	3.216
Cashflow	20819	0.050	0.065	-0.172	0.048	0.260
Mshare	20819	15.409	19.927	0	2.923	69.056
TobinQ	20819	2.134	1.357	0.813	1.712	11.443
Top1	20819	33.643	14.221	8.861	31.401	74.824
Board	20819	2.112	0.194	1.609	2.197	2.708
FirmAge	20819	2.924	0.303	1.792	2.944	3.584

In terms of the dependent variable, the average value of enterprise innovation (Innovation) measured by the number of patent grants is 1.904, with a standard deviation of 1.547. The difference between the two extreme values is 6.208, indicating that there is a significant disparity in the number of patent grants among different listed companies, suggesting that there are certain differences in the innovation output of different enterprises.

In terms of the explanatory variables, the average value of external fairness of executive compensation (Fair) measured by relative quantiles is 0.879, with a median of 0.876. This indicates that there is still a gap between the executive compensation of the sample enterprises and the highest value of executive compensation in the same industry in the same year.

In terms of the mediating variables, the average value of enterprise strategic risk-taking (Capital) calculated based on capital intensity is 0.049, with a range of 0.235. This shows that there is a significant difference in the strategic risk-taking level among different enterprises.

In terms of the control variables, the meaning of capital structure (Lev) is 0.408, ranging from 0.0459 to 0.9079. This large span reveals the significant differences in financial stability among enterprises. The range of total asset net profit rate (Roa) is -0.361 to 0.258, with a median of 0.041, indicating that the profit levels of the sample enterprises are diverse, but more than half of the enterprises are in a profitable state. The minimum value for enterprise growth (Growth) is -0.562, with a median of 0.119, indicating that the sample enterprises are generally in a state of revenue growth, with overall good growth performance. The average value of cash flow ratio (Cashflow) is 0.050, with a minimum value of -0.172 and a maximum value of 0.260, indicating that the proportion of net cash flow in operating activities of the sample enterprises is generally low. The data of executive shareholding ratio (Mshare) ranges from 0 to 69.056, with a standard deviation of 19.927, indicating significant differences in the shareholding ratio of executives among sample enterprises. The range of Tobin's Q (TobinQ) is 10.630, indicating a significant difference in market value among sample enterprises. The standard deviation of equity concentration (Top1) is as high as 14.221, with a minimum value of 8.861 and a maximum value of 74.824, reflecting the significant differences in the shareholding ratio of the first major shareholder of different enterprises, and thereby reflecting the different severity of the second type of principal-agent problem among listed companies.

5.2. Main results

As shown in column (1) of Table 3, the regression coefficient α_1 of the external fairness of executive compensation (Fair) on enterprise innovation (Innovation) is significantly positive at the 0.1% level, which is consistent with expectations. The results indicate that as the value of Fair increases, that is, as the external fairness of executive compensation enhances, the innovation level of the enterprise also increases accordingly. Hypothesis H1 is thus confirmed.

Column (2) presents the regression test results of Eq (2). The regression coefficient β_1 of the external fairness of executive compensation (Fair) on enterprise strategic risk assumption (Capital) is 0.0612, which is significantly positive at the 0.1% level. Model (3) is the regression test result of Eq (3). At the same time, executive compensation external fairness (Fair) and enterprise strategic risk assumption (Capital) are included in the regression of enterprise innovation (Innovation). It can be seen that the regression coefficients η_1 and η_2 of executive compensation external fairness Fair and enterprise strategic risk assumption (Capital) on enterprise innovation (Innovation) are both significantly positive, with a significance level of 0.1%. According to the test method of intermediary effect by Wen Zhonglin et al., the regression coefficients α_1 , β_1 , η_1 and η_2 in Eq (1), (2) and (3) are all significant, indicating that enterprise strategic risk assumption plays a partial intermediary effect in the process of executive compensation external fairness influencing enterprise innovation, verifying the correctness of hypothesis H2.

Table 3. The regression results of the external fairness of executive compensation and enterprise innovation.

	(1) Innovation	(2) Capital	(3) Innovation
Fair	2.306*** (10.22)	0.061*** (8.78)	2.250*** (9.96)
Capital			0.911*** (4.22)
Size	0.302*** (23.83)	-0.001*** (-3.75)	0.303*** (23.93)
Lev	-0.047 (-0.76)	0.018*** (9.15)	-0.064 (-1.02)
Roa	1.143*** (6.70)	0.045*** (8.95)	1.102*** (6.45)
Growth	-0.190*** (-7.58)	0.005*** (5.88)	-0.195*** (-7.76)
Cashflow	0.916*** (5.66)	0.062*** (12.23)	0.860*** (5.29)
Mshare	0.008*** (15.07)	0.000*** (15.72)	0.007*** (14.50)
TobinQ	0.002 (0.31)	0.000 (0.13)	0.002 (0.31)
Top1	0.002** (2.95)	0.000** (2.69)	0.002** (2.87)
Board	0.278*** (5.35)	-0.002 (-1.54)	0.281*** (5.40)
FirmAge	-0.284*** (-8.11)	-0.013*** (-11.73)	-0.272*** (-7.73)
Constant	-6.833*** (-22.63)	0.049*** (5.37)	-6.877*** (-22.77)
N	20819	20819	20819
adj. R2	0.290	0.148	0.291
Year	control	control	control
Industry	control	control	control

Note: ***, **, * indicate significance at the 0.1%, 1%, and 5% levels respectively. The values in parentheses are the t-values, and the same applies below.

The Sobel test yielded a Z value of 3.365 and a p-value of 0.00076575, indicating that the mediation effect is significant at the 0.1% level. Subsequently, the Bootstrap method was used for further verification, with results summarized in Table 4. The data in the table show that the 95% confidence interval does not include zero, once again confirming that the mediation effect passes the test.

Table 4. Bootstrap test.

	Observed Coefficient	Bias	Bootstrap std. err.	[95% conf. interval]	
_bs_1	0.0338818	0.0003795	0.01035561	0.0163786	0.0569547(P)
				0.0161652	0.0562005(BC)
_bs_2	-1.6448358	0.0025515	0.2277171	-2.084098	-1.184579(P)
				-2.077097	-1.169649(BC)

5.3. Robustness test

5.3.1. Replace the explained variable

To enhance the robustness of the research findings, this study follows the approach of Luan Fugui and Ji Yafang (2020) [16] and Yi Jingtao et al. (2015) [30], adopting an innovation input perspective by replacing the measure of corporate innovation with the ratio of expenditure on R&D activities to operating revenue.

According to the regression results in Table 5, in column (1), the regression coefficient α_1 for external fairness of executive compensation (Fair) on corporate innovation (Innovation1) is 0.0649, significant at the 0.1% level, indicating that higher external fairness of executive pay is associated with higher levels of corporate innovation, thus supporting hypothesis H1. In columns (2) and (3), the regression coefficients β_1 , η_1 and η_2 are all significant at the 0.1% level, with signs and significance levels consistent with those in the original model, further confirming the mediating role of corporate strategic risk-taking and supporting hypothesis H2. Therefore, the research conclusions are robust.

Table 5. Robustness test of replacing the explained variable.

	(1) Innovation1	(2) Capital	(3) Innovation1
Fair	0.065*** (10.63)	0.061*** (8.78)	0.061*** (10.12)
Capital			0.055*** (8.37)
Size	0.001** (2.62)	-0.001*** (-3.75)	0.001** (2.87)
Lev	-0.050*** (-25.82)	0.018*** (9.15)	-0.051*** (-26.29)
RoA	-0.086*** (-12.23)	0.045*** (8.95)	-0.088*** (-12.57)
Growth	-0.004*** (-4.67)	0.005*** (5.88)	-0.004*** (-5.01)
Cashflow	-0.015*** (-3.35)	0.062*** (12.23)	-0.019*** (-4.08)
Mshare	0.000*** (13.68)	0.000*** (15.72)	0.000*** (12.63)
TobinQ	0.005*** (16.38)	0.000 (0.13)	0.005*** (16.44)
Top1	-0.000*** (-7.02)	0.000** (2.69)	-0.000*** (-7.21)
Board	-0.000 (-0.23)	-0.002 (-1.54)	-0.000 (-0.14)
FirmAge	-0.011*** (-11.07)	-0.013*** (-11.73)	-0.010*** (-10.33)
Constant	0.021** (2.71)	0.049*** (5.37)	0.018* (2.35)
N	20819	20819	20819
adj. R ²	0.430	0.148	0.433
Year	control	control	control
Industry	control	control	control

5.3.2. Explain the variable with a one-period lag

Considering that the impact of external fairness of executive compensation on enterprise innovation may have a lag effect, this paper will re-perform the regression after lagging the explanatory variable of external fairness of executive compensation by one period. The regression results are shown in Table 6. The regression coefficients α_1 , β_1 , η_1 and η_2 remain significantly

positive at the 0.1% level, which is consistent with the previous research conclusions, indicating that the research conclusions of this paper are robust.

Table 6. Stability test of explanatory variables lagged by one period.

	(1) Innovation	(2) Capital	(3) Innovation
L.Fair	2.279*** (8.87)	0.049*** (6.41)	2.233*** (8.68)
Capital			0.961*** (3.70)
Size	0.316*** (21.99)	0.000 (0.94)	0.316*** (21.99)
Lev	-0.059 (-0.83)	0.020*** (9.31)	-0.078 (-1.09)
Roa	1.065*** (5.62)	0.038*** (7.23)	1.029*** (5.42)
Growth	-0.177*** (-5.77)	0.007*** (6.99)	-0.183*** (-5.98)
Cashflow	0.987*** (5.22)	0.058*** (10.65)	0.931*** (4.91)
Mshare	0.009*** (14.61)	0.000*** (15.04)	0.008*** (14.05)
TobinQ	0.012 (1.32)	0.001** (2.83)	0.011 (1.23)
Top1	0.002** (2.68)	0.000 (1.42)	0.002** (2.64)
Board	0.318*** (5.36)	-0.003 (-1.56)	0.321*** (5.41)
FirmAge	-0.242*** (-5.77)	-0.010*** (-8.07)	-0.232*** (-5.53)
Constant	-7.344*** (-21.16)	0.010 (0.98)	-7.353*** (-21.22)
N	16468	16468	16468
adj. R ²	0.286	0.146	0.286
Year	control	control	control
Industry	control	control	control

6. Research conclusion

This paper takes the listed companies in Shanghai and Shenzhen stock markets of China from 2013 to 2022 as the research sample, to explore the impact of the external fairness of executive compensation on enterprise innovation and the mediating effect of enterprise strategic risk-taking. Furthermore, it conducts group tests from three aspects: the nature of enterprise property rights, the region where the enterprise is located, and whether the enterprise is a high-tech industry, to examine the heterogeneity characteristics of the impact of the external fairness of executive compensation on enterprise innovation. Through relevant empirical analysis using Stata software, the following conclusions are obtained:

(1) The improvement of enterprise innovation level is significantly influenced by the external fairness of executive compensation. When the external fairness of executive compensation is high, they are more inclined to fully exert their talents, be courageous in taking risks and attempting innovation. Fairness enhances the executives' tolerance for failure, enabling them to dare to accept challenges and tend to choose high-risk, high-return innovative projects.

(2) Enterprise strategic risk-taking plays a mediating role in the relationship between the two. An effective compensation incentive system can reduce the opportunistic behavior of executives, lower

their risk-averse tendencies, and increase their willingness to take risks. The improvement of risk-taking level also means that the enterprise is willing to allocate more resources to high-risk but potentially high-return innovative projects for research and innovation.

(3) The external fairness of executive compensation for non-state-owned enterprises has a more significant impact on innovation incentives. State-owned enterprise executives are appointed and remunerated by the government and pay attention less to the external fairness of compensation. Their innovation motivation is weak. The executive compensation of non-state-owned enterprises is more market-oriented and more sensitive to external fairness, so the external fairness of executive compensation has a more prominent impact on innovation incentives.

(4) Compared with enterprises in the central and western regions, the external fairness of executive compensation of enterprises in the eastern region has a more significant promoting effect on enterprise innovation. The economic development level of the eastern region of China is relatively higher, and the market competition is more intense. Enterprises need to rely on more competitive compensation to attract and retain executive talent. The external fairness of executive compensation can make executives more actively engaged in work, stimulate their innovation motivation, and thereby promote the implementation of enterprise innovation activities.

(5) The external fairness of executive compensation for high-tech industry executives has a stronger promoting effect on enterprise innovation than that for non-high-tech industries. Generally speaking, high-tech industries have higher requirements for technology and continuous innovation, and technological breakthroughs are the key for enterprises to maintain competitive advantages and market share. The external fairness of compensation can stimulate the competitive awareness and innovation spirit of executives, enabling them to be more actively seeking new market opportunities and technological breakthroughs, thereby promoting the implementation of enterprise innovation activities.

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References

- [1] Werner S, Mero N P. Fair or foul: The effects of external, internal, and employee equity on changes in performance of major league baseball players[J]. *Human Relations*, 1999, 52(10): 1291-1311.
- [2] Wu Liansheng, Lin Jingyi, Wang Yaping. External Fairness of Compensation, Equity Nature and Company Performance [J]. *Management World*, 2010(03): 117-126 + 188.
- [3] Fong E A. CEO pay fairness as a predictor of stakeholder management[J]. *Journal of Business Research*, 2010, 63(4): 404-410.
- [4] Huang Hui. External Inequality and Internal Gap in Executive Compensation and Enterprise Performance [J]. *Economic Management*, 2012, 34(07): 81-92.
- [5] Qi Huajin, Zou Yan. Empirical Study on the Incentive Effect of External Fairness of Executive Compensation on Agent Behavior [J]. *Accounting Research*, 2014(03): 26-32+95.
- [6] Luo Huawe, Song Kan, Gan Shengdao. Research on the Correlation between External Fairness of Executive Compensation and Enterprise Performance: Evidence from Chinese A-share Listed Real Estate Companies [J]. *Soft Science*, 2015, 29(01): 6-10.
- [7] Banker R D, Bu D, Mehta M N. Pay gap and performance in China[J]. *A Journal of Accounting Finance and Business Studies*, 2016, 52(3): 501-531.
- [8] Yang Jian. External Fairness of Compensation and Enterprise R&D Innovation [J]. *Economic Issues Research*, 2017(10): 139-145.
- [9] Jin Jing, Wang Yanmin. External Fairness of Executive Compensation, Property Rights Nature and Enterprise Risk-taking [J]. *Commercial Research*, 2018(04): 95-102.

- [10] Niu Jianbo, Li Shengnan, Yang Yulong, et al. Executive Compensation Gap, Governance Model and Enterprise Innovation [J]. *Management Science*, 2019, 32(02): 77-93.
- [11] Guo Shujuan, Lu Yaxi, Chang Jingping. Executive Overseas Background, Compensation Gap and Enterprise Technological Innovation Investment - An Empirical Analysis Based on PSM [J]. *East China Economic Management*, 2019, 33(07): 138-148.
- [12] Lu Tanfu, Ji Yafang. External Compensation Gap of Executives, Company Governance Quality and Enterprise Innovation [J]. *Economic Review*, 2020, 37(01): 114-122.
- [13] Zhang Qianxiao, Feng Lei. Macroeconomic Policy Uncertainty and Enterprise Technological Innovation - Based on Empirical Evidence from Listed Companies in China [J]. *Contemporary Economic Science*, 2018, 40(04): 48-57+126.
- [14] Bai Junhong. Is the Government's R&D Funding Effective in China? Evidence from Large and Medium-sized Industrial Enterprises [J]. *Quarterly Journal of Economics*, 2011, 10(04): 1375-1400.
- [15] Yang Yang, Wei Jiang, Luo Lijun. Who is Utilizing Government Subsidies for Innovation? - Joint Regulatory Effects of Ownership and Factor Market Distortions [J]. *Management World*, 2015(01): 75-86+98+188.
- [16] Xiao Wen, Lin Gaobang. Government Support, R&D Management and Technological Innovation Efficiency - An Empirical Analysis Based on Industrial Sectors in China [J]. *Management World*, 2014(04): 71-80.
- [17] Aghion P, Bloom N, Griffith R, et al. Competition and innovation: an inverted-U relationship[J]. *Quarterly Journal of Economics*, 2005, 120(2): 701-728.
- [18] Arora A, Belenzon S, Suh J. Science and the market for technology[J]. *Management Science*, 2022, 68(10): 7176-7201.
- [19] Moser P. How Do patent laws influence innovation? Evidence from nineteenth-century world's fairs[J]. *The American Economic Review*, 2005, 95(4): 1214-1236.
- [20] Wu Chaopeng, Tang Di. The Enforcement of Intellectual Property Protection, Technological Innovation and Enterprise Performance: Evidence from Chinese Listed Companies [J]. *Economic Research Journal*, 2016, 51(11): 125-139.
- [21] Feng Genfu, Zheng Mingbo, Wen Jun, et al. Which Factors Determine Technological Innovation of Chinese Enterprises: A Re-empirical Study Based on Nine Major Chinese Economic Authorities Journals and A-share Listed Companies Data [J]. *China Industrial Economy*, 2021(01): 17-35.
- [22] Fisher F M, Temin P. Returns to scale in research and development. What does the schumpeterian hypothesis imply? [J]. *Journal of Political Economy*, 1973, 81(1): 56-70.
- [23] Zhou Li'an, Luo Kai. Enterprise Size and Innovation: Empirical Evidence from Provincial Level in China [J]. *Journal of Economics (Quarterly Edition)*, 2005(02): 623-638.
- [24] Yu Changhong, Yuan Yijun. Enterprise Size, Technology Acquisition Mode and R&D Structure [J]. *Research in Science and Technology*, 2017, 35(10): 1527-1535.
- [25] Hirshleifer D, Low A, Teoh S H. Are overconfident CEOs better innovators?[J]. *The Journal of Finance*, 2012, 67(4): 1457-1498.
- [26] Yi Jingtao, Zhang Xiuping, Wang Huicheng. Enterprise Heterogeneity, Executive Overconfidence and Enterprise Innovation Performance [J]. *Nankai Management Review*, 2015, 18(06): 101-112.
- [27] Francis J, Smith A. Agency costs and innovation some empirical evidence[J]. *Journal of Accounting and Economics*, 1995, 19(2-3): 383-409.
- [28] Shapiro D, Tan Y, Wang M. The effects of corporate governance on innovation in Chinese firms[J]. *Journal of Chinese economic and business studies*, 2015, 13(4): 311-335.
- [29] Xue L. Governance-knowledge fit and strategic risk taking in supply chain digitization[J]. *Decision Support Systems*, 2014(62): 54-65.
- [30] Guo Rong, Wen Qiaotian. Dual Performance Feedback, Internal and External Governance Mechanisms, and Strategic Risk Taking [J]. *Economic Management*, 2019, 41(08): 91-112.
- [31] Liu Zhenjie, Li Yingda, Li Weian. Chairman's Poverty Experience and Enterprise Strategic Risk Taking [J]. *East China Economic Management*, 2019, 33(11): 142-152.

- [32] Lv Wendong, Lin Lin, Zhao Yang. Celebrity CEOs and Enterprise Strategic Risk Taking [J]. China Soft Science, 2020(01): 112-127.
- [33] Fu Junhui, Yang Jiawei, Xia Yujia, et al. Managerial Ability and Enterprise Strategic Risk Taking: "Advancing Against the Wind" or "Retreating in the Face of Danger"? [J]. Finance and Economic Review, 2022(08): 69-79.
- [34] Campbell R J, Jeong S H, Graffin S D. Born to take risk? The effect of CEO birth order on strategic risk taking [J]. Academy of Management Journal, 2019, 62(4): 1278-1306.
- [35] Lei Xinghui, Wu Jichun, Su Taoyong, Zhang Jintao. Managers' Humility, Performance Expectation Gap, and Strategic Risk Taking [J]. Foreign Economics and Management, 2024, 46(5): 51-64.
- [36] Bargerion L L, Lehn M K, Zutter J C. Sarbanes-Oxley and corporate risk-taking[J]. Journal of Accounting and Economics, 2009, 49(1): 34-52.
- [37] Mao X C, Zhang C. Managerial risk-taking incentive and firm innovation: evidence from FAS 123R[J]. Journal of Financial and Quantitative Analysis, 2018, 53(2): 867-898.
- [38] Gao Lei. Does the nature of property rights or market competition lead to better enterprise performance? - An examination from the perspective of risk assumption [J]. Economic and Management Studies, 2018, 39(01): 136-144.
- [39] Bowman E H. Risk return paradox for strategic management[J]. Sloan Management Review, 1980, 21(3): 17-31.
- [40] Dong Baobao, Ge Baoshan. Research on the Inverted U-shaped Relationship between New Enterprise Risk-taking and Performance and the Mediating Role of Opportunity Capacity [J]. Nankai Management Review, 2014, 17(04): 56-65 + 87.
- [41] Manso G. Motivating innovation[J]. The Journal of Finance, 2011, 66(5): 1823-1860.
- [42] Galasso A, Simcoe T S. CEO overconfidence and innovation[J]. Management Science, 2011, 57(8): 1469-1484.
- [43] Jin Jing, Jiang Biding, Ding Heping, et al. Legal Environment, External Fairness of Executive Compensation and Enterprise Risk-taking [J]. Journal of Jilin University of Commerce, 2019, 35(05): 42-49 + 56.
- [44] Qiang Guoliang. Does Management Equity Incentive Reduce Company Excessive Investment? Evidence from the Reform of Shareholding System [J]. Investment Research, 2012(2): 31-43.
- [45] Schumacher C, Keck S, Tang W J. Biased interpretation of performance feedback: The role of CEO overconfidence[J]. Strategic Management Journal, 2020, 41(6): 1139-1165.
- [46] Chen Ming, Xiong Xiancheng. State-owned Equity and Private Enterprises' Strategic Risk Taking: A Dual Perspective Based on "Capability" and "Will" [J]. Contemporary Finance and Economics, 2021(07): 90-102.
- [47] Quan Jingjing, Wang Junling. Enterprise Strategic Risk Taking, Social Capital and Enterprise Performance [J]. Contemporary Economic Management, 2023, 45(1): 29-38.
- [48] Zhang Zhihong, Zhu Xiaolin. Property Rights Nature, Senior Management's External Compensation Gap and Enterprise Risk Taking [J]. Journal of Central South University of Law and Politics, 2018(03): 14-22+158.
- [49] Zhong Changbiao, Huang Yuanzhe, Liu Wei. Research on the Impact of Overseas R&D of Emerging Economies on Parent Company Innovation: Based on the Perspectives of Incremental Innovation and Disruptive Innovation [J]. Nankai Economic Research, 2014, 29(6): 91-104.
- [50] Yan Weichen, Gao Siyue. Social Relationships of the Management Team and Enterprise Innovation: Based on the Perspective of "Family Relationship" [J]. Accounting Research, 2022(02): 70-85.
- [51] Bu Danlu, Cai Chun, Ye Jianming. Research on the Issue of Senior Management Compensation Equity: Thoughts Based on Quantitative Methods from Comprehensive Theoretical Analysis [J]. Accounting Research, 2010(05): 39-46.
- [52] Miller K D, Bromiley P. Strategic risk and corporate performance: An analysis of alternative risk measures[J]. Academy of Management Journal, 1990, 33(4): 756-779.

- [53] Li Wenjing, Cen Yongci, Hu Yuming. Does the External Compensation Gap Motivate Executives? An Empirical Study Based on the Manager Market and Ownership Nature of Chinese Listed Companies [J]. Nankai Management Review, 2014, 17(04): 24-35.
- [54] Gu Haifeng, Zhu Huiping. Does the Gap in Executive Compensation Promote Enterprise Innovation Investment? Evidence from Chinese A-share Listed Companies [J]. Accounting Research, 2021(12): 107-120.
- [55] Wen Zhonglin, Zhang Lei, Hou Jietai, et al. The Procedure for Testing Mediating Effects and Its Application [J]. Acta Psychologica Sinica, 2004(5): 614-62.