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# Study on the Relationship Between Intra-executive Compensation Gap and Corporate Innovation

-- From Chinese Evidence from A-share Listed Manufacturing Companies in China

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**Abstract:** The relationship between the internal compensation gap of executives and firm innovation in Chinese manufacturing listed companies is investigated using a sample of Chinese manufacturing companies listed in Shanghai and Shenzhen A-shares from 2015 to 2020. Robustness tests are conducted using propensity score matching method and replacement variable method, and the differences are further discussed based on the nature of property rights and the degree of industry competition. The results of the study show that there is a significant positive relationship, and this relationship is more significant among non-state manufacturing firms and manufacturing firms with high industry concentration.

**Keywords:** Internal pay gap for executives, Corporate innovation, Manufacturing firms.

## 1. Introduction

As a microscopic subject of improving economic quality, manufacturing enterprises can only efficiently promote China's transformation from a large manufacturing country to a strong manufacturing country by achieving high-quality development of the manufacturing industry and improving its innovation level. In our government work report in 2022, it is proposed that we should adhere to the innovation-driven development strategy, strengthen the status of enterprises as the main body of innovation, implement various innovation incentive policies, promote enterprises to increase their R&D investment, enhance the core competitiveness of manufacturing industry, and promote the construction of a strong quality country. However, how can we effectively stimulate enterprises to carry out innovation activities? Incentivizing innovation has also become an important topic of concern for both theoretical and practical circles. In China, due to the long-term separation of ownership and control, the agency problem between shareholders and managers always exists. Moreover, since innovation activities are characterized by high risk, long period and easy failure, operators are often reluctant to take the high risks associated with innovation activities for the sake of maximizing their own interests [1], which will undoubtedly intensify the conflict between shareholders and management [2]. Therefore, providing certain incentives to management can alleviate their "short-sighted" behavior and give them a long-term perspective for the long-term interests of the company. Among all incentive methods, compensation incentive is the most effective one, and the construction of incentive-oriented executive compensation system has become one of the hot topics.

As compensation incentives continue to be strengthened, the salaries of core executives have gone up. Especially in recent years, the huge salaries of executives of listed companies have triggered greater controversies. From the literature and media reports, we can find that the public tends to focus on the pay gap between executives and employees, while paying less attention to the pay gap within the executive team. In fact, in recent years, there is a large pay gap between core executives and non-core executives in China's listed manufacturing companies and the trend is increasing year by year. Therefore, this paper selects the vertical pay gap within the executives to study the significance of rationalizing the internal pay structure of the executive team.

Previous studies have focused on the impact of intra-firm pay gap on corporate performance, surplus management and corporate value, and relatively little research has been conducted on the impact of innovation. However, studying the impact of the pay gap on the innovation capability of enterprises can help enterprises make compensation decisions in line with their own development according to the innovation-driven development strategy. The State Council issued "Several Opinions on Deepening the Reform of Institutional Mechanisms to Accelerate the Implementation of Innovation-driven Development Strategy" in 2015 to guide the deepening of institutional reforms and emphasize accelerating the implementation of innovation-driven development strategy [3]. Therefore, this paper selects panel data of manufacturing companies listed in Shanghai and Shenzhen A-shares in China from 2015 to 2020, and investigates the relationship between vertical compensation gap within executives and firms' innovation input and innovation output, and further investigates the moderating effect of the nature of property rights and industry competition on this relationship. This paper may have the following contributions: First, focusing on the Chinese manufacturing industry, a representative of the real economy, this paper uses the latest panel data to study the relationship between the vertical pay gap within executives and corporate innovation, which enriches the relevant studies on the relationship between pay gap and innovation. Second, in the empirical study, this paper adopts the propensity score matching method to solve the possible sample self-selection problem and improve the credibility of the empirical estimation. Third, grouping based on the nature of property rights and the degree of industry competition further explores the relationship between internal and external factors of the firm on the internal pay gap of executives and firm innovation, which enriches the research perspective in this area.

# 2. Theoretical Analysis and Hypothesis Formulation

## 2.1. Section Headings

Reviewing the existing literature, it can be seen that the early research on compensation focused on the incentive effect brought by pay level, and it was not until the 1980s that pay gap was proposed as a determinant of pay incentive level. With the in-depth research on executive promotion and corporate innovation in academia, scholars concerned found that executive incentives help promote corporate innovation. Yang et al. (2007) and Wang et al. (2015) found a significant positive relationship between top management incentives and the scale of corporate investment in technological innovation [4, 5]. If firms do not provide effective compensation incentives to executives, it tends to reduce the innovation motivation of executives (Jin, Yuchao, and Jin, Qinglu, 2016) [6]. By studying compensation incentives and corporate innovation in GEM firms, Feng Gu and Lin Zhang (2018) [7] found that executive compensation incentives promote innovation investment in firms. Hanmin Yan and Yan Liang (2020) [8] examined the effects of executive compensation gap and equity incentives on R&D investment using a sample of mixed state-owned enterprises in Shanghai and Shenzhen A-shares, and the results showed that both executive incentives and compensation gap have a positive relationship with R&D investment. Xia Han (2022) [9] found that pay incentives can significantly promote executives to carry out innovative activities. The above studies indicate that executive compensation incentives occupy an extremely important position in corporate innovation investment decisions. Existing studies have mainly explained the pay gap and its economic consequences based on two different perspectives, tournament theory and social comparison theory.

Tournament theory, first proposed by Lazear and Rosen, was initially used to explain executive overpay, and was later extended to explain the need for pay gaps between different levels within a firm and their incentive effects. According to the tournament theory, a larger pay gap attracts the attention of executives and thus enhances their motivation to invest in innovation (Shen and Zhang, 2018) [10]. Moreover, a larger pay gap can increase management's risk tolerance for innovation activities and improve the efficiency of implementing their innovation decisions (Xiufen Wang and Xiaoxing Yang, 2019) [11]. The pay gap within the executive team is conducive to creating a competitive atmosphere that can simultaneously stimulate the competitive consciousness of executives at different levels (Qifeng Zhao and Yongzhong Wang, 2019) [12]. Jianbing Shao and Shan Wu (2021) [13] conducted a study based on a dual innovation perspective, and the results showed that expanding the pay gap of executive teams is more conducive to exploitative innovation. Gu, Haifeng, and Zhu, Huiping (2021) [14] found that the executive pay gap facilitated more innovation investment efforts in firms with overconfident executives, firms in regions with low levels of intellectual property protection, and state-owned enterprises, compared to firms with underconfident executives, firms in regions with high levels of intellectual property protection, and non-state-owned enterprises. Zhang Hengfeng (2022) [15] found that the internal pay gap promoted innovation and the executive pay premium also increased the innovation level of firms.

The social comparison theory, which is based on equity theory and derived from the relative exploitation theory, offers the exact opposite explanation. This theory suggests that as the pay gap increases, individuals' feelings of unfairness and exploitation will prevail, which will lead to negative psychology and behaviors that are detrimental to business development (Sweeney and Inderrieden, 1990; Cowherd and Levine, 1992) [16, 17]. Executives judge the fairness of their access to compensation by comparing with other executives (Huang Hui, 2012) [18], and a smaller pay gap is more favorable for executives to increase their innovation investment (Zhang Dong and Yang Xingquan, 2015) [19], while too large a pay gap affects the level of innovation investment in the firm (Lu Wei and Zhang Shukai, 2015; Chen Hui et al., 2017) [20, 21]. Moreover, people tend to compare the compensation they receive with others and will tend to overestimate their own inputs in the process of comparison, and when they feel that their reward-input ratio is lower than that of the reference, they are prone to a sense of unfairness and exploitation, which in turn leads to a series of negative behaviors (Ruan Ao, 2019) [22], so companies should reduce the pay gap to improve team efficiency (Wang et al. 2020) [23] and team stability (Nan Xu and Han-Yi Tian, 2021).

In the context of high power distance in China, subordinates tend to develop a submissive mentality in order to maintain good working relationships with their superiors, thus following the formal power hierarchy and the differences it entails [22]. Because of this, non-core executives in executive teams are highly inclusive of the disparity between themselves and their superior executives in terms of compensation packages and are more likely to accept vertical pay disparities within the team. Specifically, tournament theory suggests that pay disparities between different levels of the firm have an incentive effect on both those who have been promoted and those who participate in the competition (Lazear and Rosen, 1981; Lin, JoonChing, 2003) [25, 26]. Thus, intra-executive pay gaps may positively affect the innovation motivation of both core and non-core executives. Moreover, a higher pay gap may increase executives' willingness to take risks, make them choose riskier projects, and ensure the smooth implementation of innovation projects by improving execution efficiency. On the other hand, for non-core executives, when they expect to be paid a higher amount upon promotion, it also increases their motivation to innovate. Therefore, the tournament theory is more applicable to explain the impact brought by the pay gap within the executive team on the firm.

Based on the above analysis, this paper proposes the following hypotheses.

H1a: Based on tournament theory, vertical pay gap within executives promotes corporate innovation

H1b: Based on the social comparison theory, the vertical pay gap within executives inhibits corporate innovation

# 3. Research Design

## 3.1 Sample Selection and Data Source

The sample selected in this paper is China's listed manufacturing companies in Shanghai and Shenzhen A-shares from 2015 to 2020. The data used are from the Cathay Capital (CSMAR) database and WIND database. With reference to previous literature, this paper further screens and processes the samples according to the following criteria: (1) excluding ST and *ST enterprise samples; (2) excluding samples with serious missing data; (3) excluding samples

listed for less than one year; (4) in order to eliminate the influence of extreme values, this paper makes a winsor treatment of 1% and 99% quantile for all continuous variables. The final observed value is 3042.

## 3.2 Variable Description

Dependent variable: In this paper, referring to the research results of Luan Fugui (2020) [27], corporate innovation is divided into two dimensions:The first dimension is to measure corporate innovation investment by R&D intensity, and in order to eliminate the effect of scale effect, the ratio of R&D expenses to total assets, RDA, is used as an indicator to measure corporate innovation investment [28]. The second dimension measures corporate innovation output by the number of patent applications, and considering the right-hand bias problem of patent application data, the variable Patent is obtained in this paper by adding 1 to the value of invention patents and taking the natural logarithm.

Independent variables: Since monetary incentives play a major role in promotion tournaments and non-monetary incentives are not yet commonly realized in China, they are often difficult to quantify. Therefore, this paper mainly considers the incentive effect from salary increase. Referring to Yang and J. (2021), the difference between the mean value of core executive compensation and the mean value of non-core executive compensation is taken as a logarithm as a measure of the intra-executive pay gap [29]. The formula calculation process is as follows.

Average value of core executives' remuneration = total annual remuneration of directors and supervisors in the first three years/3

Average value of non-core executive remuneration = (total annual remuneration of directors and supervisors - total annual remuneration of directors and supervisors in the first three years) / (number of executives - number of sole directors - number of directors and supervisors not receiving remuneration / 3)

Intra-executive pay gap = ln(core executive pay gap - mean of non-core executive pay)

Control variables: The control variables in this paper are firm size (Size), gearing ratio (Lev), total net asset margin (Roa), equity checks and balances (Top), firm's future investment opportunities (TobinQ), book-to-market ratio (MB), management shareholding (Mshare) and board size (Lnboard), while controlling for year and industry.

The variables, symbols and detailed definitions are shown in Table 1.

**Table 1.** Variable definitions and descriptions

| Variable Type | Variable Name | Variable Symbols | Variable Definition |
|---|---|---|---|
| **Dependent variable 2** | Innovation input | RDA | R&D expenses / total assets |
| | Innovation output | Patent | Ln(Number of invention patent applications + 1) |
| **Independent variable** | Compensation gap within executives | Gap | ln (average core executive compensation - average non-core executive compensation) |
| **Control variables** | Company Size | Size | Logarithm of the company's total assets |
| **Control variables** | Gearing ratio | Lev | total liabilities at the end of the period/total assets at the end of the period |
| | Return on Assets | Roa | net income/total assets average balance, market value/total assets |
| | Enterprise future investment opportunities | Tobinq | market value/total assets |
| | Book-to-market ratio | MB | book value/total market value |
| | Executive shareholding ratio | Mshare | number of shares held by management/total equity |
| | Concentration of shareholding | Top | percentage of shares held by the top 10 largest shareholders |
| | Board size | Lnboard | Ln(number of board members) |
| | Year | Year | The year dummy variable is used to control for the effect of year factor |
| | Industry | Industry | |

## 3.3 Model Setting

Referring to the studies of Niu Jianbo (2019) [30] and Yang Jie (2021) [29], this paper constructs the following model to study the relationship between vertical pay gap within executives and corporate innovation, as well as to study the relationship between the two on the basis of distinguishing the nature of property rights and the degree of industry competition, and to test hypotheses 1 and 2.

$$Innovation_{i,t}=\alpha+\beta Gap+\gamma Controls_{i,t}+\sum Year+\sum Industry+\varepsilon_{i,t} \quad (1)$$

Where, $Innovation_{i,t}$ is the firm's innovation input RDA, innovation output Patent, $Controls_{i,t}$ is the control variables affecting firm innovation and executive compensation gap, $\alpha$ is the intercept term, $\beta$ is the regression coefficient of the variables, $\gamma$ is the regression coefficient of the control variables, and $\varepsilon_{i,t}$ is the residual.

The empirical analysis of this study is completed using Stata 16.0.

# 4 Regression Results and Analysis

## 4.1 Descriptive Statistics Analysis

The descriptive statistics of the relevant variables are shown in Table 2. It can be seen that the mean value of RDA of innovation input of China's manufacturing listed companies from 2015 to 2020 is 0.027, and the standard deviation is 0.017. the mean value of Patent, a variable used to measure innovation output, is 2.061, and the standard deviation is 1.207. the above data indicate that there are large differences in the levels of both innovation input and innovation output of China's manufacturing listed companies. The mean value and standard deviation of vertical compensation gap within executives are 12.778 and 0.727, which indicates that there is a large difference in the internal compensation gap of executives among listed companies in China's manufacturing industry.

**Table 2.** Descriptive statistics results

| Variable | Observations | Average value | Standard deviation | Minimum value | Median value | Maximum Value |
|---|---|---|---|---|---|---|
| **RDA** | 3 781 | 0.027 | 0.017 | 0.001 | 0.0241 | 0.097 |
| **Patent** | 3 781 | 2.061 | 1.207 | 0 | 1.946 | 5.063 |
| **Gap** | 3 781 | 12.812 | 0.727 | 10.927 | 12.778 | 14.946 |
| **Size** | 3 781 | 22.058 | 1.080 | 20.035 | 21.944 | 25.220 |
| **TobinQ** | 3 781 | 2.493 | 2.080 | 0.276 | 1.860 | 11.008 |
| **Lev** | 3 781 | 0.377 | 0.174 | 0.050 | 0.370 | 0.827 |
| **Roa** | 3 781 | 0.056 | 0.062 | -0.162 | 0.052 | 0.250 |
| **Top** | 3 781 | 0.613 | 0.138 | 0.263 | 0.632 | 0.900 |
| **MB** | 3 781 | 0.737 | 0.654 | 0.097 | 0.539 | 3.907 |
| **Mshare** | 3 781 | 0.220 | 0.222 | 0 | 0.158 | 0.729 |
| **Lnboard** | 3 781 | 2.100 | 0.188 | 1.609 | 2.197 | 2.565 |

## 4.2 Test of the Relationship Between Pay Gap and Corporate Innovation

This paper uses a static panel data model for the study, and the results after Hausman test show that the fixed effects model is the appropriate econometric model. Table 3 reports the results of the regression analysis of pay gap and innovation inputs and outputs. Columns (1) and (3) show the regression results when people and control variables are not included, and columns (2) and (4) show the regression results when control variables such as corporate governance are included. As can be seen from Table 3, the coefficients of executive internal pay gap are significantly positive at the 1% level in all regression results, indicating that the executive internal vertical pay gap can promote corporate innovation input and innovation output, and the results validate H1a. It shows that higher executive internal pay gap can improve corporate innovation without considering other factors, and the effect of tournament theory is more significant in manufacturing listed companies more pronounced than the social comparison theory. The reason for this result is closely related to the context of high power distance in China, reflecting the recognition of the pay gap between levels.

**Table 3.** Regression results of intra-executive pay gap on corporate innovation

| | RDA | RDA | Patent | Patent |
|---|---|---|---|---|
| **Gap** | 0.003*** | 0.003*** | 0.363*** | 0.136*** |
| | (6.46) | (7.54) | (13.45) | (4.70) |
| **Constant** | -0.010 | 0.023** | -1.822*** | -7.845*** |
| | (-1.07) | (2.02) | (-2.94) | (-10.04) |
| **Controls** | Control | Control | Control | Control |
| **Year** | Control | Control | Control | Control |
| **Industry** | Control | Control | Control | Control |
| **N** | 3 781 | 3 781 | 3 781 | 3 781 |
| **R2** | 0.048 | 0.161 | 0.082 | 0.165 |
| **F** | 6.551 | 18.78 | 11.61 | 19.43 |

Note: * * *, * * *, * denote significant at 1%, 5%, 10% level, respectively, and the values in parentheses are t-test values

## 4.3 Robustness Tests

The robustness check of this paper is carried out in two aspects: first, the propensity score matching method is used to overcome the possible self-selection effect of intra-firm pay gap; second, the core explanatory variables are tested for robustness using the replacement variable method.

### 4.3.1 Propensity Score Matching

There may be endogeneity in the intra-firm pay gap due to the "self-selection" effect, i.e., firms with high innovation capability are more likely to choose a higher intra-firm pay gap,[31] and this self-selection effect may lead to endogeneity. In order to overcome the possible self-selection effect of intra-firm pay gap, this paper refers to the literature of Allen Xiong et al [32] and Qingbin Meng et al [33], and adopts propensity score matching (PSM) for the sample to overcome the effect of self-selection effect.

**Table 4.** Propensity score matching equilibrium test

| | Average value | | Standardization bias | t 检验 | |
|---|---|---|---|---|---|
| | Experimental group | Control group | | t 值 | p-value |
| Size | 22.229 | 22.294 | -6.3 | -1.92 | 0.055 |
| Lev | 0.3802 | 0.388 | -4.4 | -1.41 | 0.157 |
| Roa | 0.0626 | 0.061 | 3.4 | 1.08 | 0.282 |
| TobinQ | 2.419 | 2.307 | 5.4 | 1.83 | 0.067 |
| MB | 0.748 | 0.794 | -7.2 | -2.16 | 0.031 |
| Mshare | 0.205 | 0.198 | 3.1 | 1.00 | 0.316 |
| TOP10 | 0.615 | 0.617 | -1.0 | -0.32 | 0.749 |
| Lnboard | 2.098 | 2.112 | -7.5 | -2.38 | 0.018 |

Note: The 1:3 proximity matching method is selected in this table, and the original t-test hypothesis in the table is that the sample means of the experimental and control groups are equal

Specifically, in this paper, the median of vertical pay gap within executives is taken as the cut-off point, and companies with pay gap greater than the median are taken as the experimental group and companies with less than the median are taken as the control group, and the control variables in the main test are selected as the matching variables for 1:3 proximity matching. The results of the equilibrium test for propensity score matching are shown in Table 4, indicating that there is no longer a significant self-selection effect in the sample after passing propensity score matching.

The matched sample is regressed again, and the regression results are shown in columns (1) and (2) of Table 5. It is found that the coefficients of the intra-executive pay gap are still significant, indicating the robustness of the main test results.

**Table 5.** Robustness test regression results

| | RDA | Patent | RDA | Patent | RDA | Patent |
|---|---|---|---|---|---|---|
| Gap | 0.005*** | 0.120*** | | | | |
| | (8.06) | (3.24) | | | | |
| Gap1 | | | 0.002*** | 0.078*** | | |
| | | | (7.28) | (3.38) | | |
| L.Gap | | | | | 0.003*** | 0.127*** |
| | | | | | (6.43) | (3.93) |
| Controls | Control | Control | Control | Control | Control | Control |
| Year | Control | Control | Control | Control | Control | Control |
| Industry | Control | Control | Control | Control | Control | Control |
| N | 2 898 | 2 898 | 3 669 | 3 669 | 2 783 | 2 783 |
| R2 | 0.186 | 0.127 | 0.160 | 0.163 | 0.179 | 0.188 |
| F | 15.36 | 18.55 | 18.66 | 19.09 | 16.14 | 17.17 |

Note: * * *, * * *, * denote significant at 1%, 5%, 10% level, respectively, and the values in parentheses are t-test values

#### 4.3.2 Substitution Variable Method

In this paper, we refer to Hengfeng Zhang (2021) [15] to re-measure the vertical pay gap within executives, and select the gap between the top three executive pay gaps and the mean of non-top three executive pay to take the logarithm (Gap1) to replace the core explanatory variables, and repeat the above research process, and the empirical results are shown in columns (3) and (4) of Table 5; and refer to Ao Ruan (2019) [34] to replace the core explanatory variables lagged by one period (L.Gap) and regressed the main test again, and the results are presented in columns (5) and (6) of Table 5. The findings of the study after replacing the variables are basically consistent with the previous paper, indicating that the findings of the above study have good stability.

### 4.4 Further Analysis

Through the previous analysis, this paper finds that the vertical pay gap within executives significantly promotes the intensity of R&D investment and increases the number of invention patent applications of enterprises. After the robustness test, the findings of this paper still hold.

#### 4.4.1 Moderating Role Of Property Rights Nature

State-owned enterprises and non-state-owned enterprises differ significantly in terms of management and compensation systems, which leads to the fact that the same economic behavior may have different economic consequences in enterprises with different property rights nature . SOEs lack an effective managerial market; in fact, SOE executives are basically appointed by the local government or SASAC, and most of them have the corresponding administrative rank, and their daily assessment, rewards and punishments, and promotions are basically conducted according to the model of government officials . Therefore, for SOE executives, the promotion of administrative rank is their main incentive, while the incentive effect of salary is relatively less obvious, or other gray income exists, resulting in the weakened tournament effect of salary gap. Therefore, the nature of property rights of SOEs is likely to weaken the incentive effect of compensation mechanism.

In this paper, the sample is divided into sub-samples of state-owned enterprises and private enterprises according to the nature of property rights, and the regressions are conducted separately, and the results are shown in Table 6. From the results in Table 6, it can be seen that there is no significant difference between the role of property right nature on pay gap and innovation input, which remains consistent with the results of the main regression. However, the positive correlation between pay gap and innovation output is more significant in the subsample of private enterprises, indicating that the pay gap among executives within private enterprises has a more significant contribution to the innovation output of enterprises compared to state-owned enterprises. This may be due to the fact that for SOE executives, pay incentives are only one of many incentives, and executive level promotion may have a substitution effect

on pay incentives, making management less sensitive to pay incentives.

**Table 6.** Further analysis

| | State-owned enterprises | | Private enterprises | |
|---|---|---|---|---|
| | **RDA** | **Patent** | **RDA** | **Patent** |
| **Gap** | 0.003*** | 0.148* | 0.003*** | 0.146*** |
| | (3.83) | (1.76) | (5.85) | (4.71) |
| **Constant** | 0.036** | -9.649*** | 0.012 | -8.248*** |
| | (2.02) | (-5.65) | (1.01) | (-10.05) |
| **Controls** | Control | Control | Control | Control |
| **Year** | Control | Control | Control | Control |
| **Industry** | Control | Control | Control | Control |
| **N** | 572 | 572 | 3 093 | 3 093 |
| **R2** | 0.352 | 0.182 | 0.158 | 0.174 |
| **F** | 11.75 | 4.804 | 15.95 | 17.83 |

### 4.4.2 The Moderating Effect of Industry Competition Degree

When the market competition degree of the industry in which an enterprise is located is high, in order to survive and develop in the fierce competition and not to be eliminated by the industry to which they belong, enterprises tend to have a stronger sense of innovation and will develop more incentive compensation mechanism to motivate executives to carry out innovative activities. In this case, expanding the vertical pay gap within the executives, based on the tournament theory, the whole team will be more motivated to innovate, and because the external competitive environment is fierce and requires the core executives to make more accurate strategic decisions, increasing the pay gap at this time can motivate both the core executives and non-core executives. On the contrary, when the industry competition is relatively low and the overall willingness to innovate is not strong, the pay gap may have less impact on such firms. In this paper, the lower and higher HHI groups are recorded as the group with high industry competition and the group with low industry competition, respectively, according to the median Herfindahl Index (HHI) of each firm in the current year . And regression tests were conducted for each subsample of the two groups, and the results are presented in Table 7. The results indicated that in the subsample of firms with low industry competition, the positive relationship between intra-executive pay gap and firm innovation output was no longer significant; in the sample firms with high industry competition, the positive relationship between intra-executive vertical pay gap and innovation output was further enhanced; however, in the sample firms with low industry competition, the relationship between intra-executive vertical pay gap and firm innovation output However, the relationship between intra-executive vertical pay gap and innovation output of firms is weaker in the sample firms with lower industry competition. It indicates that a larger pay gap is more likely to enhance firms' innovation input and output levels in listed firms with high industry competition than in firms in a less competitive industry.

**Table 7.** Further analysis

| | High degree of industry competition | | Low industry competition | |
|---|---|---|---|---|
| | **RDA** | **Patent** | **RDA** | **Patent** |
| **Gap** | 0.004*** | 0.153*** | 0.001 | 0.126*** |
| | (6.16) | (3.61) | (1.60) | (2.75) |
| **Constant** | -0.019 | -12.034*** | 0.063*** | -5.895*** |
| | (-1.19) | (-11.73) | (4.82) | (-5.47) |
| **Controls** | Control | Control | Control | Control |
| **Year** | Control | Control | Control | Control |
| **Industry** | Control | Control | Control | Control |
| **N** | 1 761 | 1 761 | 1 395 | 1 395 |
| **R2** | 0.195 | 0.193 | 0.123 | 0.180 |
| **F** | 14.41 | 12.91 | 5.281 | 8.275 |

# 5 Conclusion

Based on the relevant data from Guotaian (CSCMAR), this paper investigates the impact of the internal compensation gap of executive team on corporate innovation input and innovation output in Chinese manufacturing listed companies from the perspective of power distance. The empirical results show that (1) there is a significant positive relationship between the internal pay gap of executives and the intensity of corporate R&D investment, i.e., as the pay gap increases, the level of corporate innovation investment increases; (2) there is a significant positive relationship between the internal pay gap of executives and corporate innovation output, i.e., as the internal pay gap of the executive team increases, it raises the number of invention-based patent applications of the company; (3) Further analysis reveals that the above two relationships differ slightly among manufacturing firms in terms of the nature of property rights and being in different industries. It should be noted that for state-owned enterprises, the positive correlation between the internal pay gap of executives and innovation output is significantly lower at the significance level; similarly, among enterprises in less competitive industries, the positive correlation between pay gap and innovation output is reduced, while the positive correlation with innovation input is no longer significant. In view of this, firms need to design the vertical pay gap within the executive team according to the actual situation they face, in order to maximize the incentive of risk-taking and

innovation motivation of core and non-core executives, and then improve the overall innovation input intensity and innovation output quality of the firm. Specifically, firstly, increasing the pay gap between core and non-core executives within the scope allowed by the policy can, to a certain extent, achieve the incentive effect and thus improve their innovation motivation; secondly, keeping the pay gap between core and non-core executives within a reasonable range according to the actual situation of enterprises, especially for state-owned enterprises and enterprises in low-competitive industries, whose core The pay gap between core and non-core executives should not be too large. In conclusion, this paper provides a theoretical basis for the formulation of compensation incentive policies for executive teams of enterprises with different property rights and in different industries.

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