

# Does the Pay Gap in the Top Management Team Incent Enterprise Innovation?

—Based on Property Rights and Financing Constraints

Jingru Hou

Department of Accounting, School of Management, Jinan University, Guangzhou, China

Email: zuixiangniande@126.com

**How to cite this paper:** Hou, J.R. (2018) Does the Pay Gap in the Top Management Team Incent Enterprise Innovation?—Based on Property Rights and Financing Constraints. *American Journal of Industrial and Business Management*, 8, 1290-1307. <https://doi.org/10.4236/ajibm.2018.85088>

**Received:** April 16, 2018

**Accepted:** May 20, 2018

**Published:** May 23, 2018

Copyright © 2018 by author and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

Using the patent applications data of listed firms in China from 2005 to 2014, this paper examines how the pay gap in the top management team influences enterprise innovation. The result shows that the number of patent applications especially the number of patents for invention increases significantly when the pay gap enlarges. It means the enlargement of the pay gap in the top management team could incent executives to make innovation decisions, to promote outputs of high-quality patents for invention. Finally the quality of enterprise innovation has been improved. Especially, the incentive effect of the pay gap in the top management team is more significant in private enterprises and enterprises with strong financing constraints. Therefore, enterprises in these two groups have better innovation behaviors.

## Keywords

The Pay Gap in the Top Management Team, Enterprise Innovation, Property Rights, Financing Constraints

---

## 1. Introduction

As the core brain of an enterprise, the top management team plays an important leading role in making decisions. Among many incentives to the top management team, compensation incentive is the most important and direct incentive mechanism, not only to focus on the level of compensation, but also to focus on the structure of compensation, and the most direct form of compensation structure is the pay gap in the top management team. How to adjust the pay gap to maximize its effectiveness and how to regulate the compensation structure have

always been constant issues in the field of corporate governance. In response to the issue of executive compensation, the state has attached great importance and published policies to guide it. In August 2014, the adoption and implementation of the compensation system reform plan for the chief executives of enterprises managed by the central government indicated that the reform of executive compensation of state-owned enterprises entered an advanced stage. This reform emphasized the differentiation of executive compensation, and the compensation distribution system should be adapted to the socialist market economy. At the same time, the state has brought innovation to the strategy height and encouraged enterprises to carry out technology transformation and promotion constantly. From “innovation is the key to unlock the growth lock radically”, we can sufficiently see the significance of innovation in enterprise development and economic growth. The top management team is an important decision-making group of an enterprise, and its collaborative cooperation and power of making decisions have significant influences on the accumulation of enterprise innovation achievements.

Existing researches on the economic consequences of the pay gap in the top management team are mostly from the perspective of corporate performance, investment and executive turnover. However, there is still a lack of deep understanding about how much incentive effect the pay gap can create to enterprise innovation. Therefore, based on the continuous improvement of China’s compensation system reform and the background of vigorously advocating innovation, this paper focuses on impacts of the pay gap in the top management team on enterprise innovation aiming to investigate real effects of the promotion of innovation strategy from the perspective of micro-enterprise, so as to provide references for designing the compensation structure of executives and adjusting incentive methods of innovation.

The major contribution of this paper is to explore the role of top management for enterprise innovation, extending from the previous focus on CEO personal development to focus on the whole management team, and analyzing the differences between different property rights and financing constraints. It deepens our understanding of the importance of team incentives to enterprise innovation. The major limitation of this paper is that, due to the limitations of data disclosure, there are no specific types of executives. Different types of executives are playing different roles in the management of enterprises. For example, the executives in charge of R & D are more important than other executives in high-tech enterprises, and the pay gap between them may have different incentive effects on enterprise innovation.

The paper is organized as follows. Section 2 shows the literature review and develops the hypotheses. Section 3 describes the sample selection and data and provides the descriptive statistics of all variables. Section 4 shows the empirical results about impacts of the pay gap in the top management team on enterprise innovation. Section 5 concludes the paper.

## 2. Literature Review and Hypothesis Development

### Literature Review

Existing researches on incentive effects of the pay gap in the top management team mainly based on tournament theory and social comparison theory, and the results of those studies were significantly different. The tournament theory suggests that the existence of the pay gap within the top management team makes it possible for executives to compete with each other as in a tournament. The pay gap can effectively incentivize executives to work hard for higher salaries and promotions, and ultimately improve corporate performance [1] [2] [3] [4]. Analyses based on social comparison theory suggest that the enlargement of the pay gap adds to the sense of injustice [5] and makes the salary satisfaction [6], productivity and quality of the product decline [7]. Besides, the enlargement of the pay gap may lead to a high turnover rate and a lack of team cohesion [8] [9], then the employees' sense of identification is weakened, and it even may cause a conflict between executives. Finally, it has a negative impact on corporate performance [10] [11]. [12] said that in enterprises with high level of teamwork and technical complexity, the larger the pay gap was in the top management team, the lower growth the enterprise had.

Another set of literature related to this paper is about the factors affecting enterprise innovation. Foreign scholars have explored the factors from different perspectives: Some researchers found that the increase of shareholding ratio can provide executives with a stable working environment, make them reduce myopic behaviors and promote the increase of innovation outputs ultimately. Besides, analysts could evaluate a firm based on its performance, making it possible for executives to reduce the investment of innovation due to short-term performance pressures. So analysts' reports may have a negative impact on enterprise innovation. Moreover, other researchers said that the increase of stock liquidity can increase the likelihood of short selling and the risk of hostile takeover, and this could force executives facing short-term performance pressures to cut down the activities of innovation. Domestic scholars' researches on the factors of innovation can be divided into internal and external causes. From the perspective of the enterprise, papers such as [13] [14] found that compensation incentive, shareholding and overconfidence of executives can promote innovation activities. Besides, compared with other types of enterprises, private enterprises have more inputs and better efficiency for innovation. In terms of external environment, [15] this paper agreed with the opinion that the distortion of factor market has inhibited R & D expenditure. And the innovation performance could also be affected by the litigation risks faced by enterprises. Particularly, the litigation of products has a positive incentive to enterprise innovation compared with the litigation of capital.

The financing constraint is another important factor that influences innovation decisions of executives. Financial constraints pose impacts on investment behavior, R & D expenditure, and innovation outputs. Innovation activities re-

quire sufficient cash investment; otherwise, limited internal cash provision as well as drained external fund-raising will put enterprise into a hard choice whether to continue to innovation or to drop it in order to control the operation risk. In addition, State-owned enterprises are different from private ones facing innovation decisions in terms of the distinguished property institutions. State-owned enterprises, with strong political connections with government and banking system, can easily get credit resources [16] [17], while private enterprises, discriminated in loan policies, face harder financing constraints.

### 3. Hypothesis Development

Since innovation activities are characterized by long cycles and high risks, a reasonable pay gap in the top management team may incent executives to make risky innovation decisions in order to promote the development of innovation activities. In a top management team, the pay gap can make low-paid executives work harder for salary increases and promotions. At the same time, it can also make high-paid executives feel more worried about their present performance so that they force themselves to continue working hard. This kind of mechanism could reduce the monitoring cost of shareholders to management, relieve the principal-agent problem, and then improve the corporate performance. The quantity and quality of innovation outputs also affect the performance of executives, and it will incent executives to make more effective innovation decisions. In recent years, China's enterprise innovation has gradually transformed from caring purely about the quantity to paying more attention to the quality along with innovation outputs have had a change from simple designs to high-tech inventions. And the goal of enterprise innovation is changing from catering to taste of government to increasing market value [18]. In these situations, the pay gap in the top management team may be an important factor affecting enterprise innovation. So we draw to Hypothesis 1.

Hypothesis 1: Enterprises innovate more frequently and especially earn more high-quality innovation outputs with the enlargement of the pay gap in the top management team.

Property rights are important when we analyze the impact of the pay gap in the top management team on enterprise innovation. Differences in property rights make incentives for executives significantly different between state-owned enterprises and private enterprises. Firstly, the government has strict compensation restrictions on state-owned enterprises. When the government intervenes in affairs of state-owned enterprises, the implementation of compensation restrictions appears to be the best choice for the government due to the fact of information asymmetry and the government can't give each enterprise an appropriate compensation contract which is fully compliant with the characteristics of the enterprise development [19]. Compared with state-owned enterprises, the government does not push compensation restrictions on private enterprises. Executive compensation of private enterprises is determined by the board of directors

according to performance of executives, and the compensation varies largely with the performance. Secondly, the marketization of executives in state-owned enterprises is at a low level. Most of executives in state-owned enterprises are appointed by the government, so selections or promotions of them are not exactly matched with their performances. While executives of private enterprises are mostly selected from the manager market through competition. Performance, personal ability and value creativity have always been the main focus of their selections or promotions [20]. It can be seen that due to the restriction of compensation and promotion, the pay gap is not sufficient to incentivize executives in state-owned enterprises to carry out innovation decisions with high risks and uncertainties. However, in terms of executive compensation and promotion are both linked to the performance in private enterprises, the existence of the pay gap makes executives have more incentives to work hard, make innovation decisions actively, and enhance their own value by relying on innovation outputs. So we draw to Hypothesis 2.

Hypothesis 2: Compared with state-owned enterprises, private enterprises innovate more frequently and especially earn more high-quality innovation outputs with the enlargement of the pay gap in the top management team.

Besides institutional differences, financing constraints that most enterprises face in their developments are important factors that hamper the incentive policies. Performances of enterprises with weak financing constraints are relatively high in average, which discourages executives to involve innovation activities that may be bad for their performances, even though there is a certain pay gap in the top management team. On the other hand, enterprises with limited financial resources, which have been in a lower position in credit and capital market, consider innovation an opportunity to deliver positive signals to banks and governments, show their potential of development, and thus increase their market standings and to earn resources. As the old saying goes, "Poverty gives rise to the desire for change", enterprises facing strong financing constraints step more firmly to innovations. Therefore, with the incentive of the pay gap in the top management team, executives of enterprises with strong financing constraints tend to prove their abilities through high-quality innovation outputs. So we draw to Hypothesis 3.

Hypothesis 3: Compared with enterprises with weak financing constraints, enterprises with strong financing constraints innovate more frequently and especially earn more high-quality innovation outputs with the enlargement of the pay gap in the top management team.

## **4. Research Design**

### **4.1. Research Sample**

In 2005, the disclosure guidelines for enterprise financial reporting required listed firms to disclose executive compensation forcibly, which provided an important opportunity for calculating the pay gap in the top management team in

this paper. The sample interval of this paper has been cut to 2014 due to the lack of compensation data of executives in recent years. Therefore, we choose the data of Shanghai and Shenzhen a-share listed firms from 2005 to 2014 as a research sample. According to the actual control of an enterprise, we judge whether it belongs to a state-owned enterprise or a private one, eliminate the data of financial industries, eliminate the data of ST categories, eliminate the data that major variables are missing, and eliminate the data that the asset liability ratio is greater than 1 and the pay gap in the top management team is less than 0. Finally, 6157 observations are obtained in this research sample. The data of executive compensation, patents and other financial indicators are from the CSMAR database, and the data of property rights comes from the CCER database. Considering the effect of extreme values on statistical results, continuous variables are treated with a tails adjustment on the values of the first and the 99 percentiles of the distribution processed by Winsorize. We use the Stata12 for data processing in this paper.

## 4.2. Variable Descriptions

### 1) Enterprise innovation

According to previous research, enterprise innovation is mainly measured by the growth rate of new product sales revenue, R & D expenditure divided by total assets and the number of patent applications [21] [22]. Since technological innovation is finally implemented in the efficiency of resource allocation, we select the number of patent applications to measure enterprise innovation.

We divide patent applications into high quality patents and low quality patents. High quality patent applications refer to the patents that can promote the development and progress of technology innovation, while low quality patent applications generally refer to the patents with lower content of technology. Based on the provisions of China's patent law as well as existing literature, patents for invention are recognized as high quality patents, and non-invention patents, such as utility model and appearance design, are recognized as low quality patents. We use the number of patent applications, and then standardize it with plus one and evaluating the natural logarithm of it. The same standardization applies to the number of patents for invention and non-invention patents.

### 2) The pay gap in the top management team

Reference to [23], the pay gap in the top management team is equal to the difference between the average compensation of top three executives and the average compensation of other executives, and then we take the natural logarithm of the difference. The specific calculation formula is as follows:

$$\text{Teamgap} = \text{Ln}(\text{the average compensation of top three executives} - \text{the average compensation of other executives}).$$

### 3) Property rights

According to the character of final control of an enterprise, if it is controlled by the state-owned shareholder, the property right will be equal to 1, otherwise

to 0.

#### 4) Financing constraints

Reference to [24], we construct KZ index based on the sample of Chinese listed firms to measure financing constraints faced by different enterprises. The specific calculation process of KZ index is as follows: 1) For each year of the full sample, we divide the sample by operating net cash flow divided by total assets in the last year ( $CF_{i,t}/ASSET_{i,t-1}$ ), cash dividends divided by total assets in the last year ( $DIV_{i,t}/ASSET_{i,t-1}$ ), cash holdings divided by total assets in the last year ( $CASH_{i,t}/ASSET_{i,t-1}$ ), LEV and Tobin's Q. If  $CF_{i,t}/ASSET_{i,t-1}$  is lower than its median, we will assign the  $kz1$  to 1, otherwise to 0; if  $DIV_{i,t}/ASSET_{i,t-1}$  is lower than its median, we will assign the  $kz2$  to 1, otherwise to 0; if  $CASH_{i,t}/ASSET_{i,t-1}$  is lower than its median, we will assign the  $kz3$  to 1, otherwise to 0; if LEV is lower than its median, we will assign the  $kz4$  to 1, otherwise to 0; if Tobin's Q is lower than its median, we will assign the  $kz5$  to 1, otherwise to 0. 2) Calculate KZ index, and let  $KZ = kz1 + kz2 + kz3 + kz4 + kz5$ . 3) Use Ordered Logistic Regression with KZ index as the dependent variable to regress to  $CF_{i,t}/ASSET_{i,t-1}$ ,  $DIV_{i,t}/ASSET_{i,t-1}$ ,  $CASH_{i,t}/ASSET_{i,t-1}$ , LEV and Tobin's Q, and estimate the coefficient of each variable. 4) With the estimated results of the regression above, KZ index measuring the financing constraint for each enterprise could be predicted. The greater KZ index is, the stronger the financing constraint of an enterprise is.

#### 5) Other control variables

According to some researchers such as Junqing Lin (2003), Zhengtang Zhang (2007), Xuanyu Jiang (2016) and so on, we choose the enterprise size (Size), the ratio of assets and liabilities (Lev), the shareholding ratio of the largest shareholder (Top 1), the net cash flow (CF), the age of the enterprise (Age), the asset structure (Tangibility), the return on total assets (Roa), the roles of chairman and CEO whether to be integrated (Dual) and the board independence (Indepen) as control variables. The definitions of variable are shown in **Table 1**.

### 4.3. Descriptive Statistics

**Table 2** reports the descriptive statistics of main variables. In the sample interval, the mean value of the pay gap in the top management team (Teamgap) is 12.2954, and the standard deviation is 0.8324, which indicates that there are significant differences in Teamgap between enterprises. The mean value of patent applications (Patent) is 35.7908, and the standard deviation is 87.0392, which indicates that patent applications vary hugely in different enterprises. The mean value of patents for invention is 14.1441, which is more than a third of the number of patent applications, so it is clear that China's enterprise innovation has been transformed from the low-quality innovation to the high-quality innovation with patents for invention. Overall, the quality of enterprise innovation is generally improved potentially.

**Table 1.** Variable definition.

	Variable	Definition
Dependent variable	Patent	Ln (patent applications + 1)
	Patenti	Ln (patents for invention + 1)
	Patentud	Ln (utility models + appearance designs + 1)
Independent variable	Teamgap	Ln (the average compensation of top three executives – the average compensation of other executives)
	Size	Ln (total assets)
Control variable	Lev	Debt-to-assets ratio
	Top1	The shareholding ratio of the largest shareholder
	CF	The net cash flow/Total assets
	Age	Ln(age of establishment)
	Tangibility	Fixed assets/Total assets
	Roa	Net profit/Total assets
	Dual	If the chairman and CEO are integrated, equals to 1, otherwise to 0
	Indepen	The number of independent directors/The number of directors
	SOE	If it's state-owned enterprise, equals to 1, otherwise to 0
	KZ	The index of financing constraints
	Year	Year dummy variable
	Industry	Industry dummy variable

**Table 2.** Descriptive statistics for mean variables.

Variable	Obs	Mean	SD	Min.	Median	Max.
Patent	6157	35.7908	87.0392	1.0000	11.0000	641.0000
Patenti	6157	14.1441	36.1627	0.0000	4.0000	275.0000
Patentud	6157	20.9901	52.3258	0.0000	6.0000	365.0000
Teamgap	6157	12.2954	0.8324	10.1247	12.3177	14.4197
Size	6157	21.7708	1.1843	19.8097	21.5639	25.7804
Lev	6157	0.4311	0.2027	0.0460	0.4370	0.8681
Top1	6157	0.3674	0.1468	0.0896	0.3542	0.7465
CF	6157	0.0470	0.0687	-0.1369	0.0455	0.2352
Age	6157	1.6262	0.8963	0.0000	1.7918	2.9444
Tangibility	6157	0.2502	0.1482	0.0163	0.2213	0.6649
Roa	6157	0.0455	0.0511	-0.1368	0.0408	0.2040
Dual	6157	0.2362	0.4248	0.0000	0.0000	1.0000
Indepen	6157	0.3656	0.0504	0.2857	0.3333	0.5714
KZ	6157	0.6430	0.4792	0.0000	1.0000	1.0000



## 5. Results and Analysis

### 5.1. The Pay Gap in the Top Management Team and Enterprise Innovation

According to the above logic, we construct the model (1) to explore the effect of the pay gap in the top management team on enterprise innovation.

$$\begin{aligned} & \text{LnPatent}_{i,t} (\text{LnPatent}_{i,t}, \text{LnPatent}_{i,t-1}) \\ &= \alpha_0 + \alpha_1 \text{Teamgap}_{i,t-1} + \alpha_2 \text{Size}_{i,t-1} + \alpha_3 \text{Lev}_{i,t-1} + \alpha_4 \text{Top1}_{i,t-1} \\ & \quad + \alpha_5 \text{CF}_{i,t-1} + \alpha_6 \text{Age}_{i,t-1} + \alpha_7 \text{Tangibility}_{i,t-1} + \alpha_8 \text{Roa}_{i,t-1} \\ & \quad + \alpha_9 \text{Dual}_{i,t-1} + \alpha_{10} \text{Indepen}_{i,t-1} + \sum \text{Year} + \sum \text{Industry} + \varepsilon \end{aligned} \quad (1)$$

Since effects of innovation decisions in the current period may be reflected in the future through patent applications, it is necessary to adopt the lag phase of all independent variables when we explore the effect of the pay gap in the top management team on enterprise innovation, which can reduce endogenous problems. When building the regression model, we control other factors that are related to the pay gap in the top management team and influence enterprise innovation, so as to reduce the impact of the error term on regression results. The regression results of model (1) are shown in **Table 3**. According results in **Table 3**, the coefficient of Teamgap (the pay gap in the top management team) in column (1) is estimated to be 0.0669 with a significance level at 5%, which indicates that patent applications significantly increase when the pay gap in the top management enlarges. The coefficient of Teamgap in column (2) is estimated to be 0.1178 with a significance level at 1%, which indicates that patents for invention significantly increase when the pay gap in the top management team enlarges. However, the coefficient of Teamgap in column (3) is estimated to be -0.0032 and it is not significant, which indicates that patents for non-invention do not change significantly when the pay gap in the top management team enlarges. The above results support hypothesis 1. The pay gap in the top management team can incentive executives to make effective innovation decisions, promote outputs of high-quality patents for invention, and make innovation activities transform from caring purely about the quantity to paying more attention to the quality. Finally, the capacity and level of enterprise innovation have been substantially improved.

### 5.2. The Pay Gap in the Top Management Team and Enterprise Innovation-Group by Property Rights

In order to analyze whether there are differences in effects of the pay gap on enterprise innovation in different property rights, we divide the sample into two groups according to the property rights and repeat the regression of model (1). The regression results are shown in **Table 4**. According results in **Table 4**, the coefficient of Teamgap in column (4) is estimated to be 0.0882 with a significance level at 5%, which indicates that patent applications significantly increase when the pay gap enlarges in private enterprises. The coefficient of Teamgap in column (5) is estimated to be 0.1633 with a significance level at 1%, which indicates

**Table 3.** The pay gap in the top management team and enterprise innovation.

	(1) LnPatent	(2) LnPatenti	(3) LnPatentud
Teamgap	0.0669** (2.0426)	0.1178*** (3.6140)	-0.0032 (-0.0833)
Size	0.4544*** (11.4717)	0.4493*** (11.6124)	0.4102*** (9.3029)
Lev	0.0270 (0.1643)	0.1945 (1.1207)	0.0660 (0.3481)
Top1	0.0318 (0.1615)	-0.2066 (-1.0407)	0.2231 (1.0176)
CF	0.8649*** (3.1280)	0.6603** (2.4870)	0.7970** (2.4658)
Age	-0.0558* (-1.8297)	-0.0703** (-2.2415)	-0.0436 (-1.2173)
Tangibility	-0.5560*** (-2.5817)	-0.4863** (-2.3735)	-0.4266* (-1.7362)
Roa	1.8390*** (3.8855)	1.5393*** (3.1106)	1.7911*** (3.2329)
Dual	0.1264** (2.2609)	0.1241** (2.2485)	0.0744 (1.1106)
Indepen	0.6946 (1.4412)	0.5575 (1.1618)	0.7526 (1.3914)
Constant	-8.9277*** (-9.6683)	-9.9966*** (-11.7328)	-7.9695*** (-7.6833)
Year	yes	yes	yes
Industry	yes	yes	yes
N	6157	6157	6157
adj. R <sup>2</sup>	0.272	0.258	0.278

\*\*\*, \*\*, \* denote significance at the 1, 5, and 10 percent levels, respectively.

**Table 4.** The pay gap in the top management team and enterprise innovation-group by property rights.

	State-owned enterprises			Private enterprises		
	(1) LnPatent	(2) LnPatenti	(3) LnPatentud	(4) LnPatent	(5) LnPatenti	(6) LnPatentud
Teamgap	0.0232 (0.4512)	0.0696 (1.2994)	-0.0439 (-0.7113)	0.0882** (2.0388)	0.1633*** (4.0441)	0.0032 (0.0651)
Size	0.4901*** (9.1393)	0.4684*** (8.9037)	0.4593*** (7.6748)	0.4166*** (6.7552)	0.3848*** (6.5099)	0.3838*** (5.2531)

## Continued

Lev	-0.3370	-0.3157	-0.2159	0.3785*	0.7043***	0.3490
	(-1.3075)	(-1.2171)	(-0.7029)	(1.7927)	(3.2016)	(1.4490)
Top1	-0.0445	-0.2291	0.0993	0.1564	-0.1925	0.3828
	(-0.1357)	(-0.7278)	(0.2685)	(0.6606)	(-0.7722)	(1.4298)
CF	1.2299***	1.1110***	1.0543**	0.6748*	0.5095	0.6363
	(2.8665)	(2.8393)	(2.0979)	(1.8888)	(1.4600)	(1.5314)
Age	-0.0552	-0.1182**	0.0030	-0.0696*	-0.1042***	-0.0737
	(-0.9738)	(-2.0793)	(0.0449)	(-1.7311)	(-2.6080)	(-1.5203)
Tangibility	-0.5658*	-0.5769*	-0.4712	-0.4586*	-0.3918	-0.2550
	(-1.7167)	(-1.8912)	(-1.2666)	(-1.6971)	(-1.5251)	(-0.8332)
Roa	1.1845*	0.3705	2.0308**	2.3508***	2.7285***	1.4018*
	(1.6754)	(0.5123)	(2.4706)	(3.7433)	(4.2973)	(1.8516)
Dual	0.1628	0.2374**	0.0373	0.1209*	0.1249*	0.0793
	(1.4470)	(2.1814)	(0.2746)	(1.8968)	(1.9360)	(1.0649)
Indepen	0.4117	0.1705	0.8813	0.8950	0.7570	0.7215
	(0.5072)	(0.2116)	(1.0091)	(1.6139)	(1.3184)	(1.1242)
Constant	-9.4853***	-9.8383***	-9.1836***	-8.4282***	-9.1833***	-7.4299***
	(-8.9681)	(-9.8620)	(-7.4119)	(-5.9696)	(-6.8863)	(-4.4566)
Year	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes
N	2909	2909	2909	3248	3248	3248
adj. R <sup>2</sup>	0.346	0.322	0.328	0.199	0.213	0.247

\*\*\*, \*\*, \*denote significance at the 1, 5, and 10 percent levels, respectively.

that patents for invention significantly increase when the pay gap enlarges in private enterprises. While in state-owned enterprises, none of these coefficients are significant. After the Chow-test, the coefficients of Teamgap in column (1) and (4) as well as column (2) and (5) are significantly different from the P value equaling to 0.000, which indicates that there are significant differences between two groups. The above results support hypothesis 2. Due to the fact that executive compensation and market for managers are restricted by government in state-owned enterprises, the pay gap in the top management team is not sufficient to incent executives those who are with limited compensation raises and promotions to make innovation decisions. As a result, there is no significant increase in innovation outputs in state-owned enterprises. Compared with state-owned enterprises, private enterprises are not subject to the restriction of executive compensation or market for managers, the pay gap in the top management team can effectively incent executives to make innovation decisions and promote outputs of patent applications especially high-quality patents for invention in order to achieve the goal of substantial innovation.

### 5.3. The Pay Gap in the Top Management Team and Enterprise Innovation-Group by Financing Constraints

In order to analyze whether there are differences in effects of the pay gap on innovation in enterprises with different financing constraints, we divide the sample into two groups according to financing constraints and repeat the regression of model (1). The regression results are shown in **Table 5**. According results in **Table 5**, the coefficient of Teamgap in column (1) is estimated to be 0.0703 with a

**Table 5.** The pay gap in the top management team and enterprise innovation-group by financing constraints.

	Strong financing constraints (High-KZ)			Weak financing constraints (Low-KZ)		
	(1) LnPatent	(2) LnPatenti	(3) LnPatentud	(4) LnPatent	(5) LnPatenti	(6) LnPatentud
Teamgap	0.0703* (1.7934)	0.1214*** (3.0826)	0.0070 (0.1589)	0.0275 (0.6147)	0.0696* (1.7311)	-0.0674 (-1.2332)
Size	0.4370*** (9.2460)	0.4280*** (9.4827)	0.4091*** (7.7938)	0.5025*** (10.1848)	0.5125*** (9.7461)	0.4198*** (7.5924)
Lev	0.0238 (0.1154)	0.0896 (0.4359)	0.0478 (0.1999)	0.4684* (1.8404)	0.6049** (2.1020)	0.5805** (2.0479)
Top1	0.0578 (0.2524)	-0.1889 (-0.8166)	0.1906 (0.7627)	-0.0164 (-0.0617)	-0.2167 (-0.8091)	0.2623 (0.8689)
CF	0.9544*** (3.1003)	0.8444*** (2.7096)	0.8301** (2.4274)	0.5152 (1.0340)	0.3275 (0.7295)	0.5603 (0.9032)
Age	-0.0723* (-1.9266)	-0.0513 (-1.3887)	-0.0831* (-1.9274)	-0.0314 (-0.7264)	-0.1122** (-2.3589)	0.0152 (0.2989)
Tangibility	-0.4503* (-1.8964)	-0.4327* (-1.8780)	-0.3574 (-1.3365)	-0.7864** (-2.5054)	-0.5829** (-1.9628)	-0.6778* (-1.8211)
Roa	1.9119*** (3.6403)	1.8508*** (3.4484)	1.5503*** (2.6180)	1.1721 (1.4025)	0.8893 (1.0064)	1.5501 (1.5737)
Dual	0.1229* (1.7483)	0.1064 (1.5517)	0.1126 (1.3783)	0.1226* (1.6731)	0.1358* (1.7964)	0.0165 (0.1864)
Indepen	0.8769 (1.5500)	0.5582 (1.0352)	1.2277* (1.9480)	0.4901 (0.7414)	0.5870 (0.7876)	-0.0906 (-0.1133)
Constant	-8.5972*** (-8.3091)	-9.5371*** (-10.0117)	-8.0784*** (-6.9872)	-9.8027*** (-8.0779)	-11.5385*** (-10.1855)	-7.7133*** (-5.5176)
Year	yes	yes	yes	yes	yes	yes
Industry	yes	yes	yes	yes	yes	yes
N	3959	3959	3959	2198	2198	2198
adj. R <sup>2</sup>	0.264	0.248	0.259	0.295	0.286	0.336

\*\*\*, \*\*, \*denote significance at the 1, 5, and 10 percent levels, respectively.

significance level at 10% and the coefficient of Teamgap in column (2) is estimated to be 0.1214 with a significance level at 1%, which indicate that patent applications especially patents for invention significantly increase when the pay gap enlarges in the group of enterprises with strong financing constraints. While in the group of enterprises with weak financing constraints, the coefficient of Teamgap in column (5) is estimated to be 0.0696 merely with a significance level at 1%. After the Chow-test, the coefficients of Teamgap in column (1) and (4) as well as in column (2) and (5) are significantly different from the P value equaling to 0.000, which indicates that there are significant differences between two groups. The above results support hypothesis 3. The above results show that when enterprises are facing with strong financing constraints, they cannot obtain sufficient loans or other resources to meet the needs of development. At this time, it is necessary for enterprises with strong financing constraints to deliver positive signals to outside to show that they have potential to do well, and innovation has a strong function of signal transmission. Enterprises show their own technical levels and development abilities through innovation outputs especially obtaining patents for invention. So, the enlargement of the pay gap in the top management team in enterprises with strong financing constraints makes executives more incentive to make innovation decisions, to push enterprises to create more high-quality inventions and to deliver positive signals.

#### **5.4. Robustness Test**

Considering the endogenous problem between the pay gap in the top management team and enterprise innovation, we use the average of Teamgap within the same industry and firm's location as an instrumental variable for Teamgap with reference to [25], and then we perform the two-stage least squares regression (2sls). The regression results after using an instrumental variable are consistent with the above.

#### **6. Conclusions**

Using the data of a-share listed firms from 2005 to 2014, this paper examines how the pay gap in the top management team influences enterprise innovation. The result shows that the number of patent applications especially the number of patents for invention increases significantly when the pay gap enlarges. Furthermore, the incentive effect of the pay gap in the top management team is more significant in private enterprises and enterprises with strong financing constraints.

The results show that the pay gap in the top management team can incentive executives to make effective innovation decisions and promote the increase of innovation outputs, especially the high-quality patents for invention. Private enterprises are vulnerable to credit discrimination, but their development situations are more active and they can try to seize the opportunity to become stronger. The incentive effect of the pay gap can create ultimately reflect in the

increase of patents for invention. The enterprises with strong financing constraints deliver positive signals to outside through innovative activities. And because of the pay gap, the executives who are in the situation of “to survive in the cracks” have more incentives to use innovation outputs to obtain credit resources, and reduce the external financing cost, etc., so that they can achieve the purpose of the “rescue”. Therefore, performances of innovation in these enterprises are more outstanding compared with enterprises facing weak financing constraints. Under the background that the innovation constantly drives development, the enterprise should optimize the compensation structure of executives according to their property rights and financing constraints, so that it can maximize the incentive effect of the pay gap in the top management team, and encourage executives to promote the development of high quality innovation activities, then lead the enterprise to transform from caring purely about the quantity of innovation to paying more attention to the quality of innovation, and improve the resource allocation efficiency of the technology innovation.

Choosing the enduring topic in corporate governance—the pay gap in the top management team, this paper explores its effects on enterprise innovation considering property rights and financing constraints. It provides references for designing the compensation structure of executives and adjusting incentive methods of innovation and enriches the literature in related fields.

## References

- [1] Chen, Z. and Zhang, M. (2006) A Research on the Top Executives' Pay Distributions. *China Accounting Review*, **1**, 15-28.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CCJD&dbname=CCJDLAST1&filename=ZKJP200601003&uid=WEEvREcwSIJHSlDRa1FhdKjkVWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=Mjg1NjBQeWJcZnJHNEh0Zk1ybzIzGwJRSOGVYMUx1eFlTN0RoMVQzcVRyV00xRnJDVVJMS2ZZdVpyRkNubFZiL0E](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CCJD&dbname=CCJDLAST1&filename=ZKJP200601003&uid=WEEvREcwSIJHSlDRa1FhdKjkVWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=Mjg1NjBQeWJcZnJHNEh0Zk1ybzIzGwJRSOGVYMUx1eFlTN0RoMVQzcVRyV00xRnJDVVJMS2ZZdVpyRkNubFZiL0E)
- [2] Lazear, E. and Rosen, S. (1981) Rank-Order Tournaments as Optimum Labor Contracts. *Journal of Political Economy*, **89**, 841-864. <https://doi.org/10.1086/261010>  
[http://xueshu.baidu.com/s?wd=paperuri%3A%28c393fe9de44b93fd90d20ad1624bfc79%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F1830810&ie=utf-8&sc\\_us=6013546680356202469](http://xueshu.baidu.com/s?wd=paperuri%3A%28c393fe9de44b93fd90d20ad1624bfc79%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F1830810&ie=utf-8&sc_us=6013546680356202469)
- [3] Lin, J.Q., Huang, Z.H. and Sun, Y.X. (2003) TMT Pay Gap, Firm Performance and Corporate Governance. *Economic Research Journal*, **4**, 31-40.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2003&file-name=JJYJ200304003&uid=WEEvREcwSIJHSlDRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjNSt0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDMwODV4WVM3RGgxVDNxVHJXTTFGckNVUkxLZlI1ZHFGeTdNvjd2Skx5ZlNaTEc0SHRMTXE0OUZaNF14ZVgxTHU](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2003&file-name=JJYJ200304003&uid=WEEvREcwSIJHSlDRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjNSt0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDMwODV4WVM3RGgxVDNxVHJXTTFGckNVUkxLZlI1ZHFGeTdNvjd2Skx5ZlNaTEc0SHRMTXE0OUZaNF14ZVgxTHU)
- [4] Lin, B.X. and Lu, R. (2009) Managerial Power, Compensation Gap and Firm Performance: Evidence from Chinese Public Listed Companies. *Global Finance Journal*, **20**, 153-164. <https://doi.org/10.1016/j.gfj.2008.12.002>

- [http://xueshu.baidu.com/s?wd=paperuri%3A%2829461ab2ebd33ff7b886441118ed495a%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS1044028309000453&ie=utf-8&sc\\_us=10585537045850533176](http://xueshu.baidu.com/s?wd=paperuri%3A%2829461ab2ebd33ff7b886441118ed495a%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS1044028309000453&ie=utf-8&sc_us=10585537045850533176)
- [5] Major, B. and Testa, M. (1989) Social Comparison Processes and Judgments of Entitlement and Satisfaction. *Journal of Experimental Social Psychology*, **25**, 101-120. [http://xueshu.baidu.com/s?wd=paperuri%3A%28ecaab16b8ac0601ef2b8ecc8fb7f5d4%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2F0022103189900073&ie=utf-8&sc\\_us=16181051545072757726](http://xueshu.baidu.com/s?wd=paperuri%3A%28ecaab16b8ac0601ef2b8ecc8fb7f5d4%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2F0022103189900073&ie=utf-8&sc_us=16181051545072757726)
- [6] Fehr, E. and Schmidt, K.M. (1999) A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics*, **114**, 817-868. <https://doi.org/10.1162/003355399556151> [http://xueshu.baidu.com/s?wd=paperuri%3A%285882d32b7b3210451d41a2333d60ab-ef%29&filter=sc\\_long\\_sign&sc\\_ks\\_para=q%3DA%20Theory%20of%20Fairness%2C%20Competition%2C%20and%20Cooperation&sc\\_us=13657150377609935482&tn=SE\\_baiduxueshu\\_c1gjeupa&ie=utf-8](http://xueshu.baidu.com/s?wd=paperuri%3A%285882d32b7b3210451d41a2333d60ab-ef%29&filter=sc_long_sign&sc_ks_para=q%3DA%20Theory%20of%20Fairness%2C%20Competition%2C%20and%20Cooperation&sc_us=13657150377609935482&tn=SE_baiduxueshu_c1gjeupa&ie=utf-8)
- [7] Cowherd, D.M. and Levine, D.I. (1992) Product Quality and Pay Equity between Lower-Level Employees and Top Management: An Investigation of Distributive Justice Theory. *Administrative Science Quarterly*, **37**, 302-320. <https://doi.org/10.2307/2393226> [http://xueshu.baidu.com/s?wd=paperuri%3A%2855b4c4aba839c4cc26cc35d3cd79fc2e%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2Finfo%2F2393226&ie=utf-8&sc\\_us=10528736522668898258](http://xueshu.baidu.com/s?wd=paperuri%3A%2855b4c4aba839c4cc26cc35d3cd79fc2e%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2Finfo%2F2393226&ie=utf-8&sc_us=10528736522668898258)
- [8] Greenberg, J. (1993) Stealing in the Name of Justice: Informational and Interpersonal Moderators of Theft Reactions to Underpayment Inequity. *Organizational Behavior & Human Decision Processes*, **54**, 81-103. <https://doi.org/10.1006/obhd.1993.1004> [http://xueshu.baidu.com/s?wd=paperuri%3A%283bea8a3a779e6a48c7b7320f2a1e1648%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0749597883710046&ie=utf-8&sc\\_us=15146162452862008119](http://xueshu.baidu.com/s?wd=paperuri%3A%283bea8a3a779e6a48c7b7320f2a1e1648%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0749597883710046&ie=utf-8&sc_us=15146162452862008119)
- [9] Kale, J.R., Reis, E. and Venkateswaran, A. (2013) Pay Inequalities and Managerial Turnover. *Journal of Empirical Finance*, **27**, 21-39. <https://doi.org/10.1016/j.jempfin.2013.11.002> [http://xueshu.baidu.com/s?wd=paperuri%3A%280a4cc7c8c156033b75a16da5426d2a0%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0927539813000807&ie=utf-8&sc\\_us=1413446601861878704](http://xueshu.baidu.com/s?wd=paperuri%3A%280a4cc7c8c156033b75a16da5426d2a0%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS0927539813000807&ie=utf-8&sc_us=1413446601861878704)
- [10] Akerlof, G.A. and Yellen, J.A. (1990) The Fair Wage-Effort Hypothesis and Unemployment. *The Quarterly Journal of Economics*, **105**, 255-283. <https://doi.org/10.2307/2937787> <https://academic.oup.com/qje/article-abstract/105/2/255/1864771>
- [11] Siegel, P.A. and Hambrick, D.C. (2005) Pay Disparities within Top Management Groups: Evidence of Harmful Effects on Performance of High-Technology Firms. *Organization Science*, **16**, 259-274. <https://doi.org/10.1287/orsc.1050.0128> [http://xueshu.baidu.com/s?wd=paperuri%3A%28cbc8d3a6ded34414f163ca74621f8b99%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.emeraldinsight.com%2Fservlet%2Flinkout%3Fsuffix%3Db19%26amp](http://xueshu.baidu.com/s?wd=paperuri%3A%28cbc8d3a6ded34414f163ca74621f8b99%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.emeraldinsight.com%2Fservlet%2Flinkout%3Fsuffix%3Db19%26amp)

- [%3Bdbid%3D16%26amp%3Bdoi%3D10.1108%252F0953481111132686%26amp%3Bkey%3D10.1287%252Forsc.1050.0128&ie=utf-8&sc\\_us=1282446965224491691](#)
- [12] Xia, N. and Dong, Y. (2014) Executive Compensation, Employee Compensation and Corporate Growth-Based on Listed SMEs in China Empirical Data. *China Accounting Review*, **9**, 89-95.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2015&filename=KJYJ201409012&uid=WEEvREcwSljHSldRa1FhdKjKvWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=Mjg3ODNVUkxLZl1WnJGQ25uVWI3SUxpZlNaTEc0SDIYTXBvOUVab1I4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckM](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2015&filename=KJYJ201409012&uid=WEEvREcwSljHSldRa1FhdKjKvWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=Mjg3ODNVUkxLZl1WnJGQ25uVWI3SUxpZlNaTEc0SDIYTXBvOUVab1I4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckM)
- [13] Li, C.T. and Song, M. (2010) Innovation Activities in Chinese Manufacturing Firms: The Roles of Firm Ownership and CEO Incentives. *Economic Research Journal*, **5**, 55-67.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2010&file-name=JYJ201005005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTI2MzBoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VML0tMeWZTWkxHNEg5SE1xbzLzGWVISOGVYMUx1eFITN0Q](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2010&file-name=JYJ201005005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTI2MzBoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VML0tMeWZTWkxHNEg5SE1xbzLzGWVISOGVYMUx1eFITN0Q)
- [14] Yi, J.T., Zhang, X.P. and Wang, H.C. (2015) Firm Heterogeneity, Top Executives' Overconfidence, and Corporate Innovation Performance. *Nankai Business Review*, **18**, 101-112.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2016&filename=LKGP201506012&uid=WEEvREcwSljHSldRa1FhdKjKvWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjkzMjRSTETmWXVackZDbm5WcnpMS1NiTWZyRzRIOVRNcV5k5RVpvUjhlWDFMdxhZUzdEaDFUM3FUcldNMUzyQ1U](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2016&filename=LKGP201506012&uid=WEEvREcwSljHSldRa1FhdKjKvWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjkzMjRSTETmWXVackZDbm5WcnpMS1NiTWZyRzRIOVRNcV5k5RVpvUjhlWDFMdxhZUzdEaDFUM3FUcldNMUzyQ1U)
- [15] Zhang, J., Zhou, X.Y. and Li, Y. (2011) Does Factor Market Distortion Barrage Chinese Firms' R & D? *Economic Research Journal*, **8**, 78-91.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2011&file-name=JYJ201108008&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTEyODBMWZTWkxHNEg5RE1wNDIGYklSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VyelA](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2011&file-name=JYJ201108008&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTEyODBMWZTWkxHNEg5RE1wNDIGYklSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VyelA)
- [16] Li, G. and Liu, L. (2009) Debt Financing Cost and Private Credit Discrimination. *Financial Research*, **12**, 137-150.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2009&file-name=JRYJ200912013&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDIzNDl0ak5yWTlFWjRSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3blc3L0FMei9TWkxHNEg](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2009&file-name=JRYJ200912013&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDIzNDl0ak5yWTlFWjRSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3blc3L0FMei9TWkxHNEg)
- [17] Wei, Z., Zeng, A. and Li, B. (2014) Financial Ecological Environment and Corporate Financial Constraint—Evidence from Chinese Listed Firms. *China Accounting Review*, **5**, 73-80.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2014&file-name=JYJ201409012&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTI2MzBoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VML0tMeWZTWkxHNEg5SE1xbzLzGWVISOGVYMUx1eFITN0Q](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2014&file-name=JYJ201409012&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNIrDjnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTI2MzBoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3Z1VML0tMeWZTWkxHNEg5SE1xbzLzGWVISOGVYMUx1eFITN0Q)



- [name=KJYJ201405009&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDQ1NzBYTXFvOUZiWVI4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckNVUkxLZll1ZHFGeTduVmJ6TUxpZlNaTEc0SDk](http://xueshu.baidu.com/s?wd=paperuri%3A%28e86cf904d1ff4f1c232be4803e6b4e43%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F2393510&ie=utf-8&sc_us=788250084338724708)
- [18] Wade, J. and Chandratat, I. (1990) Golden Parachutes: CEOs and the Exercise of Social Influence. *Administrative Science Quarterly*, **35**, 87-603.  
[http://xueshu.baidu.com/s?wd=paperuri%3A%28e86cf904d1ff4f1c232be4803e6b4e43%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F2393510&ie=utf-8&sc\\_us=788250084338724708](http://xueshu.baidu.com/s?wd=paperuri%3A%28e86cf904d1ff4f1c232be4803e6b4e43%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F2393510&ie=utf-8&sc_us=788250084338724708)  
<https://doi.org/10.2307/2393510>
- [19] Chen, D., Chen, X. and Wan, H. (2005) Regulation and Non-Pecuniary Compensation in Chinese SOEs. *Economic Research Journal*, **2**, 92-101.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2005&file-name=JYJ200502009&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDUwMDZUZdEaDFUM3FUcldNMUZyQ1VSTETmWXVkcUZ5N25WN3pNTHlmU1pMRzRIdFRNck5RmJZUjhlWDFMdxg](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2005&file-name=JYJ200502009&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MDUwMDZUZdEaDFUM3FUcldNMUZyQ1VSTETmWXVkcUZ5N25WN3pNTHlmU1pMRzRIdFRNck5RmJZUjhlWDFMdxg)
- [20] Liu, S., Sun, P. and Liu, N. (2003) The Ultimate Ownership and Its Shareholding Structures: Does It Matter for Corporate Performance? *Economic Research Journal*, **4**, 51-62.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2003&file-name=JYJ200304005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTEwNzVGVWVlSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDV VJMS2ZzZdWRxRnk3Z1ZyckMeWZTWkxHNEh0TE1xNDk](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2003&file-name=JYJ200304005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKa-ID8j8gFw!!&v=MTEwNzVGVWVlSOGVYMUx1eFITN0RoMVQzcVRyV00xRnJDV VJMS2ZzZdWRxRnk3Z1ZyckMeWZTWkxHNEh0TE1xNDk)
- [21] Tong, T.W., He, W., He, Z.L. and Lu, J. (2014) Patent Regime Shift and Firm Innovation: Evidence from the Second Amendment to China's Patent Law. *Academy of Management Annual Meeting Proceedings*, **1**, 14174.  
<https://doi.org/10.5465/ambpp.2014.14174abstract>  
[https://www.researchgate.net/publication/276898021\\_Patent\\_Regime\\_Shift\\_and\\_Firm\\_Innovation\\_Evidence\\_from\\_the\\_Second\\_Amendment\\_to\\_China's\\_Patent\\_Law](https://www.researchgate.net/publication/276898021_Patent_Regime_Shift_and_Firm_Innovation_Evidence_from_the_Second_Amendment_to_China's_Patent_Law)
- [22] Li, W. and Zheng, M. (2016) Is It Substantive Innovation or Strategic Innovation?—Impact of Macroeconomic Policies on Micro-Enterprises' Innovation. *Economic Research Journal*, **4**, 60-73.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2016&filename=JYJ201604005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjI5NzBackZDbm1WTHJBTlhmU1pMRzRIOWZ NcTQ5RlIZUjhlWDFMdxXhZUZdEaDFUM3FUcldNMUZyQ1VSTETmWXU](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2016&filename=JYJ201604005&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjI5NzBackZDbm1WTHJBTlhmU1pMRzRIOWZ NcTQ5RlIZUjhlWDFMdxXhZUZdEaDFUM3FUcldNMUZyQ1VSTETmWXU)
- [23] Zhang, Z. (2007) Top Management Team Coordination Needs, Compensation Dispersion and Firm Performance: A Perspective of Tournament Theory. *Nankai Business Review*, **10**, 4-11.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2007&file-name=LKGP200702002&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4g](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2007&file-name=LKGP200702002&uid=WEEvREcwSljHSldRa1FhdXNXa0hIb3VXSk9GNHlyTDg2eWk3dWNiRDJnST0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4g)

[gTkoUKa-ID8j8gFw!!&v=MTIxODBLU2JNZnJHNEh0Yk1yWTIGWm9SOGVYMUx1eFlTN0RoMVQzcVRyV00xRnJDVVJMS2ZZdWRxRnk3blVyN0k](#)

- [24] Kaplan, S.N. and Zingales, L. (1997) Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? *Quarterly Journal of Economics*, **112**, 169-215. <https://doi.org/10.1162/003355397555163>  
[http://xueshu.baidu.com/s?wd=paperuri%3A%28fa4097ddeece17f70f23c0a3935279b%29&filter=sc\\_long\\_sign&tn=SE\\_xueshusource\\_2kduw22v&sc\\_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F2951280&ie=utf-8&sc\\_us=6674577725077515313](http://xueshu.baidu.com/s?wd=paperuri%3A%28fa4097ddeece17f70f23c0a3935279b%29&filter=sc_long_sign&tn=SE_xueshusource_2kduw22v&sc_vurl=http%3A%2F%2Fwww.jstor.org%2Fstable%2F2951280&ie=utf-8&sc_us=6674577725077515313)
- [25] Jiang, X. (2016) Government Decentralization and Innovation of State-Owned Enterprises. *Management World*, **9**, 120-135.  
[http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2017&filename=GLSJ201609011&uid=WEEvREcwSljHSldRa1FhdKjkVWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=\\$9A4hF\\_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjAyOTBmTXBvOUVaWVI4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckNVUkxLZll1WnJGQ25tVXJ6QUlpSFlaTEc0SDk](http://kns.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFDLAST2017&filename=GLSJ201609011&uid=WEEvREcwSljHSldRa1FhdKjkVWI3Y2ZQL2FXM3RzUWNzSE9YR3FGUXZZaz0=$9A4hF_YAuvQ5obgVAqNKPCYcEjKensW4ggI8Fm4gTkoUKaID8j8gFw!!&v=MjAyOTBmTXBvOUVaWVI4ZVgxTHV4WVM3RGgxVDNxVHJXTTFGckNVUkxLZll1WnJGQ25tVXJ6QUlpSFlaTEc0SDk)