Role of Knowledge Coordination Needs within Top Management Team in Setting Executive Compensation Gap: Evidence from China

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Abstract: This paper examines the determining mechanism of executive compensation gap (ECG) by initiatively introducing the concept of knowledge coordination needs (KCN) as the critical antecedent, since the relationship between KCN and ECG is still unexplored to date, particularly in china. Based on economic view and behavioral view, two competitive hypotheses on the effect of KCN on ECG are respectively proposed. By adopting the listed companies in Chinese manufacturing industry over the period of 2009-2013 as the sample, both multiple linear regression and hierarchical linear regression results confirm that KCN has positive effect on ECG. Our finding suggests that under the condition of higher KCN, it is much more important for the board to align interests between the shareholders and the top executives by enlarging ECG than to enhance knowledge coordination among executives by constraining ECG. The performance consequence of such a positive relationship between KCN and ECG within TMT should be explored further in the near future.

Keywords: Executive compensation gap (ECG); Knowledge coordination needs (KCN); Top Management Team (TMT); Firm performance; Listed manufacturing companies; China.

1. Introduction

It is clear that each enterprises decision requires the mutual efforts of the top management team (TMT) to successfully implement it, rather than simply the efforts of CEO. The fact that executives work in TMT and their actions affect each other indicates that the compensation level of one executive is likely to change the incentives of other top executives as well. And thus executive compensation gap (ECG) has a critical meaning in motivating all the top executives, including CEO. According to much literature on executive compensation issues, ECG is an important organizational issue that may explain differences in firm performance.

ECG has received growing attention in the management literature. Despite an increasing number of studies, research evidence on the effects of ECG has not yet been consistent. Tournament theory suggests that a large compensation gap between CEO and company Vice-Presidents (VPs) leads to higher company performance; behavioral theory states that higher performance may be achieved with a small compensation gap between CEO and VPs. According to Ting and Jianan (2013), such inconsistent results on the performance consequences of ECG mostly rely on the unclear formation mechanism of ECG.

According to a thorough review on extant research on ECG, there are three groups of antecedents, namely, antecedents in industry level (Kin *et al.*, 2008), antecedents in firm level (Choe *et al.*, 2014), and antecedents in TMT level (Kwok *et al.*, 2009). By exploring the determinants of ECG, previous studies have shed light on the important question of how ECG is formulated from many perspectives. However, the effect of knowledge coordination needs (KCN) on ECG has not been reached, especially in China. With the development of knowledge-based economy, KCN of enterprises will grows rapidly, how ECG should evolve is an unsolved issue. In order to fill this gap between theory research status and enterprises practice needs in this field, we try to investigate the role of KCN in the setting of ECG by adopting the listed manufacturing firms over the period of 2009-2013.

There are two reasons why we choose KCN as the critical antecedents of ECG. Theoretically, according to (Ying-Fen *et al.*, 2013), tournament theory is more appropriate in high-tech companies in Taiwan, while organizational justice theory is more appropriate in labor-intensive companies in Taiwan. They conclude that the difference in ECG mainly derives from the basic difference between the two kinds of companies, i.e. the difference

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of KCN. Besides, a most related original study by Andrew and James (2001) empirically find there is a significant positive relationship between ECG and (task) cooperation need, a very similar but different concept with KCN. Practically, with the development of knowledge-based economy, the operation process of enterprises has a growing dependence on knowledge embedded in top executives. The task coordination needs, focused by Andrew and James (2001), which originally dominate the business operation process, has gradually changed into KCN. Based on organizational justice theory, since ECG will affect task coordination quality, then knowledge coordination, which is more difficult to evaluate and observe, will be affect by ECG more easily. Therefore, KCN can be the potential antecedent of ECG both theoretically and practically.

This study makes three contributions to existing literature. The first contribution is to initiatively introduce KCN as the critical antecedent of ECG, which theoretically should have been discussed, but practically has not been investigated in detail, especially in China. The second contribution is to provide and validate a comprehensive measure system composed of five indexes of KCN, which is basically a pioneering work. The third contribution is to find a positive relationship between KCN and ECG. Besides, we also provide several potential influence mechanisms of KCN on ECG, both negative and positive, which can be further discussed and tested in the future.

The next part of this paper is arranged as follows. Part 2 reviews the literature on the antecedents of ECG, discusses the concept of KCN within TMT and provides two competitive hypotheses on the relationship between KCN and ECG. Part 3 designs the measures of all the research variables including ECG, KCN and other control variables, introduces the sample design process of this study, and provides the descriptive statistics results and correlation analysis results of the research variables in this study. Part 4 is the results and discussion. Part 5 is the conclusions.

2. Literature Review and Hypothesis
2.1. Antecedents of ECG
According to a thorough review on extant research on ECG, there are three groups of antecedents, namely, antecedents in industry level, antecedents in firm level and antecedents in TMT level.

(1) Antecedents in Industry Level
First, since larger ECG can attract and maintain high-qualified top executives, then the potential growth opportunity of an industry can be realized. Therefore, industry growth opportunity can affect ECG positively (Kin *et al.*, 2008). Second, as the market risks increase, the firms will enlarge ECG in order to eliminate the weakening effect of reward risk on top executives' work effort (Eriksson, 1999). Third, by investigating the relationship between insolvency risk and executive compensation for BHCs over the 1992-2008 period and employing a system model to account for the endogeneity problem, Gang and Elyas (2013) obtain that greater industry stability is associated with greater pay-share inequality, another term of ECG. Fourth, if enterprises belong to an industry that can generally get better average performance compared to other industries, they prefer enlarging ECG to a good degree (Bing-Xuan and Rui, 2009).

(2) Antecedents in Firm Level
First, most literature in managerial discretion field argues that there is a positive effect of managerial discretion on ECG (Zhang and Zhao, 2010). Meanwhile, according to Choe *et al.* (2014), CEO power, a very similar or even an alternative concept to managerial discretion, also has positive effect on ECG. Second, with regard to ECG decision process, because of the traditional atmosphere of "anti-exploitation", "equality" and "harmony among leaders", state-owned shareholders usually emphasize more strongly on the negative influence advocated by behavior theory, and ignore the performance improvement effect of benign competition advocated by tournament theory. Consequently, state-owned share ratio is negatively related with ECG in TMT (Lin and Sun, 2003). Third, employees usually like to ignore individual input differences and simultaneously overestimate their own output, so with the increase of common staff's participation in pay decision-making process, ECG will be much smaller (Andrew and James, 2001).

(3) TMT Features
First, Andrew *et al.* (2015) argue that, due to traditional and widespread gender bias in compensation practices, the gender composition difference of TMT can explain ECG to a significant degree by empirically proving that women in the NLSY79 and NLSY97 are less likely than men to receive competitive compensation. Many other scholars, for example, Susan and Mark (2011), also hold this view. Second, by implementing a survey in the Suzhou area, Kwok *et al.* (2009) confirm that a large compensation gap exists between local and expatriate employees in foreign multinationals in China, and further conclude that the ratio of expatriates in TMT can positively affect ECG. Third, empirical evidence in Conyon and Sadler (2001) shows that ECG is positively related with the number of vice presidents in top management teams. Recent evidence in Bognanno (2001) further indicates that there is a non-linear positive relationship between ECG and team hierarchy, namely, the pay gap between top managers and the second highest top managers is the largest, and as team size increases, ECG will rise correspondingly. The last but not the least, companies managed by a female CEO perform better, and have a smaller compensation gap between the CEO and the other executives than companies managed by a male CEO (Joao, 2011).

2.2. KCN within TMT

Knowledge coordination is the core concept both in knowledge management and project management, which is has received great attention from scholars in the two fields. With the ever-increasing social development and technology progress, more and more enterprises have begun to adopt knowledge team. During project implementation, team members can improve knowledge application through enhancing interpersonal knowledge cooperation and knowledge integration, and thus value creation of knowledge can be maximized, especially it is true when the team is really knowledge-based. Since 1990s, with the development of knowledge team practice, theoretical circle has paid more attention to KCN. One of the most important features of knowledge team is there is significant KCN among team members, which can apart from the other individual collection, small groups or common teams. Knowledge coordination, as one important method to improve team performance, can be viewed as not only the proactive activities of each party involving in the cooperation in improving collaborative development and collaborative innovation process, but their positive attitudes in making contributions to knowledge creation and accumulation (McKelvey *et al.*, 2003).

Based on the existing research, knowledge coordination needs can be viewed as the demanding degree on knowledge cooperation and knowledge interaction activities among team members during the process of completing team tasks, or the inter-dependence degree on each member's knowledge. KCN is highly correlated with many team outcomes in the opinions of management scholars. Previous studies on KCN mostly focused on engineering project teams or R&D project teams, while TMT was ignored to a large degree. In fact, KCN in TMT is even higher than that in the common knowledge-based teams. The operation process of TMT is knowledge-intensive, which needs knowledge from many kinds of fields, i.e., commercial, technological and management, therefore, it can be regarded as a knowledge co-creation process among top executives (Shankar and Zuopeng, 2012). To deal with KCN appropriately is the basic feature of TMT operation, which determines TMT effectiveness and thus firm performance. Therefore, it is of initiative contribution in theory to treat KCN as the important antecedent of ECG and make an in-depth investigation on the relationship between the two.

Since organization appears, there is the collaboration need, while collaboration need is not necessarily KCN. Collaboration needs can be divided into KCN and task collaboration needs (TCN). There are critical differences between the two concepts. TCN usually appears under conditions as follows: there is clear division of labor among team members, each member's work is of good visibility, and accountability mechanism can be rather easily utilized to coordinate team members' behavior (Donald *et al.*, 2014). To deal with TCN, team members need to exchange information of task demanding and correspondingly co-work in their own functions, while knowledge exchange is rather limited, let alone knowledge co-creation behavior. KCN usually appears under the conditions as follows: each team members' jobs are interconnected and muti-knowledge demanding, inter-dependency and blend are necessary, and it is difficult to distinguish each individual's contribution and responsibility. To deal with KCN, team members should delve themselves into knowledge exchange activities, knowledge interaction activities and most importantly knowledge creation activities.

Coordination needs in TMT, a typical knowledge-based team (Li-Ren *et al.*, 2014), undoubtedly belong to interdependent KCN, instead of TCN. The satisfaction degree of KCN in TMT has critical effects on firm performance. Compared with the common knowledge-based teams, the running of TMT needs wider knowledge in more fields, including production, sale, strategy, finance, human resource, innovation and even culture, while the former only need specialized knowledge in one field. Operation process of TMT is of more knowledge needs both in quality and quantity, and its nature is the knowledge co-creation process integrating different knowledge.

KCN in TMT is not a well-defined concept in existing literature. Therefore, further investigation on its definition and measure is necessary for the following empirical analysis. First, business complexity (BC) of a company increases KCN significantly. With the development of BC, enterprises get involved in more businesses of different industries, related or unrelated, more knowledge embedded in such industries are needed, and also more knowledge interaction activities are demanded. Consequently, BC degree can effectively manifest KCN in some respects. Second, technology intensity (TI) of a company increases KCN significantly. If TI is higher, then not only firm assets would be comprised of more knowledge-based components, for example, intangible assets, patents and goodwill, etc., but also the firms will endure higher market or competition risk and uncertainty, and thus the daily or strategic operation of the firm will naturally face higher KCN. Therefore, TI can effectively manifest KCN in some ways. Third, R&D investment intensity (RDII) of a company increases KCN significantly. RDII represents the difficulty and quality of technology innovation activities which is knowledge-intensive, and further shows the knowledge coordination latitude around the R&D projects from the perspective of each top executive. Therefore, the higher RDII, the higher KCN in TMT is. Consequently, RDII can manifest KCN to a large degree. Fourth, knowledge premium (KP), which refers to the potential performance latitude deriving from knowledge coordination among top executives, is closely related to KCN. In one hand, for firms with higher KCN, good knowledge coordination can increase firm performance in a non-linear method; in the other hand, poor knowledge coordination can decrease firm performance greatly. With the increase of KP, the potential value that can be attained from satisfying KCN will grow rapidly. Therefore, KP, operationally defined as performance variance within an industry, can manifest KCN to a large degree. Finally, internationalization degree (ID) is closely related to KCN. Since the operation in foreign countries is a higher knowledge-demanding task than running in host countries, the improvement of ID of enterprises would propel more knowledge coordination, especially the knowledge related to MNC running. Consequently, ID can manifest KCN to a large degree.

2.3. Hypothesis

There are two opposite intuitions behind the effect of KCN on ECG, one is positive, and the other is negative.

In one side, logically referring from the perspective of economic view, there are several reasons for the existing of positive relationship between KCN and ECG.

First, top executives in firms with higher KCN are more various in capability distribution, and simultaneously have higher quality level in total human capital stock than that in firms with lower KCN. A wider discrete distribution in executives' capability leads to very different contributions and status of each executive within TMT, and thus according to the principle of marginal output equilibrium, there will be a larger ECG among top executives; Furthermore, a higher human capital stock will improve the total amount of executives' compensation. Under this condition, the combination effect of higher total compensation amount of TMT and more discrete capability or contribution distribution within TMT would further enlarge ECG.

Second, during knowledge coordination process, the board would monitor what each executive does and further evaluate how well each executive does. However, due to knowledge-intensive nature of the coordination process, the visibility of executives' collaborative behavior is not enough to identify each executive's marginal output clearly for the board. What the smartest board can make sure is the rank of individual executive's contribution in knowledge coordination. In order to motivate the executives to work collaboratively, the boards who regard themselves as the smartest tend to adopt tournament perspective by enlarging the pay gap between the winner and the loser.

Third, firms with higher KCN would passively or proactively face more innovative issues that have higher risk to fail. During knowledge coordination process, the one who owns the critical knowledge that is the most sensitive to the success or failure of such innovative business issues would be highly evaluated to the most degree, though each kind of knowledge itself is equal in objective value. For example, the critical capability of CEO in monitoring, evaluating, organizing and coordinating knowledge coordination behavior among top executives is valuable and irreplaceable to the success of knowledge coordination, and thus it is can be viewed as the most sensitive knowledge/capability to the success or failure of such innovative business issues. There should certainly a large pay gap between CEO and other executives, i.e. ECG.

Fourth, KCN would increase both the professionalization degree and specialization degree of the operation process of the whole TMT, which can bring greater extra difficulty for the board to monitor CEO and top executives. Due to knowledge and information limitation, higher professionalization degree and specialization degree would make TMT's decision-making process just seem as a "dark-box" for the board, which of course can lead to lower monitoring efficiency and higher monitoring cost, and thus shareholders' interests may be hampered at a higher possibility. In order to effectively align interests between top managers and shareholders, the board of enterprises with higher KCN intends to set a higher ECG improving the internal monitoring within TMT. Therefore, we have a hypothesis as follows:

H1: KCN has a positive effect on ECG.

In the other hand, logically referring from the perspective of behavioral view, there are at least three reasons for the appearance of a negative relationship between KCN and ECG.

First, poor visibility of knowledge coordination can negatively affect ECG. Larger ECG based on performance can not be realized practically in enterprises with higher KCN. Under the condition of higher KCN, the behavior of executives is highly knowledge-intensive and interdependent, so that the visibility of their efforts and motives is rather poor. CEO and the board can not identify each executive's effort and motive precisely, and even they can not judge correctly each executive's relative contribution. The application of compensation system based on tournament theory is not suitable for this condition. If CEO and the board really want to enlarge ECG based on their relative contribution, not only the monitoring cost is too high, but the result fairness will be questioned. What is more, anti-productive behavior derived from such sense of unfair ECG, such as, lowering effort level, rejecting cooperation, and even damaging others' effort, is very difficult to monitor and identify. In a word, larger ECG under higher KCN would lead to such a negative consequence: the real collaborative behavior satisfying KCN cannot be recognized and acknowledged, while simultaneously the false collaborative behavior undermining KCN cannot be identified and punished. Therefore, higher KCN intends to lower ECG.

Second, enterprises with higher KCN require empowered leadership of CEO in order to motivate the top executives who are usually the super stars in their specialized fields. Technology-intensity and knowledge-sharing-related values in such enterprises are changing how work gets done, requiring new leadership competencies, such as the ability to work with remote global teams or embrace democratized decision making over hierarchical power. Prior research has shown a strong link between the sense of empowerment, an individual internal motivation, and knowledge sharing (Gupta and Govindarajan, 2000). Since there is a greater knowledge asymmetry between CEO and other top executives in enterprises with higher KCN, it is necessary for CEO to overcome problems of knowledge asymmetry by changing the power asymmetry, i.e. establishing effect empowerment between CEO and other top executives. Larger ECG will weaken the sense of empowerment of top executives. What is more, larger ECG will attract executives' attention from internal motivation, such as the sense of empowerment and achievement, to pursuing external motivation, such as money and other material rewards, which usually derive from short-term performance. While knowledge coordination and knowledge sharing behavior has the nature of long-term perspective, therefore, such behavior will be hindered. In order to avoid this, enterprises with higher KCN should keep a smaller ECG.

Third, KCN requires higher knowledge stock which necessarily needs an atmosphere of smaller ECG. In knowledge psychological view, even larger ECG based on knowledge instead of performance is not acceptable, since it can lead the bad consequence of knowledge loss. It seems that a larger ECG based on knowledge highly values knowledge embedded in top executives. However, in practice, such a larger ECG would create great risk for knowledge loss, which of course hinders knowledge coordination within TMT. In one side, since knowledge is so important for acquiring higher compensation, top executives would not like to share their specialized knowledge with others. What is more, when they find there is higher risk for their knowledge to be copied and learned by others during the process of knowledge coordination, they will even withdraw from knowledge coordination. In order to make their knowledge more unique and irreplaceable within the TMT, senior executives have no motive to transfer their knowledge to fresh executives till they leave the organization. Therefore, extra ECG not only hinders knowledge coordination among top executives at present, but constrains knowledge inheritance from generation to generation within TMT. The so-called "organizational forgetting" will damage enterprises intellectual capital greatly. In the other side, the subjective bias on knowledge coordination performance under the condition of higher KCN would be enhanced infinitely by a larger ECG. Such as bias not only directly affects knowledge coordination motive of top executives, but indirectly hinders knowledge coordination behavior of top executives by inducing executives' turnover. Executives who quit usually leave with some critical knowledge which has not been held by the enterprises. Such knowledge, usually some kind of insights embedded in the specialized enterprises, would be in shortage for a rather long time till the successors reinvent it. What is more, the leavers usually go to the competitors of the enterprises and bring such knowledge to the competitors. Such a trade-off in knowledge stock between these enterprises and their competitors would damage the competitive edge of the former. In order to avoid this, enterprises with higher KCN should keep a smaller ECG.

According to the discussion above, we propose an opposite competitive hypothesis as follows:

H2: KCN has a negative effect on ECG.

3. Method

3.1. Measures

Research variables in this study can be divided into independent variables, dependent variables and control variables. Independent variable is KCN, and dependent variable is ECG, while control variables mainly include regional economic level (REL), firm size (FS), ownership concentration degree (OCD), firm performance (FP), ratio of independent directors, (RID), CEO shareholding (CEOS), CEO age (AGE), CEO duality (CEOD), and state-owned share percentage (SSP).

(1) Measure of Independent Variable

Aforementioned literature on the definition of KCN shows that there is still no systematic measure method for KCN at the level of TMT. Referring to the growing measure method of KCN at the level of project team level scattered in extant literature, based on the recognition that KCN within TMT should be measured comprehensively and muti-dimensionally, the paper attempts to co-measure KCN by the following five indexes. ① Business complexity (BC), is defined as the percentage of the first large business over all business. KCN is higher when BC grows. ② Technology,ntensity (TI) , is defined as the ratio of intangible assets to total assets, in which intdo not includeoes not include land-use right. KCN is higher when TI grows. ③ R&D investment intensity (RDII), is defined as the ratio of R&D expenditure to total revenue. KCN is higher when RDII grows. ④ Knowledge premium (KP), is defined as the ROA variance within an industry. KCN is higher when KP grows. ⑤ Internationalization degree (ID), is defined as the ratio of foreign revenue to total sales. KCN is higher when ID grows. We use BC, TI, RDII, KP and ID to respectively manifest KCN, and further adopt the mean of the normalized value of each index (KCNI) to comprehensively measure KCN.

(2) Measure of Dependent Variable

ECG is measured by the difference between CEO compensation level and the average compensation level of other executives. According to description analysis by adopting the sample designed as follows, such a difference is far away from being normally distributed. Therefore, it is not suitable for linear regression analysis. Confirming to suggestions in existing literature, we further make the logarithmic transformation on ECG, coded as LNECG.

(3) Measure of Control Variables

REL is defined as 1, 2 and 3. When firms are geographically located in western regions (provinces), the poorest regions in Chinese mainland, REL is coded as 1. When firms are geographically located in eastern regions, the richest regions in Chinese mainland, REL is coded as 3. When firms are geographically located in middle regions in Chinese mainland, REL is coded as 2. FS is defined as the logarithm of total assets. OCD is defined as share percentage of the first large shareholder. FP is defined as return to assets. RID is defined as the ratio of independent directors to the board size. CEOS is defined as whether CEO holds share of the company. If it is true, CEOS is coded as 1, otherwise CEOS is coded as 0. CEOD is defined as whether CEO is both the chairman. If it is true, CEOD is coded as 1, otherwise CEOD is coded as 0. SSP is defined as the percentage of state-owned share to total share.

3.2. Sample

Taking Chinese manufacturing listed enterprises in Shenzhen and Shanghai Stock Exchange over 2009-2013 as the subjects to be investigated, we design the research sample according to the following criteria. First, in order to get a balanced panel sample with a five-year period, the firms should have gone public at least since 2008. Second, the firms ever marked by ST, PT, SST and *ST over the five years should be eliminated from the sample, since the financial data of such firms usually may be abnormal which can lead to systematical bias of empirical results. Third, firms that have not published all the complete data in their annual reports of each year over 2008-2012 which are required in this study should be removed from the sample. Especially the data of R&D investment should be complete. Fourth, firms with abnormal data in executive compensation should be removed, since exact executive compensation data are critical to the effectiveness of this study. For example, if CEO's compensation is lower than the average executive compensation, then this firm should be removed from the sample, because such data is an outlier. The last but not the least, firms with extreme ECG should be removed from the sample in order to assure the normal distribution of ECG, since the normality of ECG, as the sole dependent variable in this study, is critical to the research reliability and validity. In this study, we respectively remove 1% firms with the top highest performance and 1% firms with the lowest performance in the quasi sample.

According to the above five conditions, 240 listed manufacturing firms are chosen as the final sample. Since each firm has the data of five years, we finally get a sample of 1200 firm-year. Most of the data are selected from the Financial Research Database of CSMAR and RESSET, and part of the data are selected from the annual reports of listed firms which can supplement the data missing and data error of the commercial research database. In order to assure data accuracy, the data of 1% sample firms sourced from the database are randomly selected to compare with the corresponding data sourced from the annual reports by hand. The comparison results do confirm the validity of the final sample data.

3.3. Data
(1) Descriptive Statistics

By applying SPSS19.0, descriptive statistics analysis of the research variables designed above is executed, and results are shown in Tab.1. In order to assure the normality of the research variables in distribution in case the risk of spurious regression in our analysis, the paper has further implemented Skewness and Kurtosis analysis of the main research variables. The results show that, except for ECG, all the other variables in our sample are suitable for linear regression analysis.

Table-1. Descriptive statistics of research variables

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
ECG [a]	1200	1254.17	2159637.50	228075.9611	226133.61167	5.114E10
LNECG	1200	7.13	14.59	11.9604	.90858	.826
KCN	1200	.00	1.00	.4900	.25315	.064
REL	1200	1.00	3.00	2.4200	.73420	.539
FS	1200	15.91	26.78	21.8974	1.27063	1.614
OCD	1200	.79	93.61	37.2993	14.80749	219.262
FP	1200	-.85	.75	.0246	.11112	.012
IDR	1200	2.00	10.00	3.5783	.99063	.981
CEOS	1200	.00	1.00	.2633	.44063	.194
AGE	1200	35.00	69.00	52.6583	4.75417	22.602
CEOD	1200	.00	1.00	.1108	.31406	.099
SSP	1200	.00	100.00	29.2326	24.40067	595.393

[a] ECG is not normally distributed. Therefore, we use LNECG as the alternative measure.

According to Tab.1, the mean of ECG is 228075.9611 RMB Yuan, which means on average CEO will get an excess pay of more than 200 thousands RMB Yuan compared to other top executives. Obviously, ECG of Chinese manufacturing industry has grown to a rather high level in recent five years, which is about 45% higher than the level of ECG of Chinese manufacturing industry in the begin of 2000s. The mean of FP is 2.46%, much lower than average bank lending rate over the same period, which indicates a fact that firms of Chinese manufacturing industry are running at a rather low profit rate. In general, the development of manufacturing industry in China has lagged far behind the development of the whole economy. Such a poor profitability of manufacturing industry demonstrates that China is just a "large manufacturer" instead of a "powerful manufacturer".

(2) Correlation Analysis

By adopting the method of Pearson correlation analysis with SPSS19.0, the correlations among the research variables with 2-tailed significance are shown in Tab.2. According to Tab.2, most of the variables are significantly correlated with each other, and especially it is true that there are significant relationship among ECG, the sole dependent variable, and KCN, the sole dependent variable. What is more, the relationship in nature is confirming to the research hypothesis. Most of the correlations between control variables and dependent variable are significant,

indicating that the choice of control variables is appropriate. And all the correlations are below than 0.5, indicating that there is an acceptable risk in multicollinearity and thus the variables are suitable for regression analysis.

Table-2. Pearson Correlations Among Research Variables

	LNECG	KCN	REL	FS	OCD	FP	IDR	CEOS	AGE	CEOD	SSP
LNECG	1										
KCN	.309**	1									
REL	.185**	-.006	1								
FS	.340**	.152**	-.012	1							
OCD	.068*	.000	.041	.261**	1						
FP	.227**	.132**	.028	.084**	.062*	1					
IDR	.082**	.213**	-.051	.144**	.081**	.006	1				
CEOS	.152**	.082**	.060*	.057*	-.154**	.131**	.018	1			
AGE	.049	.093**	.060*	.169**	.091**	.047	.050	.073*	1		
CEOD	.062*	-.007	-.050	-.053	-.104**	.024	-.040	.149**	-.023	1	
SSP	-.007	.071*	-.136**	.185**	.495**	-.031	.219**	-.139**	.198**	-.159**	1

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed). Valid N: 1200.

4. Results and Discussion

4.1. Results

In order to enhance the validity of our empirical analysis, we apply two methods to test our competitive hypotheses.

First, multiple linear regression (MLR) is adopted. The MLR model (Model 7) is constructed by taking LNECG as the dependent variable and taking REL, FS, OCD, FP, IDR, CEOS, AGE, CEOD, SSP and KCN as the as the predictor variables. Among the ten predictor variables, KCN is the explanatory variable attracting our attention in this study, while the other nine variables are control variables. The regression results of Model 7 are shown in the right part of Tab.3, i.e., column 9. According to MLR results, the regression coefficient of KCN on ECG is significantly positive (Beta=0.254, P=0.000). That means, even considering the effect of control variables on ECG, KCN has a positive effect on ECG. In other word, our finding confirms H1, while H2 does not hold.

Table-3. Regression results of KCN on ECG [a]

HLM							MLR	
Predictors	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Predictors	Model 7
(Constant) [b]	6.324*** (13.539)	5.957*** (12.793)	5.615*** (11.976)	5.946*** (12.614)	6.203*** (11.747)	6.228*** (11.919)	(Constan)	6.375*** (14.193)
REL	.185*** (6.978)	.175*** (6.664)	.176*** (6.747)	.191*** (7.317)	.176*** (6.785)	.185*** (7.181)	REL	.184*** (7.212)
FS	.329*** (11.986)	.360*** (13.015)	.377*** 13.596	.351*** (12.507)	.338*** (6.785)	.321*** (10.162)	FS	.313*** (11.835)
OCD	-.011 (-.357)	-.012 (-.407)	.000 (.014)	.017 (.550)	.000 (.032)	.008 (.260)	OCD	.007 (.246)
FP	.183*** (6.971)	.174*** (6.696)	.161*** (6.203)	.159*** (6.169)	.157*** (6.032)	.157*** (6.155)	FP	.154*** (6.053)
IDR	.050* (1.871)	.038 (1.437)	.037 (1.392)	-.002 (-.070)	.031 (1.172)	-.001 (-.047)	IDR	.004 (.138)
CEOS	.086*** (3.175)	.074*** (2.786)	.072*** (2.705)	.073*** (2.775)	.070*** (2.629)	.076*** (2.898)	CEOS	.074*** (2.848
AGE	-.030 (-1.102)	-.044* (-1.658)	-.048* (-1.817)	-.047* (-1.794)	-.048* (-1.834)	-.039 (-1.494)	AGE	-.040 (-1.564)
CEOD	.070*** (2.660)	.070*** (2.672)	.068*** (2.608)	.073*** (2.839)	.067** (2.584)	.071*** (2.782)	CEOD	.069*** (2.729)
SSP	-.013 (-.423)	-.031 (-.982)	-.025 (-.795)	-.026 (-.826)	-.022 (-.708)	-.029 (-.949)	SSP	-.026 (-.834)
								Continue

BC		.149*** (5.643)	.126*** (4.706)	.117*** (4.386)	.126*** (4.708)	.108*** (4.104)	**KCN**	.254*** (9.897)
TI			.117*** (4.357)	.114*** (4.278)	.081*** (2.601)	.095*** (3.125)		
RDII				.122*** (4.380)	.123*** (4.504)	.125*** (4.631)		
KP					.070** (2.166)	.071** (2.221)		
ID						.115*** (4.536)		
F	34.487	35.027	34.050	33.531	31.409	31.157	F	43.362
R^2	.207	.228	.240	.253	.256	.270	R^2	.267
Adjusted R^2	.201	.221	.233	.246	.248	.261	Adjusted R^2	.261
ΔR^2	.207	.021	.012	.013	.003	.014	ΔR^2	.267
Sig ΔR^2	.000	.000	.000	.000	.031	.000	Sig ΔR^2	.000
Valid N	1200						Valid N	1200

***. Correlation is significant at the 0.01 level (2-tailed).
**. Correlation is significant at the 0.05 level (2-tailed).
*. Correlation is significant at the 0.1 level (2-tailed)
a. Dependent variable: LNECG.
b. Constants are unstandardized Coefficients, while the coefficients of other predictors are standardized.

Second, hierarchical linear regression model (HLM) is adopted. The HLM method is implemented in six steps by analyzing six models. Model 1 takes LNECG as the dependent variable and takes the above nine control variables as the predictor variables. We let BC, the first measure index of KCN, enter into Model1, then Model 2 is established. We let TI, the second measure index of KCN, enter into Model 2, then Model 3 is constructed. We let RDII, the third measure index of KCN, enter into Model3, then Model 4 is established. We let KP, the fourth measure index of KCN, enter into Model 4, then Model 5 is constructed. We let ID, the fifth measure index of KCN, enter into Model 5, then Model 6 is established. Results are shown in the left part of Tab.3, i.e., column 2, column 3, column 4, column 5, column 6 and column 7.

According to HLM results, each single measure of KCN has significantly positive effect on ECG. Specifically, BC in Model 2 can produce extra 2.1% R Square (Sig. F Change=0.000) relative to Model 1 with a positive coefficient (Beta=0.149, P=0.000), TI in Model 3 can produce extra 1.2% R Square (Sig. F Change=0.000) relative to Model 2 with a positive coefficient (Beta=0.117, P=0.000), RDII in Model 4 can produce extra 1.3% R Square (Sig. F Change=0.000) relative to Model 3 with a positive coefficient (Beta=0.122, P=0.000), KP in Model 5 can produce extra 0.3% R Square (Sig. F Change=0.031) relative to Model 4 with a positive coefficient (Beta=0.070, P=0.000), and ID in Model 6 can produce extra 1.4% R Square (Sig. F Change=0.000) relative to Model 5 with a positive coefficient (Beta=0.115, P=0.000). The positive effect of KP is significant at the 0.05 level, while the positive effects of the other four measures are significant at the 0.01 level. Therefore, even when we use different single measures of KCN instead of a comprehensive measure, the results still confirm H1, while H2 still does not hold.

4.2. Robustness Test

We try two methods to do robustness test. First we test whether the empirical results still hold when the measure of ECG changes. In Model 1 to Model 7, LNECG, the dependent variable, is replaced by the standard deviation of top five executives' compensation level within TMT (SDECG). The new regression results show that, even taking SDECG as the measure of ECG, H1 still holds. Second, we test whether the empirical results are robust with the change of control variables. REL, FS, OCD, FP, IDR, CEOS, AGE, CEOD and SSP are gradually removed from Model 1 to Model 7 step by step, and finally there is no control variable in the regression models. During the process, all the regression results confirm the hypothesis. Besides, we choose supervisory number, average managerial compensation level of an industry, the professional background of independent director and ratio of female executives as the new control variables, and put them into Model 1 to Model 7. The regression results prove H1 instead of H2. Therefore, the validity of H1 is not dependent on the choice of control variables.

4.3. Discussion

We propose H1, which argues that KCN is positively related to ECG, based on the economic view. And we also propose H2, a competitive hypothesis of H1, which argues that KCN is negative related to ECG, based on the behavioral view. The empirical analysis adopting the data the Chinese listed manufacturing companies over 2009-2013 proves H1. Our research results indicate, under the condition of higher KCN, it is more important for

shareholders and the board to align interests between shareholders and top executives by enlarging ECG than to enhance collaborations among executives by constraining ECG. Further investigation on this positive relationship between KCN and ECG, it can be inferred that, besides the behavioral reasons discussed in part 2, there may be some other reasons related to the characteristics of top executives.

In one side, with the development of market economy in China, the professional qualities of top executives have improved greatly. Both knowledge coordination willingness and capability are the core components of the professional qualities of top executives. Such an idea has gradually been a consensus among top executives: To be a top executive, to be good at knowledge coordination. As the shareholders and the board, in order to reward the efforts and performance of top executives, it is a good choice to enlarge ECG, since the negative effect of ECG argued by behavioral view has been mitigated by the improvement of the professional qualities of top executives.

In the other side, the need structure of top executives in China has changed greatly for recent decades. According to McClelland Achievement Motivation Theory, also termed as Three Needs Theory, there are three critical needs for each person, respectively need for achievement, need for affiliation and need for power. The present culture in commerce of China is short-term orientated, material wealth focused, and inter-personal relationship is more focused on competition rather than cooperation. For top executives in China, the most important need is the need for achievement, the second is the need for power, and the last is the need for affiliation. No matter the ECG is larger or smaller, collaborative behavior from the executives would be rather limited, since they have very limited need for affiliation. Therefore, for the board and shareholders, larger ECG may be a better choice, since such a choice can at least enhance the competitive effort of each top executive. As for the knowledge coordination behavior, because at present ECG seems to have no significant effect on their attitudes on it, to decrease ECG almost has no use.

Such a result indicates that in Chinese enterprises with higher KCN, the shareholders and the board still intend to adopt the economic view by enlarging ECG in order to get two good consequences: First, they hope that larger ECG can reach high monitoring intensity among TMT, which can lower the higher monitoring cost under the condition of higher KCN; Second, they argue that larger ECG can enhance the internal competition among top executives and improve the effort degree of top executives, especially when larger ECG is combined with spiritual prizes and career promotions, while they expect the negative counterproductive behavior will be mitigated by both internal monitoring from the top executives within TMT and external monitoring from the experienced board. Beside, powerful CEO may have greater power and discretion in compensation setting under the condition of higher KCN. On behalf of his own interests, larger ECG will provide himself a higher reward given a certain level of total compensation package of the TMT.

5. Conclusions

It is a pioneering work to investigate the relationship between KCN and ECG. We propose two opposite hypotheses as the competitive hypotheses for empirical test. H1 argues that KCN will be positively related to ECG based on the economic perspective. First, higher KCN needs higher talented executives who need higher total compensation package of the TMT, while KCN simultaneously leads to high distribution dispersion of executives' capability within the TMT which determines the distribution dispersion of executives' compensation within the TMT will be larger. The two facts co-enhance ECG. Second, the board wants to enlarge ECG in order to enhance the internal monitoring intensity among executives, since the visibility of executives' behavior is very poor due to the higher KCN. Third, CEO holds the critical knowledge most sensitive to the success or failure of knowledge coordination behavior, therefore, ECG, as the compensation gap between executives and CEO, should be larger. H2 argues that KCN will be negatively related to ECG based on the behavioral perspective. First, poor visibility of knowledge coordination can negatively affect ECG under the condition of higher KCN. If larger ECG is based on evaluated performance of each executive, the poor visibility of their behavior makes the results are not reliable. Wrong punishments or prizes base on such evaluation will damage knowledge coordination. Second, knowledge coordination and knowledge sharing behavior has the nature of long-term perspective, while ECG is usually based on short-term performance. In order to avoid this, enterprises with higher KCN should keep a smaller ECG. Third, KCN requires higher knowledge stock which necessarily needs an atmosphere of smaller ECG.

The results reflect something quite new in the area. The empirical test results conclude that H1 holds. That is to say, KCN is positively related to ECG. Enterprises in China intend to enlarge ECG when they face the challenge of higher KCN. This finding indicates that, for the shareholders and the board, to align the interests between the shareholders and the executives by enlarging ECG is more important than to enhance knowledge coordination behavior of top executive by lowering ECG, even when they face the fact of higher KCN.

However, such a relationship between KCN and ECG is not necessarily good to firm performance. Though the positive effect of KCN on ECG exceeds the negative effect of KCN on ECG at present in China, the performance consequences of the two choices are not clear. Whether such a positive relationship between the two can improve firm performance, it is an interesting problem for future research.

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