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The Moderating Effects of Product Market Competition on Executive Compensation

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Abstract

This paper examines the moderating effects of product market competition on the relationship between a firm and its CEOs. The predictions of managerial talent hypothesis and risk-differential hypothesis were tested using a sample of publicly traded firms in the high-tech industry in Taiwan. The results indicate that product market competition negatively moderates the relationship between firm performance, R&D activity, investment diversity and the firm's CEO compensation. These results provide evidence for the risk-differential hypothesis, under which executives may consider risk more important than incentives when they are in a highly competitive product market.

Keywords: product market competition, moderating effects, managerial talent hypothesis, risk-differential hypothesis, CEO compensation, high-tech industry

Scholars have for many years sought to better understand to what extent product market competition impacts managerial incentives and organizational slack. Many economic theorists (Holmstrom, 1982; Lazear and Rosen, 1981; Nalebuff and Stiglitz, 1983) advocate product market competition because competition changes the importance of managerial ability and effort in the determination of profits. The

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classic approaches to product market competition (Alexander and Zhou, 1995; Hermalin, 1992; Machlup, 1967; Schmidt, 1997) suggest that the presence of competition may allow a firm to evaluate managers' ability more quickly and precisely. In this case, to the extent that increases in competition can actually reduce managerial slack; competition is believed to help correct a firm's agency problems. Research on CEO compensation implies that the greater the level of a given firm's complexity, the greater the impact of a CEO on the firm (Finkelstein & Boyd, 1998). In this regard, it seems logical that, as product market competition increases, the complexity of the firm should increase; leading to concomitant increases in CEO pay. Therefore, the greater the competition intensity of a firm, the more executive compensation should reflect managerial effort.

Nevertheless, some scholars have questioned whether incentive activity works as prescribed. To the extent that the uncertainty of outcomes is high, the use of incentives tied to those outcomes would mean that agents bear more risk. Agent models contain the assumption that managers are risk averse. Therefore, as product market competition becomes intense, CEOs should work to reduce the link between firm performance and CEO compensation (Bloom & Milkovich, 1998). Accordingly, despite the numerous theoretical investigations in this area, the effects of product market competition on the contractual relationship between a firm's owners and its chief executives remain unsettled (Balkin, Markman, & Gomez-Mejia, 2000; Carpenter & Fredrickson, 2001; Hart, 1983; Hermalin, 1992; Nalebuff and Stiglitz, 1983).

This paper focuses on the moderating effects of product market competition between firm-related factors (firm performance, R&D activities and investment diversity) and CEO compensation in the high-tech industry in Taiwan. Over the past two decades, high-tech industry has gradually surpassed traditional manufacturing industry and become the largest contributor to economic growth in Taiwan. Moreover, the industry has become an important overseas business partner for international high-tech business. Consequently, the development of this new industry has captured the interest of researchers (at the same time, controversy over the compensation of top managers has captured the attention of the public). Companies in the industry have to deal with fierce competition and an unstable business

environment, and chief executive officers are often held accountable to external parties for compensation received. With these developments in mind, this study utilizes two contrasting hypotheses — managerial talent and risk-differential — to test the effects of product market competition on CEO compensation. The results are then presented, along with a discussion and conclusion of their implications for organizations.

Theoretical Background and Hypotheses

Despite competition being recognized as one of the main factors in the determination of managerial employment contracting and incentives in most financial literature, the managerial research literature does not offer many studies of the issue. Fundamentally, a review of the literature shows that there are two contrasting arguments on the impact of increased competition: managerial talent and risk-differential hypotheses.

The risk-differential hypothesis claims that based on the premise of the agency theory; there is a difference between the attitudes of agents and principals toward risk. Risk-averse managers prefer to make conservative decisions to reduce their risk exposure. Since profits may fall when competition increases, the correlation between firm performance and CEO compensation would imply that risks for executives rise when outcomes are uncertain. Therefore, risk-averse executives would prefer to have their compensation contracts made less sensitive to firm performance in more competitive environments (Aggarwal and Samwick, 1999).

In contrast, the managerial talent hypothesis states that increased competition requires greater management skills. Thus, a CEO with higher talent in a more competitive product market should be given higher levels of pay (Hubbard and Palia, 1995). In highly competitive markets, an executive's ability and effort would have a greater impact on a firm's profits than in less competitive markets. Consequently, compensation levels are by definition sufficient in competitive markets; otherwise, underpaid executives would likely be bid away by competitor firms prepared to pay a premium. Fee and Hadlock (2000) confirmed empirically that management turnover rates in competitive markets are greater than in monopolistic markets. In addition,

Joskow, Rose and Shepard (1993) find that CEOs in regulated firms have lower levels of compensation than CEOs in unregulated firms. According to these arguments, the talented CEOs operating in more competitive environment should be better paid when the company performs well (Hubbard and Palia, 1995).

Given the inconclusiveness of the theoretical research on the managerial talent and risk- differential hypotheses, this study examines the moderating effects of product market competition on CEO compensation. The study will focus on three independent variables that are identified by previous research to be critical to the determinant of CEO compensation: firm performance, R&D activity and investment diversity.

1. Firm performance, product market competition and CEO compensation

Market competition changes a firm's profit and the marginal profit of effort. Changes in market competition will also induce changes in CEO contract terms as the firm adapts to changes in profit and marginal profit of effort. The optimal contract tends to increase profit sharing to compensate for the loss of income due to increased competition (Alexander and Zhou, 1995). This competitive atmosphere often forces companies to raise compensation to recruit or retain executive talent. Consequently, with the greater possibility that CEO actions can enhance profitability, the talented executive in more competitive markets may prefer to have his or her wealth more strongly tied to performance than an executive in less competitive markets.

In contrast, according to the agency theory, agents are assumed to be risk averse and self-interested. The principal-agent theory suggests that the primary means for shareholders to ensure that executives take optimal action is to tie executive pay to the performance of their firms and to provide high-powered incentives for executives to maximize returns to shareholders (Nilakant and Rao, 1994). However, aligning CEO pay with firm performance introduces additional risk in the compensation contract (Beatty and Zajac, 1994). Furthermore, changes in market competition generate a direct effect on the supply of managerial effort through its impact on the firm's profit and marginal profit of effort. Increased competition reduces the firm's

profits and generates greater business risk. One might expect that executives in more competitive markets face greater risk if the pay level is strongly tied to firm performance. Therefore, contrary to the managerial talent hypothesis, risk-averse executives should be reluctant to strongly tie their compensation to firm performance.

In the Taiwanese high-tech industry, there is a strong need for professional CEOs who are held responsible for firm performance. However, due to the traditional social structure, most CEOs in Taiwanese companies tend to be a member of the board of directors and have the authority to set their pay-levels relatively free of the influence of owners. According to previous studies (Gomez-Mejia, Tosi & Hinkin, 1987), management-controlled firms tend to over-report earnings and are more risk-averse. Moreover, as the fierce product market competition in high-tech industry may be detrimental to a firm's performance, it should not be surprising that performance is not likely to be the basis of such executives' pay. Therefore, in the Taiwanese context it can be hypothesized that:

Hypothesis 1: Product market competition will negatively moderate the relationship between firm performance and CEO compensation.

2. R&D activity, Product market competition and CEO compensation

R&D activity in the development of new products and technologies has long been recognized as an important resource for sustaining organizational competitive advantage (Holthausen, Larcker and Sloan, 1995). Franko (1989), in his comprehensive study of the relationship between R&D spending and business performance, found that commercially oriented R&D activity is an important determinant of business performance across a broad range of industries. As the ability to cope with high technology demands is likely to be rare, those firms with intensive R&D activities will tend to pay their CEOs more in an effort to attract capable candidates (Baysinger, Kosnik, and Turk, 1991). Furthermore, the effect of an executive's ability to assist the firm in sustaining its R&D capability on the firm's performance is larger in a more competitive product market than in a less competitive one. Therefore, it would be expected that the level of CEO compensation should be

more strongly tied to the level of the firm's R&D activity in more competitive markets than in less competitive markets.

By contrast, the assumption of risk aversion from agency theory is that agents do not like variability in their compensation. High investment in R&D activities is generally a high-risk strategy that is attractive to stockholders because they anticipate a positive effect on firm performance. However, the effect of the risk associated with R&D activities may place an agent's entire employment relationship in jeopardy (Balkin, Markman and Gomez-Mejia, 2000). Emphasis on R&D investments implies a greater variability of outcomes and a greater probability of failure. Research on product market competition indicates that agents in organizations facing more competition may react by withholding effort or by taking actions designed to reduce their risk exposure that are coincidentally detrimental to organizational performance. Because the executives are subject to employment risk under high levels of R&D activity, executives would prefer to have their compensation contracts made less sensitive to the outcomes of firm R&D activities.

As with most corporations in developed countries, there is a definite awareness for Taiwanese high-technology firms that R&D investment is an important element in surviving in hyper-competitive technology markets. However, executives will be reluctant to invest in R&D activities because innovation projects have high failure rates and do not yield short-term returns. In traditional "Confucian" societies, executives are more conservative in investing in R&D projects, as risky R&D projects imply an immediate employment risk that cannot be diversified away. Consequently, in Taiwan, we expect to find a negative effect of product market competition on the relationship between the level of a firm's R&D activities and its CEO compensation. Thus, it can be hypothesized that:

Hypothesis 2: Product market competition will negatively moderate the relationship between a firm's R&D activities and CEO compensation.

3. Investment diversity, Product market competition and CEO compensation

Management research has recently emphasized corporate flexibility for pursuing competitive advantage (Hitt, 1998). Firms are able to source potential flexibility

advantages through investments in subsidiary companies with differing equity ownership, e.g., wholly, majority and minority ownership (Athanassiou and Nigh, 1999). These investments are suggested as ways for firms to further extend organizational boundaries, to seek more resources and to improve firm performance (Steensma and Corley, 2000). As such diversity of investments increases organizational complexity; the knowledge and skill required of chief executives also increases. Highly talented executives would be paid more because of their ability to meet the challenge and to make larger marginal contributions to the performance of such diversified firms (Henderson and Fredrickson, 1996). Since the complexities of investment diversity are likely to increase with the level of product market competition that diversified firms face, there is reason to expect that the linkage between investment diversity and CEO compensation would become stronger as competition in the product market escalates.

Instead, although most diversification research shows that the way for firms to improve performance is to diversify into more profitable industries (Stroh, Brett, Bauman and Reilly, 1996), diversification itself may impose risk on CEOs by reducing their income and employment stability (Henderson and Fredrickson, 1996). Since the basic impact of increased competition is that it may reduce profits, a higher level of uncertainty about the outcome of firm diversification may be associated with increased product market competition. Therefore, risk-averse CEOs in more competitive markets may react to reduce their risk exposure associated with diversified investments by having their compensation contracts made less sensitive to the firm's diversified investments.

In the traditional Taiwanese view, a firm prefers to keep the majority of the money in its core business, i.e. no diversification at all. Recently, newer thinking in high-technology industries has begun to embrace the view that the way for firms to improve performance is to diversify into more profitable industries. However, as firms diversify further away from their core business, managers are less likely to have an understanding of their firms' disparate business or markets. An inevitable result of lower performance levels would make the firm associated with more risk. Therefore, in Taiwanese context, we hypothesized that:

Hypothesis 3: Product market competition will negatively moderate the relationship

between a firm's investment diversity and CEO compensation.

Research Method

1. Data and sampling

The study explores the moderating effect of product market competition on CEO compensation. The hypotheses were examined by using a sample of publicly traded firms in the Electronics/Semiconductor industry in Taiwan. The products of the Electronics/Semiconductor industry consist principally of computer, consumer and communications, and semiconductor products.

Most data for this study were collected from proxy statements obtained either from the firms under study or from the Security and Futures Commission (SFC) in Taiwan. All publicly traded firms in Taiwan are required by law to file statements relating to their finances, products and businesses as a whole. These statutory filings formed the primary data source of this study. The sample frame for this study consisted of 238 publicly traded companied classified as Electronics/Semiconductor industry by SFC in 1998 and 1999. Missing data reduced the final sample to 150 companies.

2. Measures

Competition density. Researchers refer to competition as "constraints arising from the joint dependence of multiple organizations on the same set of finite resources" (Carroll and Hannan, 1995: 115). A critical idea is that competition is affected by the density of the population. As competition intensifies, density increases relative to resources, which means existing organizations have to compete for a pool of resources that, relatively speaking, has shrunk, resulting in reductions in the potential gain for the organization. Therefore, in this study, product market competition was represented by competition density, defined as the ratio of the actual number of competitive organizations to the total number of possible competitive organizations. In an effort to determine the competition density of each product market, a series of interviews were conducted with senior engineers in Electronics/Semiconductor industry to make sure of the characteristics and the

categories of Electronics/Semiconductor products.

For the purpose of measuring this variable, a two-stage data collection was performed. In the first stage, we collected data of the major products of the 238 publicly traded companied to construct a competition matrix. Cell entry X*ij* equaled 1 if major products stated in the proxy statements of company *i* and company *j* were classified as the same categories based on Institute for Information Industry (Taiwan) code. Then, a 238 × 238 "competition matrix" of the entire industry could be constructed. In the second stage, according to the competition matrix, competition density was computed for each of the 150 companies using the network analysis program UCINET V (Borgatti, Everett, and Freeman, 1992).

R&D activity. R&D activity is measured as the average number of R&D employees stated in the proxy statements in the year of 1997 and 1998; as a firm could sustain its capability to innovate by internalizing R&D professionals (Hamel and Prahalad, 1994).

Investment diversity. As firms are able to source potential advantages through different types of investments in subsidiary companies (Roth and O'Donnell, 1996), investment diversity was measured as a count of the average number of equity subsidiaries in 1997 and 1998, including majority and minority ownership, for each firm. Lubatkin, Merchant, and Srinivasan (1993) concluded that a simple count of businesses was as valid as more complex measures to examine the primary effect of diversification.

Firm performance. Since the underlying interest in this study was the CEO compensation of a firm, a performance measure was chosen that reflected profits of the firm attributed to the CEOs. This measure, which has been used in previous research, is the logarithm of net income for the previous year, 1998 (Tosi, Werner, Katzand and Gomez-Mejia, 2000). CEO compensation is typically tied to short-term measures of firm performance, and so the measure of performance in this study was also short-term. The data was taken from the proxy statements of each firm.

CEO compensation. CEO compensation was measured as the logarithm of the total compensation received by the CEO in 1999. Since the publicly traded firms in Taiwan are not required by law to disclose bonuses and other compensation

separately, it was not possible to decompose the total compensation figure into its components for finer examination.

Control variables. *Firm size* was measured using annual sales for 1998. Firm size was expected to have a positive relationship to levels of CEO pay. *Firm age* was measured as the number of years since the firm's foundation.

3. Statistical Analysis

The hypotheses were tested with hierarchical moderated regression analysis. As is customary, we ran initial regression with the control variables. This procedure was followed by regressions with only main effects entered. Finally, the hypothesized interactions between independent variables and the attributions of product market competition were added. To eliminate problems of multicollinearity resulting from the interaction terms, the independent predictor variables were centered prior to computing the interaction terms. This transformation did not affect the unstandardized regression coefficients or the model's R^2 and F values. Significant interactions were then plotted to facilitate interpretation of the moderating effects of product market competition on CEO compensation.

The Empirical Results

The means, standard deviations, and bivariate correlations for all variables are presented in Table 1. Among those firm related factors, from Table 2, firm performance and R&D activity were found to be positively related to CEO compensation. Investment diversity and competition density does not have significant effects on CEO compensation.

The results of the moderated regression analysis predicting the effects of product market competition on CEO compensation are reported in Step 3, Table 2. The R^2 changes reflect the entry of variable sets in step 1, step 2 and step 3 of the hierarchical regression. The interactions of product market competition with firm performance, R&D activity and investment diversity were significant, as was the full model's increase in R^2 over the main effect model. In order to better understand their directions the interactions were plotted following Cohen and Cohen (1983) and

Jaccard, Turrisi and Wan (1990).

TABLE 1 Descriptive Statistics and Pearson Correlations

Variable	Mean	s.t.	1	2	3	4	5	6
1. Firm size[a]	3977.27	6765.19	-					
2. Firm age	16.23	7.55	-.097	-				
3.Competition density	0.054	0.026	-.104	.045	-			
4. Number of R&D employees	120	179	.461**	-.088	-.048	-		
5. Number of subsidiaries	5.57	5.91	.181*	.045	-.076	.347**	-	
7. Firm performance[b]	5.12	0.55	.455**	-.074	-.192*	.500**	.371**	-
8. CEO compensation[c]	6.83	0.36	.444**	-.104	-.071	.408**	.178*	.446**

a. In millions of New Taiwan Dollars.

b. Logarithm of net income.

c. Logarithm of total CEO compensation

* p<.05; ** p<.01

TABLE 2 Results of Moderated Regression Analysis

Variable	Step 1	Step 2	Step 3
Firm size[a]	.435**	.167	.11
Firm age	-.06	-.05	-.04
Firm Performance		.32**	.70**
R&D activity		.17*	.45
Investment diversity		-.10	-.12
Competition density			.14+
Competitive density x			
Firm Performance			-1.6*
R&D activity			-.32*
Investment diversity			-.32+
Adjusted R^2	.19**	.26**	.28*
Change in adjusted R^2		.07	.02*

+p<.10; * p<.05; ** p<.01

Figure 1 shows the plot for the interaction effect of firm performance and competition density on CEO compensation. The graph indicated that when competition density is low, firm performance is positively related to CEO compensation. However, there is a negative effect of firm performance on CEO compensation when competition density is high. To interpret the interaction effect further, we took an additional analytical step to examine if the effect of firm performance (X_1) on CEO compensation (Y) was monotonic over the range of competition density (X_2) observed in the sample. For this analysis, we followed Schoonhoven (1981) and computed the partial derivative of CEO compensation in the regression equation with respect to firm performances $\partial Y/\partial X_1 = 0.7 - 1.6X_2$. The point was then found at which an increase in firm performance has no effect on CEO compensation. Since the calculated value of the point for competition density (X_2), which is .438, was within the range observed in the sample ($0 \leqq X_2 \leqq .97$), we concluded that firm performance has a nonmonotonic effect on CEO compensation over the range of competition density. This nonmonotonic effect indicates the following: under lower competition density, firm performance had a positive effect on CEO compensation, however, under higher competition density, firm performance had a negative effect on CEO compensation. From the analysis, we concluded that the risk differential hypothesis for Hypothesis1 is supported.

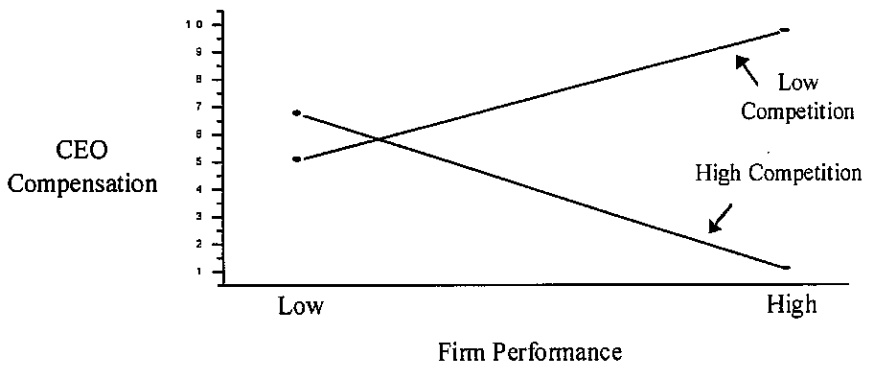

Figure 1 Effects of Firm Performance and Product Market Competition on CEO Compensation

From table 2, the interaction of competition density and R&D activity had a significant negative association with CEO compensation (beta = -.32, $p<.05$). Figure 2 showed that the positive effect of R&D activity on CEO compensation was weaker for higher levels of competition density. The partial derivative of CEO compensation (Y) with respect to R&D activity (X_1) was computed as $\partial Y/\partial X_1 = 0.45-.32X_2$, where X_2 = competition density. The partial derivative analysis revealed that the effect of R&D activity on CEO compensation was monotonic over the range of competition density observed in the sample. The result exhibited a decreasingly positive slope, expressing the change in CEO compensation as competition density increases. This outcome is consistent with the risk-differential hypothesis of Hypothesis 2.

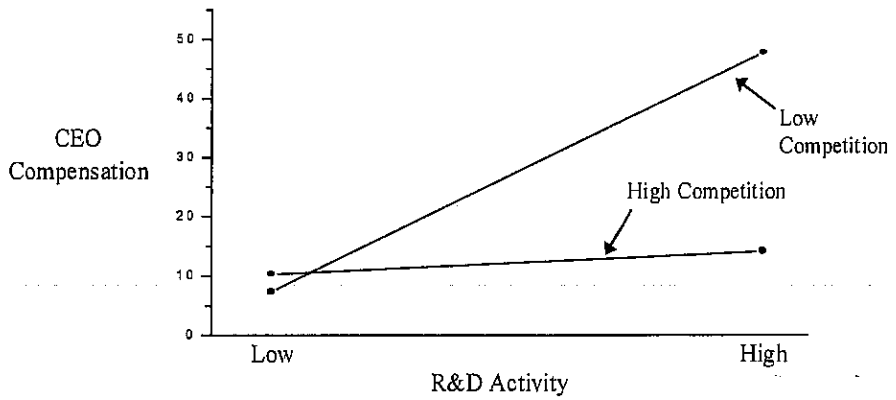

Figure 2 Effects of R&D Activity and Product Market Competition on CEO Compensation

The result of the interaction effect of investment diversity (X_1) and competition density (X_2) on CEO compensation (Y) was graphically displayed in Figure 3. The interaction in Table 2 suggested that the greater the competition density, the greater the negative impact of investment diversity on CEO compensation. To clarify the interaction, we once more computed the partial derivative of CEO compensation (Y) with respect to investment diversity (X_1) over the observed range of competition density (X_2) as $\partial Y/\partial X_1 = -.12-.32X_2$. Partial derivative analysis revealed that the

effect of investment diversity on CEO compensation was monotonic over the range of competition density observed in the sample. Thus, the result was congruent with the risk-differential hypothesis.

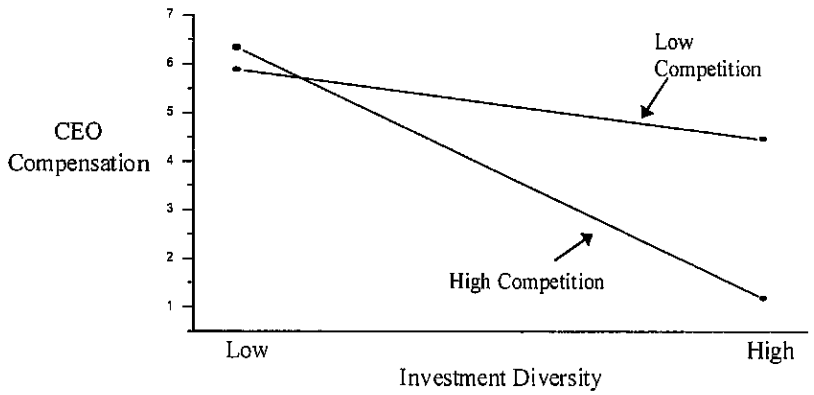

Figure 3 Effects of Investment Diversity and Product Market Competition on CEO Compensation

Discussion

In considering how product market competition influences the principal-agent relationships, product market competition was found to negatively moderate the relationship between firm-related factors (firm performance, R&D activity and investment diversity) and the CEO compensation. Although the debate regarding the role that product market competition plays as a potential source of disciplinary restraint for management has generated renewed interest in understanding its effect on managerial incentives, the findings in this study indicate that researchers need to go beyond examining product market competition through a single lens. The results suggest that the question of whether product market competition is beneficial must be answered in terms of specific outcomes and attributions. The overall results of this study provide empirical evidence to support recent theoretical statements that when risk is higher, incentive pay can negatively influence the behavior of agents. In

contrast to the predictions of the managerial talent hypothesis, the risk-differential hypothesis suggests that risk-averse executives would consider risk, in any form, more influential in determining compensation levels than incentives. Therefore, CEOs in a more competitive environment tended to undertake actions to reduce their employment and compensation risks.

The results are consistent with the agency-based compensation research showing that environment turbulence is negatively related to the use of incentive pay. Analysis of data from the high-tech industry in Taiwan yielded three significant findings. First, the results indicated that the association between firm performance and CEO compensation was positive in product markets with comparatively low competition and negative in more competitive markets. This finding appears consistent with the risk-differential hypothesis that competition itself may impose risk on agents by reducing their income and employment stability. Interesting enough, partial derivative analysis for the interaction revealed that the pay-performance sensitivity became negative when competition reached a value of .452. A plausible explanation for this effect is as competitive processes become stronger, organizations find it more difficult to sustain the inflow of available resources, resulting in performance fall-offs. Under such circumstances, CEOs may take action to manipulate the firm's short-term performance in ways that are detrimental to its long-term performance. In this case, CEOs in organizations facing higher competition may have their compensation made less sensitive to firm performance to reduce their risk exposure. The offset for pay-performance sensitivity between lower and higher competitive markets may explain the statistical evidence provided by a great many of studies showing a weak to insignificant relationship between executive pay and performance (Gomez-Mejia and Wiseman, 1997; Tosi and Gomez-Mejia, 1989; Tosi, Katz and Gomez-Mejia, 1997; Tosi et al., 2000). More competitive product markets make it difficult to determine whether variations in organizational performance are due to inferior managerial performance or factors outside of managerial control. Apparently, in highly competitive markets, risk considerations seem to substantially alter the observed pay-performance relationship.

Secondly, results also showed that product market competition negatively moderates the relationship between a firm's R&D activity and CEO compensation.

Since firms in competitive environments need to continuously improve their innovation capabilities to generate profits, it is very important to tie executive compensation to firm R&D activity. However, an optimal compensation scheme motivates executives, but does not expose them to excessive risk. Therefore, as the market gets more competitive, executives will make their compensation less sensitive to the firm's R&D activity to reduce the risk they incur.

Finally, decomposition of the interactions revealed the simple effects of investment diversity on CEO compensation to be negatively moderated by product market competition. This result is consistent with the risk-differential hypothesis. One likely explanation for the finding is that investment diversity may influence firm performance indirectly by increasing administrative complexity and bureaucratic costs. As the competition density increases, risks that lie outside of executive control may negatively influence outcome measures of diversified investment, thereby reducing the incentive for the executives to tie their compensation to firm investment diversity. Although no significant direct effect between investment diversity and CEO compensation was found in our study, the negative slope shown in Figure 3 may remind us that the agency view of diversity is that diversification is seen as a way for managers to advance the personal goals of CEOs instead of maximizing shareholder value (Jensen, 1990). Chief executives may thus protect themselves from the risk associated with investment diversification by not binding their compensation to their firm's investment diversity.

Taken together, the findings of the present study contribute to the research examining the executive pay-performance relationship in light of the need to align the actions of agents with desired organizational outcomes. Though product market competition has often been claimed to reduce managerial slack, market competition on its own increases an agent's overall risk exposure by jeopardizing both the entire employment relationship and the agent's income stream. The negative effect of product market competition on the relationship between firm-related factors (firm performance, R&D activities, and investment diversity) and CEO compensation suggests that the executives may consider risk more important than incentives when they are in a highly competitive product market. This idea is consistent with the basic risk aversion assumption of agency theory that agents do not like variability in their

compensation, particularly when the environment is highly uncertain.

1. Limitations

This study has three major limitations. First, the generalizability of our findings may be limited by the nature and dynamics of competition in this industry. Further inferences regarding other type of industries should be made with caution. The second concerns the sampling of Taiwanese industrial firms. Such a sample was used in part because, with the growing amounts of inward investment made in Asia by foreign MNCs, the valuable insight provided by this sample can help understand the dynamics of compensation in these regions. However, there is reason to expect that the results would vary if executives from different countries vary in their tolerance toward risk and uncertainty. Finally, the cross-sectional design prevented the establishment of causal relationships. Future research should utilize longitudinal data to examine the ecological effects of product market competition.

Conclusion

The objective of this study has been to shed light on issues within managerial compensation theory and to clarify the effect of product market competition on managerial incentives. The relationships found between product market competition, firm-related factors and CEO compensation suggest that principals need to keep the risk-aversion assumption in mind when attempting to align agent behavior through incentive pay. Furthermore, this paper reported what is perhaps the first large sample study of executive compensation determinants in Taiwan. As there is fierce product market competition in the high-tech industry in Taiwan, this study shows evidence that the risk-differential hypothesis will obtain when product market competition exceeds a certain level.

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