The Effect of Board of Directors' Independence on CEO Compensation

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Abstract

This paper explores the ways in which the board of directors' independence influence the compensation received by CEOs. We use three measures of board independence, namely CEO duality, board size and board composition. We analyse the impact of each of these three variables on the level of CEO cash and total compensation as well as on the sensitivity of cash and total compensation to firm performance. Using panel data on large Canadian firms gathered between 2001 and 2004, we find that dual CEOs do not receive higher compensation; nevertheless the sensitivity of their pay to firm performance is lower than no dual CEOs. Furthermore, the results suggest that as board size increases CEO compensation increases and becomes less sensitive to performance. Finally, the proportion of unrelated directors doesn't seem to have any effect on compensation level, however it has a positive effect on the pay-performance sensitivity.

EFM classification: 190; 150; 110.

Keywords: pay performance sensitivity, CEO compensation, CEO duality, unrelated directors, board size.

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1. Introduction

The issue of executive compensation has attracted much attention in recent years, resulting in an ongoing debate in the popular press as well as in academic journals. Since the design of executive pay is the board of directors' duty, several papers investigate the effect of board characteristics on the compensation package received by CEOs. Most of these papers analyse the effect of the board of directors on the compensation level, however only some papers investigate its effect on the pay-performance sensitivity[2]. Furthermore, the effect of the board of directors on compensation has been widely investigated in the American context and in a lesser extent in the U.K, however the role played by board members in fixing compensation in Canada is not known. In this paper, we try to fill this gap by studying the effect of board independence on the level as well the pay performance sensitivity of compensation received by CEOs in a sample of Canadian firms listed on the TSX. We focus our attention on three measures of board effectiveness: CEO duality, board size and the proportion of unrelated directors on the board. We study the effect of these three measures on the level of CEO compensation as well as on its sensitivity to firm performance.

Using median regression in a sample of 196 Canadian firms listed on the TSX over the period 2001-2004, our results indicate that CEOs receive higher compensation when the board size is large. CEO duality and board composition however, do not seem to have any influence on the compensation level. As for the pay performance sensitivity, it is lower when the CEO is also the chairman of the board and when the board size is large, this sensitivity increases when the proportion of unrelated directors on the board increases. Collectively, our results indicate that when the CEO power over the board is high (proxied by CEO duality and board size), the compensation package is designed to favour the CEO, reflecting that the board members are co-opted. However, it seems that unrelated directors play their governance role by linking pay to performance. Our results suggest that Canadian firms should reduce the size of their boards and dissociate the roles of chief executive officer and chairman, in order to have a well designed compensation package.

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[2] Exceptions include Yermack (1996) who studied the effect of board size on the pay performance sensitivity, Anderson et al. (2003) who were interested on the effect of CEOs sitting on their own compensation committee as well as the fraction of outside directors on the compensation committee and Newman and Mozes (1999) who investigated the effect of the compensation committee composition on the pay-performance sensitivity. Conyon and Peck (1998) conclude that pay performance sensitivity is larger and for boards and remuneration committees dominated by outsiders.

The rest of the paper is organised as follows. Section 2 discusses the relevant literature and develops the hypotheses. Section 3 provides the model specification and the variables measurements. Section 4 describes the sample and data sources. The empirical results are presented in section 5. Section 6 concludes the paper.

2. Hypotheses

In many firms, the CEO is also the chairman of the board. For instance, Shivdasani and Yermack (1999) find dissociation between the two functions in only 16% of their sample. The CEO who assumes the position of board chair may use his power to select the board members, control the agenda, filter information available to the board and manage the directors. Hence, it is expected that board control will be lower in the case of CEO duality. In accordance with this argument, Jensen (1993, p.866) suggest to separate the chairman and CEO position. Several papers study the impact of CEO duality on the level of compensation received. The results are however mixed. Mallette et al. (1995), Sridharan (1996), Core et al. (1999)[3] and Conyon and Murphy (2000) find that CEO compensation is higher when the CEO is also the board chairman. However, Cordeiro and Veliyath (2003) and Angbazo and Naraynan (1997) fail to find any significant relationship and Cheng et al. (2005) find a negative relationship between CEO duality and CEO compensation. Given the mixed results documented in prior work, we examine the effect of CEO duality on the level of compensation as well as on its sensitivity to firm performance.

Hypothesis 1. In the presence of duality, CEO compensation is greater and it is less sensitive to firm performance.

Jensen (1993, p.865) suggest that when the board of directors is composed of more that 7 or 8 members, it will be less efficient and it is easier for the CEO to control the members. In this case, the CEO may influence his compensation. In a similar vein, the Toronto Stock Exchange Committee on Corporate Governance (1994, p. 31) reports « The issue of board size is that some boards are too big to facilitate effective decision making. If the board is too big, the individual director risks losing a sense of responsibility may feel constrained about actively participating in board deliberations and may have little sense of accountability of board decisions".

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[3]The authors report that in the case of duality, the CEO receives additional compensation of $ 152,577.

The empirical evidence on the effect of board size on management compensation is however inconclusive. Holthausen and Larcker (1993) and Core et al. (1999) find a positive relationship between board size and CEO compensation. In particular, Core et al. (1999) find that total CEO compensation increases by $30,601 when a member is added to the board. In the other hand, in a sample of commercial banks during the year 1989, Angbazo and Narayanan (1997) fail to find any significant relationship between board size and CEO compensation. Contrary to prediction, Grinstein and Hribar (2004) obtain a negative and significant relationship between board size and bonuses received by CEOs in mergers and acquisitions. The studies investigating the effect of board size on the pay performance sensitivity are scarce. Yermack (1996), in a sample of 452 US firms over the period 1984-1991, conclude that sensitivity decreases as board size increases. In this paper, we investigate the effect of board size on the level of CEO compensation as well as on the pay performance sensitivity.

Hypothesis 2. CEO compensation increases and it becomes less sensitive to firm performance as board size increases.

The board of directors is composed of outside directors and inside directors. Fama (1980) and Fama and Jensen (1983) suggest that outside directors are in competition and therefore are incited to develop a good reputation in monitoring management and Pfeffer (1981) argue that inside directors are loyal to the CEO because of the power he has over them. Accordingly, most studies consider that outside directors are independent while inside directors are co-opted. Nevertheless, despite the belief that outside directors are efficient monitors, the results obtained at the empirical level are mixed[4]. Boyd (1994), in a sample of 193 firms, finds that the ratio of insiders is negatively related to CEO compensation, while Grinstein and Hribar (2004) conclude that the ratio of insiders is not a significant determinant of bonuses perceived by CEOs in mergers and acquisitions. In a sample of 153 manufacturing firms in 1979-1980, Mehran (1995) finds that the use of equity based compensation is greater in firms with more outside directors on the board. Newman and Mozes (1999, p. 50) report "...the relation between CEO compensation and firm performance is more favourable toward CEOs of insider-influenced firms than it is to CEOs of outsider-influenced firms".

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[4] While Xie et al. (2003), Byrd and Hickman (1992) and Weisbach (1988) conclude that outside directors protect shareholders interests, Erickson et al. (2005), among others, report a non significant relationship between board independence and firm performance and Agarwal and Knober (1996) and Bhagat and Black (2001) find that outsiders have a negative effect on shareholders welfare.

The mixed results identified in prior work may be explained by the fact that outside board members may not be independent [Main et al. (1995)], or that they do not have the time, the expertise or the motivation[5] to monitor management [Gilson and Kraakman (1991)]. Given the conflicting arguments behind the effect of the board composition on CEO compensation, we do not predict a particular sign for this variable. Hence, we test the following hypothesis:

> *Hypothesis 3. The board composition influences the level of compensation received by the CEO as well as its sensitivity to firm performance. The signs of the relations are an empirical matter.*

In addition to the board characteristics, we control for variables that prior work suggest to be important determinants of either pay level or pay performance sensitivity. First, agency theory suggests the existence of a trade-off between risk and incentives: pay-performance sensitivity should decrease as risk rises[6], also it has been argued to compensate CEOs for assuming more risk. Second, it has been suggested that growth opportunities and firm size influence CEO compensation. Hence, we include measures of firm risk, growth opportunities and firm size in the regression.

3. Model Specification and Variables Measurements:

In order to test our hypotheses, we estimate the following regression:

$$COMP = \gamma_0 + \gamma_1 RET + \gamma_2 (CEO\,duality) + \gamma_3 RET * (CEO\,duality) + \gamma_4 CDF(board\,size)$$
$$+ \gamma_5 RET * CDF(board\,size) + \gamma_6 CDF(proportion\,unrelated) +$$
$$\gamma_7 RET * CDF(proportion\,unreated) + control\,variables$$

COMP is the compensation received by the chief executive officer. We use two compensation measures: cash compensation and total compensation. Cash compensation is the sum of salary and bonus and total compensation is equal to the sum of cash compensation and stock option value. Stock options are valued using the *Back& Scholes* (1973) model adjusted for dividends. RET is annual dollar stock returns to shareholders, which is computed as the product of annual percentage returns and beginning market value of the firm. CEO

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[5] In most cases, the CEO may influence the selection of board members. The study by Shivdasani and Yermack (1999) shows that the CEO has a direct influence in the directors' nomination process in more than 50% of the firms' sample.

[6] In accordance with this argument, Aggarwal and Samwick (1999) and Dee et al. (2005)find that the sensitivity of pay to performance decreases as risk rises.

duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. CDF denotes the cumulative distribution function. The CDF values of 0 and 1 correspond to the minimum and maximum observed values in the sample. CDF (Board size) is the cumulative distribution function of the board size, measured by the total number of directors in the board. CDF (proportion unrelated) is the cumulative distribution function of the proportion of unrelated directors which is measured by the ratio of unrelated directors on the board divided by the board size. Directors are classified as either related or unrelated according to the Dey report' guideline 2, which defines an unrelated director as:

"[A] director who is independent of management and is free from any interest and any business or any other relationship which could, or could reasonably be perceived to materially interfere with the director's ability to act with a view to the best interests of the corporation, other than interests and relationships arising from shareholdings".

RET*CEO duality, RET*CDF(board size) and RET*CDF(proportion unrelated) are interaction terms capturing the effect CEO duality, board size, the proportion of unrelated directors respectively on pay-performance sensitivity.

Finally, we control for firm size, growth opportunities, firm risk, year effects and industry effects. Firm size is measured by the cumulative distribution function of sales. Growth opportunities are proxied by the cumulative distribution function of the market to book ratio. Following Aggarwal and Samwick (1999) and Dee et al. (2005), we use the cumulative distribution function of the variance of dollar returns to control for risk, this variance is computed using a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year. Year effects and industry effects are controlled by adding dummy variables into the regression.

4. Sample and data sources

We examine CEO compensation in 196 large Canadian firms in the S&P/TSX index over the period 2001-2004. Table (1) below presents the distribution of our sample firms by industry, where we can see that 36% of firms in our sample belong to the manufacturing sector followed by services (28%), then mining and oil and gas extraction (20%). Financial sector and other industry sectors together form 17% of our sample firms.

Insert Table 1 here

Since 1993, all Canadian publicly traded companies are required to disclose top executive compensation. We collect data on CEO compensation (i.e. base salary, bonuses and shares represented by stock option awards) from firm proxy statements available from SEDAR database.

All of the compensation elements are reported in values, except for stock options. We value stock options using the Black & Scholes approach for valuing European call options adjusted for dividend payments. The strike price, market price and time to expiration for each stock option grant were carefully gathered from proxy statements. We use the interest rate on Canadian government 10-year bond as proxy for interest risk-free rate, which is obtained from the Bank of Canada. The expected dividend rate and the expected stock return volatility are gathered from Stock-Guide database.

The executive compensation packages awarded by the firms in our sample are expressed in Canadian dollars, but some are provided in U.S. dollars. In that case, we convert these compensation elements in Canadian dollars using the average exchange rate over the corresponding fiscal year. Furthermore, we deflated our monetary values using the consumer price index (CPI) of the last month of the corresponding fiscal year (with 2000 as the year base).

Stock market data were collected from the Canadian Financial Markets Research Centre (CFMRC). Data on CEO duality, board size and board composition are gathered from proxy statements.

We collect the above data for fiscal years lying between January 2001 and December 2004. We define the fiscal year as the year in which lies the final month of the fiscal year chosen by the corporation. Thus, a fiscal year from July 2003 to June 2004 is treated as an observation for 2004.

Finally, we have excluded observations for which companies changed their fiscal years, observations with partial compensation due to CEO turnover and observations with missing data.

5. Empirical Results

Table (2) presents descriptive statistics about dependent as well as independent variables. Cash compensation varies between 60676.67 and $1.71 \ 10^7$ Canadian dollars, the mean (median) equals 1221117 (897210.9). The mean and the median of total compensation are 2120046 and 1374243 Canadian dollars respectively. It is noteworthy that the mean is higher than the median indicating that compensation distributions are right skewed. Furthermore, Table (2) shows that the mean (median) of percentage return equals 1.84% (1.35%). The percentage return varies between a loss of 161.86% and a gain of 310.98%. The dollar shareholders return ranges from a loss of 683277.600 and a gain of 732605.900 million Canadian dollars. Furthermore, it emerges from Table (2) that the CEO is also the chairman of the board in 23% of the sample. A median board size is composed of 10 members, while a mean board size contains 12 members. These figures are higher than suggested by theory, nevertheless, they are close to those found by Erickson et al. (2005) who obtain, in a sample of Canadian firms over the period 1993-1997, a mean and a median of 10,24 and 11 respectively. The mean and the median of the proportion of unrelated directors are 72% and 75% respectively which are close to the recommendation of the Dey report[7], and higher than those reported by Erickson et al. (2005) who found 69% (70%) for the mean (median).

Insert Table 2 here

Table (3) presents Pearson correlation coefficients. It emerges from the correlation matrix that CEO duality does not have a significant effect on cash and total compensation received by CEOs. Board size and the proportion of unrelated directors, however, have a positive and significant effect on compensation. It also emerges from this table that board size is highly correlated with firm size, with a correlation coefficient of 0.6398. The proportion of unrelated directors on the board seems to be positively correlated with firm size. This may be due to the fact that large firms are more targeted by analysts and hence conform more to the TSX guidelines.

Insert Table 3 here

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[7] The Dey report recommends that two third of the board of directors should be composed of unrelated directors.

Table (4) reports the results using median regression[8]. In fact, in the presence of outliers, the median is more robust than the mean (Aggarwal and Samwick (1999)). In this table, we present two different models. In the first model, cash compensation is used as the dependent variable, while in the second model total compensation is the dependent variable. Several interesting results emerge from this table. The reported results show that cash compensation and total compensation are sensitive to firm performance: the coefficient on shareholders return is positive and significant at the 1% level in both models. This result is consistent with agency theory that suggests tying managerial compensation to firm performance.

As for the variables of interest, the results are mixed. The coefficient on CEO duality is insignificant in both models. This result is similar to the one found by Cordeiro and Veliyath (2003). The coefficient on the interaction term between CEO duality and performance however is negative and significant at the 5% level in the first model and at the 1% level in the second model. Therefore, when the CEO is also chairman, he does not receive higher compensation, nevertheless the negative and significant coefficient on the interaction term indicates that the sensitivity of his pay to shareholder return is lower. While, this result may be explained by the influence that dual CEOs exercise over their pay package, it may also be explained by the fact that dual CEOs own a large fraction of the stock of their firms and hence need not incentives. Anderson and Bizjak (2003), for instance, found that the value of new option grants and the full option portfolio are significantly lower when the CEO is serving on the compensation committee, however, when total pay sensitivity (equity holdings+ full option portfolio) is considered, they found that the sensitivity is larger for serving CEOs than for non serving CEOs. In our sample, the Pearson correlation coefficient, not reported, between CEO duality and CEO stockholding is 0.3188 and it is significant at the one percent level. Hence, as robustness check, we control for CEO share ownership by adding into the regression the cumulative distribution function of CEO share ownership and its interaction with shareholders return. The results reported in Table (5) show that after controlling for CEO stockholding, the negative sign on the interaction term persists and this result holds for cash compensation as well as total compensation.

The coefficient on board size is positive and significant at the 1% and 10% in the first and second model respectively indicating that compensation received by CEOs increases as

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[8] Median regression minimizes the sum of absolute deviations rather than the sum of squared deviations.

board size becomes larger. In particular, when board size increases from the median size (CDF (board size)=0.5) to the maximum size observed in the sample (CDF(board size)=1), CEO cash and total compensation increase by 235.723 (471.446-471.446*0.5) and 170.816 (341.633-341.633*0.5) thousand dollars respectively. Our finding is consistent with the results of Core et al.(1999). Furthermore, the coefficient on the interaction term is negative and significant at the one percent level in both models, indicating that large boards grant lower incentives than small boards. This result suggests that large boards are ineffective and is in accordance with the argument that productivity decreases as the group contains more members.

The proportion of unrelated directors on the board does not seem to influence the level of cash as well as total compensation. However, the positive and significant coefficient (at the 1% level) identified on the interaction term between dollar shareholder return and the proportion of unrelated directors indicates that firms with more unrelated directors offer their CEOs more incentives. The estimated coefficient of $0.538 \ 10^{-2}$ in the CEO cash compensation regression indicates that when shareholders realize a loss (gain) of 1000 million dollars, CEO cash compensation decreases (increases) by 5380 ($0.538 \ 10^{-2}* \ (-1000)= -5.38$ thousands) Canadian dollars in a firm in which the proportion of unrelated directors is at its maximum (CDF (proportion unrelated)=1), however, it decreases (increases) by only 2690 ($0.5*0.538 \ 10^{-2}*(-1000)= -2.69$ thousands) Canadian dollars in a firm in which the proportion of unrelated directors is at the median (CDF (proportion unrelated)=0.5). The similar thing happens for CEO total compensation. In fact, when shareholders realize a loss (gain) of 1000 million dollars, CEO total compensation decreases (increases) by 10880 Canadian dollars in a firm in which the proportion of unrelated directors is at its maximum (CDF (proportion unrelated)=1), however, it decreases (increases) by 5440 Canadian dollars in a firm in which the proportion of unrelated directors is at the median (CDF (proportion unrelated)=0.5). These figures show that as the proportion of unrelated directors on the board increases, CEO pay becomes more sensitive to shareholders return. This result is consistent with the governance role played by unrelated directors.

Concerning the control variables, we find that growth opportunities have a negative effect on cash as well as total compensation received by the CEO. We also find that firm risk measured by the variance of shareholders return has a positive and significant (at the 1% level) effect on the level of compensation, indicating that managers are compensated for

assuming risk. As for the pay-performance sensitivity, it seems that it is influenced by growth opportunities, a result that is consistent with the finding of Dee et al. (2005). Also, in accordance with the existence of a trade-off between risk and incentives suggested by agency theory, we find that pay-performance sensitivity decreases as risk rises. This result corroborates the finding of Aggarwal and Samwick (1999).

From the results presented in Table (4), we can estimate the level of pay performance sensitivity. In fact, in a firm where there is dissociation between the roles of CEO and board chairman (the variable CEO duality takes the value of zero), the size of the board is the smallest one in the sample (the variable CDF (board size) is equal to zero), the proportion of unrelated directors is the largest one in the sample (the variable CDF(proportion unrelated) equals one) and growth opportunities and risk are at their minimum, the estimated pay performance sensitivity of cash compensation equals 0.01996 ($1.45 \ 10^{-2}$ +$0.538 \ 10^{-2}$). Since returns are measured in million dollars while compensation is measured in thousands dollars, the figure indicates that CEO cash compensation increases by 0.01996 Canadian dollars per 1000 Canadian dollars increase in firm value. In the same firm, CEO total compensation rises by 0.0319 Canadian dollars per 1000 Canadian dollars increase in firm value.

In a firm where the CEO is also the board chairman (the variable CEO duality takes the value of one), the board size is the largest one in the sample (the variable CDF (board size) is equal to one), the proportion of unrelated directors is the lowest one in the sample (the variable CDF(proportion unrelated) equals zero) and other things being equal, the CEO pay-performance sensitivity is 0.00826 ($1.458 \ 10^{-2}$ -$0.111 \ 10^{-2}$ -$0.52 \ 10^{-2}$) and 0.00544 ($2.031 \ 10^{-2}$ -$0.463 \ 10^{-2}$ -$1.024 \ 10^{-2}$) for cash compensation and total compensation respectively.

Hence, the pay performance sensitivity of cash compensation is twofold higher in the first firm than in the second firm and it is more than fivefold when total compensation is considered. This finding indicates that effective boards tie CEO compensation more closely to firm performance than ineffective ones.

In Table (6), we report results after controlling for firm size. In fact, prior work suggests that firm size is an important determinant of CEO compensation. For instance, Tosi et al. (2000), in a meta-analysis of the empirical literature, finds that firm size accounts for 40% of the variance of CEO compensation and Cichello (2005) emphasizes the importance of controlling for firm size when estimating the pay performance sensitivity. Hence, we control

for firm size in the regression by introducing the cumulative distribution function of sales. The regression results reported in Table (6) are weaker than those reported in Table (4). In fact, the coefficients on the cumulative distribution function of the board size and growth opportunities become insignificantly different from zero and this holds for both models. In addition, the interaction term between return and CEO duality becomes insignificant in the first model. Furthermore, the results presented in Table (6) should be interpreted with caution as there is concern of mutlicolinearity problem. In fact, the correlation matrix reported in Table (3) shows strong and positive correlation between the cumulative distribution function of sales and the cumulative distribution function of board size. The correlation between the two variables is 0.6398 and it is statistically significant at the 1% level.

6. Conclusion

The members of the board of directors are elected by shareholders to act in the best of their interests. Among the duties the board of directors are assigned is to fix the level and the structure of CEO compensation. The aim of this paper was to investigate the effect of board independence on the level of compensation received by Canadian CEOs as well as on its sensitivity to shareholder value. After controlling for variables that influence the pay level and the pay performance sensitivity, we conclude that CEO duality does not influence the pay level, however it has a negative effect on the pay- performance sensitivity. In addition, our results suggest that large board size is associated with higher pay and a pay that is negatively related to performance. Finally, unrelated directors play a governance role by offering a compensation that is performance based to their CEOs. Our results suggest to dissociate the roles of chief executive officer and chairman of the board and to decrease the board size in order to have a well designed compensation package.

Table 1. Distribution of the sample firms by industry

Industry	Firm number	Percentage
1. Mining and oil and gas extraction (NAICS 21)	40	20.41
2. Manufacturing (NAICS 31 to 33)	70	35.71
3. Finance and insurance (NAICS 52)	19	9.69
4. Services (NAICS 41 to 91 except 52)	54	27.55
5. other industries (NAICS 22, NAICS 23)	13	6.64

Note: NAIC refers to North American Industry Classification

Table 2. Descriptive Statistics of dependent and independent variables

This table presents descriptive statistics on dependent and independent variables. These statistics are based on a sample of 196 Canadian firms in the S&P/TSX index and covers the period from 2001 to 2004. Cash compensation is the sum of salary and bonus. Total compensation is the sum of cash compensation and stock option value. Stock options are valued using the Back& Scholes (1973) model adjusted for dividends. CEO duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. Board size is measured by the total number of directors in the board. Proportion of unrelated directors is measured by the number of unrelated directors in the board divided by board size. RET is dollar shareholders return and equals annual percentage return times beginning market value. Risk is measured by the variance of annual dollar returns computed using a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year. Firm size is proxied by total sales. Growth opportunities are proxied by the market to book ratio.

Variable	Mean	Median	Minimum	Maximum	Standard deviation
Cash compensation	1221117	897210.9	60676.67	$1.71\ 10^7$	1224697
Total compensation	2120046	1374243	73694.93	$4.76\ 10^7$	2683363
CEO duality	0.23	0	0	1	0.42
Board size	12.12	10	4	22	3.25
Proportion of unrelated directors	0.72	0.75	0.116	0.93	0.15
Percentage return	0,018	0.0135	-0.161	0.310	0.041
Market capitalization (in million)	3459495	1117871	3214.63	$3.83\ 10^7$	5958164
RET(in million)	26510.74	10865.51	-683277.60	732605.9	119807,8
Risk	47451.32	16214.17	102	940764.6	91353.05
Firm size	3292547	1165236	0	3.0710^7	3292547
Growth opportunities	1.73	1.25	0.049	35.56	1.73

Table 3. Correlation between Variables

This table presents Pearson correlation coefficients between variables. These coefficients are computed based on a sample of 196 Canadian firms in the S&P/TSX index and covers the period from 2001 to 2004. Cash compensation is the sum of salary and bonus. Total compensation is the sum of cash compensation and stock option value. Stock options are valued using the Back& Scholes (1973) model adjusted for dividends. RET is annual stock returns to shareholders, which is the product of annual percentage returns and beginning market value. CEO duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. CDF denotes the cumulative distribution function. CDF (Board size), CDF (proportion unrelated) are the cumulative distribution functions of the board size and the proportion of unrelated directors. Firm size is measured by sales, growth opportunities are proxied by the market to book ration and Risk is measured by the variance of annual dollar returns computed using a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year.

	Cash compensation	Total compensation	RET	CEO duality	CDF(Board size)	CDF(Percentage unrelated)	CDF(firm size)	CDF(growth opportunities)	CDF(risk)
Cash compensation	1								
Total compensation	0.7349 0.0000	1							
RET	0.2231 0.0000	0.0919 0.0178	1						
CEO duality	-0.0572 0.1291	-0.0515 0.1830	-0.0649 0.0810	1					
CDF(Board size)	0.2643 0.0000	0.1585 0.0001	0.1883 0.0000	-0.1477 0.0001	1				
CDF(percent unrelated)	0.1594 0.0001	0.1060 0.0117	0.1670 0.0000	-0.0773 0.0543	0.1817 0.0000	1			
CDF(firm size)	0.4803 0.0000	0.3514 0.0000	0.2312 0.0000	0.0098 0.7900	0.6398 0.0000	0.1902 0.0000	1		
CDF(growth opportunities)	-0.2351 0.0000	-0.0974 0.0116	-0.0403 0.2719	-0.0536 0.1471	-0.3533 0.0000	-0.0452 0.2602	-0.5010 0.0000	1	
CDF(risk)	0.2814 0.0000	0.3514 0.0000	0.1295 0.0006	0.0120 0.7570	0.1845 0.0000	0.1474 0.0004	0.3545 0.0000	0.1542 0.0000	1

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Table 4. The effect of board independence on CEO compensation.
This table provides the regression results of the effect of board independence on CEO compensation after controlling for CEO stockholding using median regression. The results are based on a sample of Canadian firms in the S&P/TSX index and covers years from 2001 to 2004. Cash compensation is measured in thousands of dollars and equals the sum of salary and bonus. Total compensation is measured in thousands of dollars and equals the sum of cash compensation and stock option value. Stock options are valued using the *Back& Scholes* (1973) model adjusted for dividends. RET is dollar stock returns to shareholders in million dollars and measured as the product of annual percentage returns and beginning market value. CEO duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. CDF denotes the cumulative distribution function. CDF (Board size) and CDF (proportion unrelated) are the cumulative distribution functions of the board size and the proportion of unrelated directors respectively. RET*CEO duality, RET*CDF(board size), and RET*CDF(proportion unrelated), are interaction terms capturing the effect of CEO duality, board size, and the proportion of unrelated directors on pay-performance sensitivity. Growth opportunities are proxied by the market to book ratio. Risk is measured by the variance of annual dollar returns computed with a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year. D_{2002}, D_{2003} and D_{2004} are dummy variables capturing year effects and IND_2, IND_3, IND_4 and IND_5 are dummy variables capturing industry affiliation, where IND_2: Manufacturing (NAICS 31 to 33), IND_3: Finance and insurance (NAICS 52), IND_4: Services (NAICS 41 to 91 except 52), and IND_5: other industries (NAICS 22, NAICS 23).

	Cash compensation	Total compensation
Constant	497.120***	360.951
	0.000	0.854
RET (10^{-2})	1.458***	2.031***
	0.000	0.000
CEO duality	-101.158	-76.215
	0.104	0.505
RET*CEO(duality) (10^{-2})	-0.111**	-0.463***
	0.034	0.000
CDF (board size)	471.446***	341.633*
	0.000	0.089
RET*CDF (board size) (10^{-2})	-0.521***	-1.024***
	0.000	0.000
CDF (proportion unrelated)	-12.872	171.092
	0.893	0.320
RET* CDF (proportion unrelated) (10^{-2})	0.538***	1.088***
	0.000	0.000
CDF (growth opportunities)	-537.479***	-491.679**
	0.000	0.017
RET*CDF (growth opportunities) (10^{-2})	-0.467***	-0.606***
	0.000	0.001
CDF (risk)	606.212***	1782.098***
	0.000	0.000
RET*CDF (risk) (10^{-2})	-1.113***	-1.493***
	0.000	0.000
IND_2	152.572**	465.421***
	0.032	0.000
IND_3	58.623	-6.055
	0.642	0.979
IND_4	80.406	181.662
	0.323	0.226

IND$_5$	-81.985	-148.417
	0.474	0.473
D$_{2002}$	13.740	-18.911
	0.853	0.890
D$_{2003}$	37.857	-159.748
	0.614	0.246
D$_{2004}$	101.345	-74.526
	0.188	0.595
Pseudo R^2	0.179	0.187
Iteration	78	99
Observations	515	497

*   significatif at 10%
**   significatif at 5%
*** significatif at 1% .

Table 5. The Effect of Board Independence on CEO Compensation after Controlling for CEO Stockholding

This table provides the regression results of the effect of board independence on CEO compensation using median regression. The results are based on a sample of 196 Canadian firms in the S&P/TSX index and covers years from 2001 to 2004. Cash compensation is measured in thousands of dollars and equals the sum of salary and bonus. Total compensation is measured in thousands of dollars and equals the sum of cash compensation and stock option value. Stock options are valued using the *Back& Scholes* (1973) model adjusted for dividends. RET is dollar stock returns to shareholders in million dollars and measured as the product of annual percentage returns and beginning market value. CEO duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. CDF denotes the cumulative distribution function. CDF (Board size), CDF (proportion unrelated) and CDF(CEO stockholding) are the cumulative distribution functions of the board size, the proportion of unrelated directors and CEO stockholding respectively. RET*CEO duality, RET*CDF(board size), RET*CDF(proportion unrelated), RET*CDF (CEO stockholding) are interaction terms capturing the effect of CEO duality, board size, proportion of unrelated directors and CEO stockholding on pay-performance sensitivity. Growth opportunities are proxied by the market to book ratio. Risk is measured by the variance of annual percentage returns computed with a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year. CEO Stockholding is the ratio of shares owned by the CEO divided by the total number of shares outstanding. D_{2002}, D_{2003} and D_{2004} are dummy variables capturing year effects and IND_2, IND_3, IND_4 and IND_5 are dummy variables capturing industry affiliation, where IND_2: Manufacturing (NAICS 31 to 33), IND_3: Finance and insurance (NAICS 52), IND_4: Services (NAICS 41 to 91 except 52), and IND_5: other industries (NAICS 22, NAICS 23).

	Cash compensation	Total compensation
Constant	513.667***	557.029**
	0.000	0.050
RET (10^{-2})	1.010***	1.563***
	0.000	0.000
CEO duality	-99.338	-77.494
	0.137	0.573
RET*CEO(duality) (10^{-2})	-0.331***	-0.611***
	0.000	0.000
CDF (board size)	444.945***	286.389
	0.000	0.245
RET*CDF (board size) (10^{-2})	-0.274*	-0.952***
	0.084	0.004
CDF (proportion unrelated)	-21.241	92.281
	0.828	0.644
RET* CDF (proportion unrelated) (10^{-2})	0.614***	1.382***
	0.000	0.000
CDF (growth opportunities)	-624.639***	-441.532*
	0.000	0.055
RET*CDF (growth opportunities) (10^{-2})	-0.308***	-0.829***
	0.002	0.000
CDF (risk)	642.655***	1889.423***
	0.000	0.000
RET*CDF (risk) (10^{-2})	-1.032***	-1.202***
	0.000	0.004
CDF (CEO stockholding)	46.431	-194.212
	0.685	0.396
RET*CDF (CEO stockholding) (10^{-2})	0.349**	0.393
	0.019	0.181

IND$_2$	156.575**	454.806**
	0.033	0.003
IND$_3$	51.205	9.700
	0.696	0.970
IND$_4$	57.930	216.130
	0.501	0.224
IND$_5$	-78.276	-143.796
	0.484	0.522
D$_{2002}$	21.917	-141.716
	0.771	0.358
D$_{2003}$	52.972	-224.158
	0.492	0.154
D$_{2004}$	141.652*	-136.759
	0.073	0.393
Pseudo R^2	0.1918	0.1990
Iteration	74	81
Observations	474	460

*   significatif at 10%
**   significatif at 5%
*** significatif at 1% .

Table 6. The Effect of Board Independence on CEO Compensation after Controlling for Firm Size

This table provides the regression results of the effect of board independence on CEO compensation after controlling for firm size using median regression. The results are based on a sample of Canadian firms in the S&P/TSX index and covers years from 2001 to 2004. Cash compensation is measured in thousands of dollars and equals the sum of salary and bonus. Total compensation is measured in thousands of dollars and equals the sum of cash compensation and stock option value. Stock options are valued using the *Back& Scholes* (1973) model adjusted for dividends. RET is dollar stock returns to shareholders in million dollars and measured as the product of annual percentage returns and beginning market value. CEO duality is a dummy variable that takes the value of one if the board chair is also the CEO, and zero otherwise. CDF denotes the cumulative distribution function. CDF (Board size), CDF (proportion unrelated) and CDF(firm size) are the cumulative distribution functions of the board size, the proportion of unrelated directors and sales respectively. RET*CEO duality, RET*CDF(board size), RET*CDF(proportion unrelated), RET*CDF(firm size) are interaction terms capturing the effect of CEO duality, board size, proportion of unrelated directors and sales on pay-performance sensitivity. Growth opportunities are proxied by the market to book ratio. Risk is measured by the variance of annual percentage returns computed with a minimum of 36 months and a maximum of 60 months prior to the beginning of the fiscal year. Firm size is measured by sales. D_{2002}, D_{2003} and D_{2004} are dummy variables capturing year effects and IND_2, IND_3, IND_4 and IND_5 are dummy variables capturing industry affiliation, where IND_2: Manufacturing (NAICS 31 to 33), IND_3: Finance and insurance (NAICS 52), IND_4: Services (NAICS 41 to 91 except 52), IND_5: other industries (NAICS 22, NAICS 23).

	Cash compensation	Total compensation
Constant	300.405**	-33.942
	0.019	0.854
RET (10^{-2})	1.321***	0.017***
	0.000	0.000
CEO duality	-171.235***	-12.517
	0.009	0.896
RET*CEO(duality) (10^{-2})	-0.077	-0.527***
	0.195	0.000
CDF (board size)	-87.302	-194.126
	0.490	0.288
RET*CDF (board size) (10^{-2})	-0.436***	-0.885***
	0.003	0.000
CDF (proportion unrelated)	17.886	95.890
	0.860	0.506
RET* CDF (proportion unrelated) (10^{-2})	0.503***	0.010***
	0.000	0.000
CDF (firm size)	1120.551***	1598.232***
	0.000	0.000
RET*CDF (firm size) (10^{-2})	-0.295	-0.264
	0.126	0.288
CDF (growth opportunities)	-143.975	160.883
	0.290	0.424
RET*CDF (growth opportunities) (10^{-2})	-0.575***	-0.779***
	0.000	0.000
CDF (risk)	331.854***	1544.211***
	0.008	0.000
RET*CDF (risk) (10^{-2})	-0.754***	-1.001***
	0.001	0.001
IND_2	21.947	187.252
	0.782	0.102

IND_3	116.444	-209.370
	0.382	0.287
IND_4	14.323	66.928
	0.872	0.602
IND_5	-226.563*	-379.894**
	0.064	0.034
D_{2002}	11.799	-6.640
	0.879	0.953
D_{2003}	39.912	-260.207**
	0.611	0.023
D_{2004}	78.978	-143.617
	0.324	0.216
Pseudo R^2	0.2158	0.2089
Iteration	95	99
Observations	515	497

*   significatif at 10%
**   significatif at 5%
*** significatif at 1% .

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