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CEO equity compensation and earnings management: The role of growth opportunities

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ABSTRACT

Prior research has documented a positive association between chief executive officer (CEO) equity incentives and earnings management. We identify a firm's growth opportunity proxied by Book-to-Market ratio as an organizational environmental factor and use the panel threshold model to examine whether firm growth opportunity variable moderates this positive relation. Our results show that, for firms with relatively low growth potential, equity incentives motivate managers to manipulate earnings. However, as firm growth opportunities reach certain thresholds, equity pay can effectively mitigate the agency issue associated with earnings management. Finally, we find that our results still hold and become even more pronounced for the financial crisis period.

1. Introduction

Prior studies suggest that CEO equity compensation, including stock options and restricted stocks, provides managers with high-powered incentives and that there has been an increasing trend in CEO equity incentives over the past decade (e.g., Conyon, 2006). The widespread prevalence of equity-based pay for top executives has increased the interest of researchers in assessing whether such equity incentives reduce managers' desire to manipulate earnings by aligning manager and shareholder interests (i.e., the interest alignment view). However, extensive research has produced mixed and often a positive relation between CEO equity compensation and earnings management (i.e., the agency view).[1] In other words, extant findings are more consistent with the position that more CEO equity compensation is associated with greater earnings manipulation.

A possible interpretation of these conflicting findings is that such studies might not have considered whether equity compensation can mitigate the earnings management behavior may depend on a firm's organizational environment. Namely, it is the environment in which a firm operates that is associated with the efficiency of equity pay. To distinguish the interest alignment and agency views, we identify firm growth opportunity as an organizational environmental factor and posit that,

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[1] For example, see O'Connor et al. (2006), Larcker et al. (2007), and Zhang et al. (2008) and many others. One exception is Armstrong et al. (2010), who find that accounting irregularities occur less frequently at firms where CEOs have relatively higher levels of equity incentives.

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as a primary relation, a positive association exists between equity pay and earnings management. Further, we examine whether firm growth opportunity moderates this positive relation.

The positive relation between equity incentives and earnings management weakens for growth firms for the following reasons. First, as Smith and Watts (1992) suggest, the existence and prevalence of growth opportunities may make it more difficult for shareholders to determine whether managers are making decisions that maximize firm value, indicating that the incidence of information asymmetry could be higher for growth firms. Consequently, higher agency costs could be associated with high-growth firms; therefore, a greater need exists for growth firms to adopt equity incentive mechanisms to improve transparency of financial reporting and enhance monitoring (Yermack, 1995). Thus, the interest alignment effect of equity incentives could be more pronounced for firms with more growth opportunities.

Second, corporate finance theory suggests that greater growth opportunities should lead to more convex executive pay contracts, which increase managers' incentives to exploit such opportunities (Smith and Watts, 1992). As growth opportunities increase to some extent, the economic benefit of motivating managers to take on risk and maximize firm value most likely outweighs the discount that the managers apply to risky pay, thereby improving firm performance (Core and Qian, 2000).[2] Thus, firms with greater growth opportunities are less likely to use earnings management to inflate their reported earnings.

We use the absolute value of discretionary accruals (ABSDA) as a proxy for earnings management, where higher values imply more severe earnings management. We measure equity compensation (EQCOMP) as the fair value of equity compensation granted to CEOs, deflated by CEO total compensation. Following Hovakimian et al. (2001), Chen and Zhao (2006), firm growth opportunities are proxied by the Book-to-Market ratio (BM). In specific, a lower/higher BM ratio is associated with higher/lower growth opportunities.

Our results reveal that, on average, equity pay motivates CEOs to manage earnings, consistent with the agency view. Furthermore, using the panel threshold model with two regimes, we find that the association between EQCOMP and earnings manipulation becomes less pronounced when firm growth opportunities go beyond a certain threshold. Moreover, when the threshold model with three regimes is used, we observe that the positive relation between EQCOMP and earnings management weakens significantly for firm with relatively higher growth opportunities. Namely, when firms with relatively high growth opportunities are considered, the equity incentives can alleviate earnings management to a greater extent.

These results indicate that firm growth opportunities can moderate the positive relation between CEO equity compensation and earnings management and that equity pay can facilitate achieving incentive alignment more effectively for firms with greater growth opportunities. The results also suggest that the panel threshold approach recognizes heterogeneity in the relation between equity compensation and earnings management as well as considers the tail part of observations, hence producing results that cannot be observed using traditional (i.e., non-threshold) approaches. Moreover, the threshold techniques may produce regime-switching estimators rather than a single measure of conditional central tendency, thereby capturing the non-monotonic relations between equity compensation and earnings management. To the extent that the sample partition and relation between the dependent and independent variables are determined jointly and endogenously, using the threshold model can overcome the potential problem in prior studies that the sample segmentation is assumed to be exogenous.

2. Sample selection and descriptive statistics

2.1. Sample selection

We obtain the firm characteristics and CEO compensation data of U.S. non-financial companies from COMPUSTAT and EXECUCOMP, respectively. The final sample comprises 6063 firm-year observations of 1487 distinct firms from 2005 to 2009.

2.2. Measures of earnings management, CEO equity pay and growth opportunities

Since the focus of this study is on the magnitude rather than the direction of earnings management, we use the absolute value of discretionary accruals (ABSDA) as a proxy for earnings management and as the dependent variable in the regression model. The discretionary accruals are measured by using a cross-sectional modified Jones model (Dechow et al., 1995) after controlling for prior performance (Kothari et al., 2005).[3] Equity compensation (EQCOMP) is defined as the sum of the fair value of restricted stocks and stock options (the Black–Scholes value on the grant date) deflated by the total CEO compensation. Last but not least, firm growth opportunities are measured by the Market-to-Book ratio (BM). This proxy infers that firms with higher growth opportunities tend to have lower BM ratios. The opposite is the cases with higher BM ratios.

[2] Numerous prior studies provide discussions of why managers value equity-based compensation at less than the firm's cost of awarding that compensation. For example, Meulbroek (2001).

[3] We first estimate the non-discretionary accruals, the fitted value obtained from the model, and the discretionary accruals are the difference between total accruals and non-discretionary accruals (i.e., the residuals from the model).

Table 1
Descriptive statistics.

Variable	Mean	Standard Dev.	25th	Median	75th
ABSDA	0.055	0.073	0.016	0.035	0.068
EQCOMP	0.435	0.273	0.232	0.484	0.649
BM	0.707	10.659	0.284	0.450	0.676
OCF	0.119	0.102	0.066	0.110	0.167
SIZE	7.431	1.610	6.321	7.336	8.472
LEV	0.496	0.205	0.345	0.504	0.646
SGW	0.095	0.322	−0.019	0.074	0.171

ABSDA is the absolute value of discretionary accruals. EQCOMP is the fair value of equity compensation deflated by total CEO compensation. BM is book value of common equity divided by market value of common equity. OCF is net cash flows from operations divided by total assets. LEV is total liabilities divided by total assets. SIZE is natural logarithm of book value of total asset. SGW is sales growth, measured as $(\text{Sales}_t - \text{Sales}_{t-1})/\text{Sales}_{t-1}$.

2.3. Control variables

To mitigate the omitted-variables problem, we include several control variables in the regression, including the book-to-market ratio (BM), net cash flow from operations (OCF), leverage (LEV), firm size (SIZE), and sales growth (SGW).[4] The definitions of the control variables are summarized in Table 1.

3. Empirical models

Let (y_{it}, x_{it}), $i = 1, 2\ldots, N$ and $t = 1, 2\ldots, T$, be a sample population, where subscript i denotes the ith firm and t denotes the tth period. When the data have a panel structure, the following equation represents a fixed-effect model:

$$y_{it} = \alpha_i + \beta' x_{it} + u_{it}, \tag{1}$$

where α_i $(i = 1, 2\ldots, N)$ and β' $(1 \times K$ vector) are unknown parameters to be estimated. As part of this study's focus on the non-monotonic relations between y_{it} and x_{it} (i.e., β parameters), we take a "group difference" between variables and redefine Eq. (1) as follows:

$$y^*_{it} = \beta' x^*_{it} + u^*_{it}, \tag{2}$$

where * denotes variables deviated from the group mean, that is, $y^*_{it} = y_{it} - \bar{y}_i$, $x^*_{it} = x_{it} - \bar{x}_i$, and $u^*_{it} = u_{it} - \bar{u}_i$, and $\bar{y}_i$, $\bar{x}_i$ and $\bar{u}_i$ are the means of y, x and u of firm i, respectively.

We present the panel threshold model (Hansen, 1999) as follows:

$$y^*_{it} = \beta^{I\prime} x^*_{it} I(q_{it} \le \gamma) + \beta^{II\prime} x^*_{it} I(q_{it} > \gamma) + u^*_{it}, \tag{3}$$

where q_{it} is defined as a threshold variable, γ denotes the threshold parameter, and $I(\cdot)$ is the indicator function. In many applications, there may be more than one threshold. The threshold model with three regimes is presented as follows:

$$y^*_{it} = \beta^{I\prime} x^*_{it} I(q_{it} \le \gamma_1) + \beta^{II\prime} x^*_{it} I(\gamma_1 < q_{it} \le \gamma_2) + \beta^{III\prime} x^* I(q_{it} > \gamma_2) + u^*_{it}, \tag{4}$$

where $\gamma_1 < \gamma_2$. The non-threshold model represents a special case of Eqs. (3) and (4) with the restrictions of $\beta^I = \beta^{II}$ and $\beta^I = \beta^{II} = \beta^{III}$, respectively. Further, we use the grid-search procedures (Balke and Fomby, 1997) to estimate the threshold parameter.[5] To avoid the problem of small samples for any regimes, we use the values of 10th and 90th percentiles of the threshold variable q_{it} as the boundary values of the threshold parameter γ.

4. Results

As shown in Table 1, the mean and median of ABSDA are 0.055 and 0.035, respectively. Further, the mean of EQCOMP is 0.435, suggesting that the ratio of the fair value of equity-based pay to CEO total pay is 43.5% on average.

Table 2 reports the results regarding the relation between equity compensation and earnings management, derived from the panel non-threshold model, Eq. (2). We find that the coefficient on EQCOMP is significantly positive (0.009 with t-

[4] These control variables are selected on the basis of prior studies on this topic (e.g., Larcker et al., 2007).

[5] The procedures are presented as follows. (1) The threshold variable (i.e., q_{it}) is defined and obtained. (2) The series of arranged q_{it}, y^*_{it} and x^*_{it} variables in Equation (3) are established and q_{it}, y^*_{it} and x^*_{it} are ordered according to the value of q_{it}, rather than time and firm. (3) By assigning a small number to serve as the initial value of γ, e.g., 0.005, the series of arranged y^*_{it} and x^*_{it} can be split into two different regime areas: regime I against regime II. (4) The regressions of Equation (3) are estimated for each regime and the residual sum of square (RSS) is calculated and saved. (5) The value of γ is increased using one grid with very small value of 0.0001, and the above fourth step is then repeated for the new values of γ. (6) Steps 4 and 5 are then repeated and the RSS value is derived for each value of γ; γ with the minimum RSS is then chosen.

Table 2
Regression analysis of the absolute value of discretionary accruals (ABSDA) on CEO equity compensation (EQCOMP) using the panel non-threshold model.

Variables	Coefficient	Stand error	t-statistic	*P*-value
Intercept	0.000	0.001	0.000	1.000
EQCOMP	0.009	0.004	2.110	0.035*
BM	0.000	0.000	0.550	0.580
OCF	0.034	0.010	2.570	0.010*
SIZE	−0.012	0.004	−3.470	0.001**
LEV	0.138	0.011	12.400	0.000**
SGW	0.003	0.003	1.010	0.311
RSS		20.123		
Adjusted R-squared		0.027		

* and ** indicate statistical significance at the 5% and 1%, respectively.

Table 3
Regression analysis of the absolute value of discretionary accruals (ABSDA) on CEO equity incentives (EQCOMP) using panel data model with two regimes.

Variables	Coefficient	Stand error	t-statistic	*P*-value
Regime I where BM ≦ 0.690: High-growth firms (Obs% = 76%)				
Intercept	−0.002	0.001	−1.940	0.052
EQCOMP	0.001	0.004	0.280	0.779
BM	0.000	0.000	0.110	0.915
OCF	0.038	0.014	2.730	0.006**
SIZE	0.000	0.004	0.070	0.943
LEV	0.088	0.012	7.390	0.000**
SGW	0.008	0.003	2.420	0.016*
Regime II where BM > 0.690: Low-growth firms (Obs% = 24%)				
Intercept	0.006	0.002	3.290	0.001**
EQCOMP	0.024	0.009	2.750	0.006**
BM	0.000	0.000	0.330	0.738
OCF	0.045	0.031	1.460	0.145
SIZE	−0.049	0.008	−6.010	0.000**
LEV	0.303	0.027	11.150	0.000**
SGW	−0.003	0.007	−0.350	0.725
RSS (Residual Sum of Square)		19.710		
Adjusted R-squared		0.047		
LR statistic for H_0: $\beta^{I} = \beta^{II}$		125.608**		

* and ** indicate statistical significance at the 5% and 1%, respectively.

statistic = 2.110), indicating that equity incentives motivate CEOs to manage earnings. However, the non-threshold estimator focuses only on the mean behavior of the data; hence, it cannot capture our regime-switching argument, nor does it allow us to examine the conditional relation between equity compensation and earnings management across firms with different levels of growth opportunities.

To examine the non-monotonic relation between equity compensation and earnings management across low-growth versus high-growth firms, we adopt the panel threshold model with two regimes (see Eq. (3)) and show the results in Table 3. First, compared with the panel model with one regime (Table 2), we find a higher adjusted R-squared (0.047) and lower Residual Sum of Square (RSS = 19.710), indicating that the panel two-regime threshold model has better goodness of fit. Second, the LR statistic (125.608) for the null hypothesis of no regime switching (i.e., $\beta^{I} = \beta^{II}$) is rejected at any conventional levels, indicating that the EQCOMP–ABSDA relation exhibits a significant threshold effect. Third, the coefficient on EQCOMP (0.024, t-statistic = 2.750) is positive and significant at the 1% significance level when the BM exceeds the threshold of 0.690 (Regime II for low-growth firms). Although the coefficient on EQCOMP (0.001, t-statistic = 0.280) remains positive for firms with a BM less than 0.690 (Regime I for high-growth firms), it becomes trivial and insignificant. These findings accord with the position that firm growth opportunity variable moderates this positive relation.

To provide further evidence regarding whether having extremely high growth opportunities moderates the relation between equity compensation and earnings management to a greater extent, we employ a panel threshold model with three regimes (i.e., Eq. (4)) and report the results in Table 4.[6]

First, in contrast to the panel models with one and two regimes, the panel model with three regimes has a higher adjusted R-squared (0.051) and lower RSS (19.623), suggesting that the threshold model with three regimes has better good-

[6] We also estimate a panel model with four regimes. However, we find that the adjusted R-squared obtained with the four-regime model is less than that of the three-regime model. Therefore, the analysis procedure does not go beyond three regimes.

Table 4
Regression analysis of the absolute value of discretionary accruals (ABSDA) on CEO equity compensation (EQCOMP) using the panel threshold model with three regimes.

Variables	Coefficient	Stand error	t-statistic	*P*-value
Regime I where BM ≦ 0.307: High-growth firms (Obs% = 29%)				
Intercept	0.001	0.002	0.260	0.795
EQCOMP	−0.018	0.008	−2.080	0.038*
BM	0.011	0.014	0.780	0.435
OCF	0.060	0.024	2.520	0.012*
SIZE	0.005	0.007	0.700	0.487
LEV	0.055	0.021	2.670	0.008**
SGW	0.010	0.006	1.550	0.121
Regime II where 0.307 < BM ≦ 0.734: Medium-growth firms (Obs% = 51%)				
Intercept	−0.002	0.001	−2.460	0.014*
EQCOMP	0.014	0.005	2.980	0.003**
BM	0.000	0.000	0.060	0.953
OCF	0.016	0.017	0.900	0.368
SIZE	−0.004	0.004	−0.810	0.418
LEV	0.129	0.014	9.160	0.000**
SGW	0.005	0.003	1.610	0.109
Regime III where BM > 0.734: Low-growth firms (Obs% = 20%)				
Intercept	0.007	0.002	3.610	0.000**
EQCOMP	0.024	0.010	2.500	0.012*
BM	0.000	0.000	0.310	0.753
OCF	0.048	0.034	1.420	0.157
SIZE	−0.056	0.009	−6.240	0.000**
LEV	0.299	0.030	10.050	0.000**
SGW	−0.002	0.008	−0.190	0.849
RSS		19.623		
Adjusted R-squared		0.051		
LR statistic for H_0: $\beta^{I} = \beta^{II} = \beta^{III}$		152.429**		

* and ** indicate statistical significance at the 5% and 1%, respectively.

ness of fit. Further, the LR statistic (152.429) is significant at the 1% significance level, indicating that the null hypothesis of $\beta^{I} = \beta^{II} = \beta^{III}$ is rejected, thus supporting a significant threshold effect.

Second, as shown in the bottom part of Table 4, the coefficient estimates on EQCOMP are 0.024 and 0.014, respectively, for Regime III (BM > 0.734: Low-growth firms) and II (0.307 < BM ≤ 0.734: Medium-growth firms), both of which are significant at the 5% significance level. We note that the coefficient on EQCOMP in Regime II (0.014) is considerably smaller than that of Regime III (0.024). These results indicate that the positive association between EQCOMP and ABSDA decreases as firms gains greater growth opportunities (i.e., from Regime III to II), consistent with our hypothesis. Moreover, the coefficient on EQCOMP is −0.018 and significant at the 5% significance level for Regime I (BM ≦ 0.307: High-growth firms). This finding provides evidence of switching relations (i.e., from positive to negative) between equity compensation and earnings management across various growth opportunities regimes proxied by BM ratios.[7]

Last but not least, to explore whether the results would be subject to the period considered, we use a dummy variable to capture the impact of financial crisis. In particular, we define a dummy variable (D) for the recent market crisis: D = 1 (0) when the data are from 2008–2009 (2005–2007).[8] The results presented in Table 5 are from running the three-regime panel regression model with the dummy variable included. First, the interaction term EQCOMP × (1−D) and EQCOMP × D are positive in Regime II and III and become negative in Regime I. The regime-switching pattern is consistent with Table 4. However, the negative coefficient on EQCOMP × (1−D) and EQCOMP × D in Regime I is insignificant (p-value = 0.837) and significant (p-value < 0.010), respectively. This result implies the interest alignment effect of equity incentives for high-growth firms (i.e., Regime I: BM < 0.307) is more pronounced for the period of financial crisis (e.g., Fich and Slezak 2008; Guo et al. 2015).[9]

[7] We also adopt the quantile regression (QR) to examine the non-uniform relation between CEO equity compensation and earnings management. The QR results show that the coefficient on EQCOMP is positive at all the 19 quantiles of ABSDA and therefore the QR approach is unable to find the evidence of switching relations (i.e., from positive to negative) between equity compensation and earnings management across various growth opportunities regimes proxied by BM ratios. The detailed QR results are available from the authors upon request and the authors acknowledge the anonymous reviewer for this suggestion.

[8] The U.S. GDP growth rate is negative for Q1, Q3, and Q4 in 2008 and Q1 and Q2 in 2009.

[9] To further test the issue of crisis versus non-crisis period, we ever divided our sample into two periods: 2005–2007 (non-crisis period) and 2008–2009 (crisis period), and then rerun the three-regime panel threshold model. The results are not tabulated since space limitation but conclusions are consistent with Table 5.

Table 5
Regression analysis of the absolute value of discretionary accruals (ABSDA) on CEO equity compensation (EQCOMP) using the three-regime panel threshold model with dummy variables.

Variables	Coefficient	Stand error	t-statistic	*P*-value
Regime I where BM ≦ 0.307: High-growth firms (Obs% = 29%)				
Intercept	0.001	0.002	0.500	0.618
EQCOMP × (1−D)	−0.002	0.010	−0.210	0.837
EQCOMP × D	−0.069	0.017	−3.950	0.000**
BM	0.011	0.014	0.790	0.430
OCF	0.061	0.024	2.590	0.010*
SIZE	0.006	0.007	0.880	0.378
LEV	0.056	0.021	2.700	0.007**
SGW	0.010	0.006	1.540	0.125
Regime II where 0.307 <BM ≦ 0.676: Medium-growth firms (Obs% = 46%)				
Intercept	−0.002	0.001	−2.480	0.013*
EQCOMP×(1-D)	0.014	0.006	2.400	0.016*
EQCOMP×D	0.007	0.009	0.780	0.434
BM	0.000	0.000	0.040	0.965
OCF	0.009	0.017	0.530	0.596
SIZE	−0.005	0.004	−1.050	0.294
LEV	0.119	0.014	8.460	0.000**
SGW	0.005	0.003	1.520	0.128
Regime III where BM > 0.676: Low-growth firms (Obs% = 25%)				
Intercept	0.006	0.002	3.220	0.001**
EQCOMP×(1-D)	0.030	0.014	2.180	0.030*
EQCOMP×D	0.025	0.012	2.150	0.032*
BM	0.000	0.000	0.320	0.750
OCF	0.052	0.031	1.680	0.093
SIZE	−0.047	0.008	−5.670	0.000**
LEV	0.298	0.027	10.860	0.000**
SGW	−0.001	0.007	−0.190	0.852
RSS		19.599		

Note: We use a dummy variable for the period of financial crisis. In particular, D = 1 (0) when the data are from 2008 to 2009 (2005–2007). * and ** indicate statistical significance at the 5% and 1%, respectively.

5. Conclusion and future research direction

Our study elucidates how firm growth opportunities may moderate the positive association between equity incentives and earnings management. The evidence herein suggests that, on average, equity incentives motivate managers to manipulate earnings, as indicated by prior studies. However, the positive association becomes weaker as the growth opportunities of firms become greater. In particular, when the condition variable, the growth opportunities proxied by Book-to-Market ratio, reaches a certain threshold, the positive association between equity incentives and earnings management weakens significantly. These findings appear to be consistent with the position that the interest alignment effect of equity incentives is more pronounced for firms with more growth opportunities, and thus weakens managers' incentives to manipulate earnings.

Our study has several caveats that should be noted. First, our inferences are drawn from results for a limited sample period (2005–2009) and based on the identified threshold variable, the firm growth opportunities proxied by Book-to-Market ratio. For their future studies, researchers may consider alternative proxies for growth opportunities and extend the sample period beyond ours. Second, we use modified Jones model after controlling for performance to measure discretionary accruals (DA) and CEO equity pay ratio to proxy for equity incentives, respectively. Researchers may consider alternative DA models (e.g., performance-matched model) and alternative CEO's equity incentive proxies (e.g., pay-for-performance sensitivity) in their future work.

Data availability

From the sources identified in this paper

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