

CEO Compensation Matters for Risk-Taking S&P 1500 Firms

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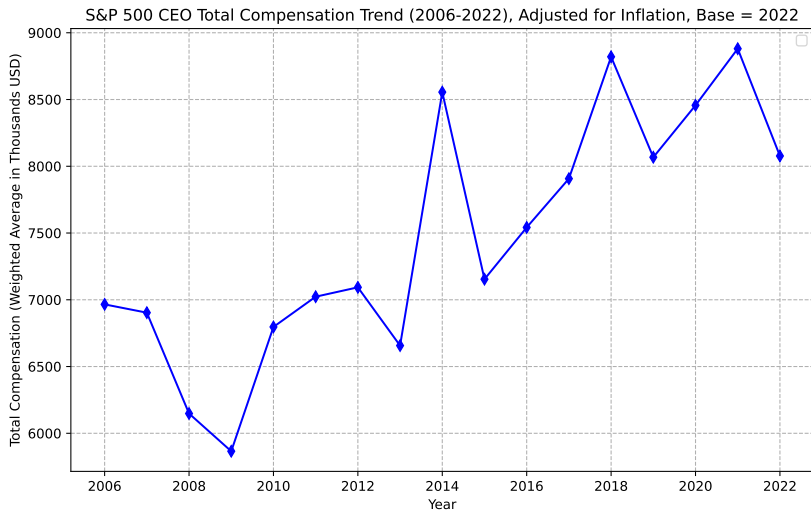


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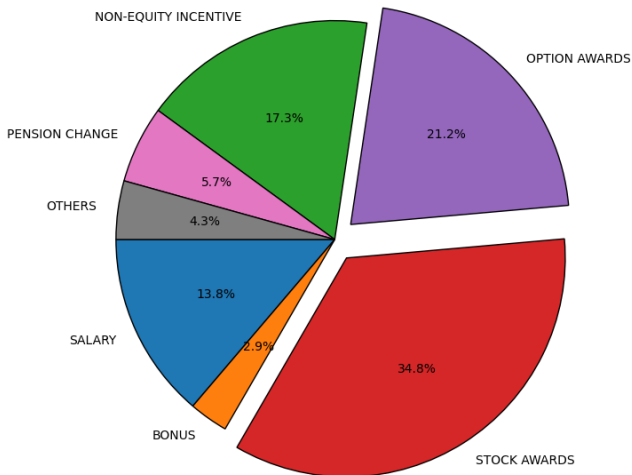
CEO Compensation Over Time

Source: Authors' analysis of data from ExecuComp database via WRDS



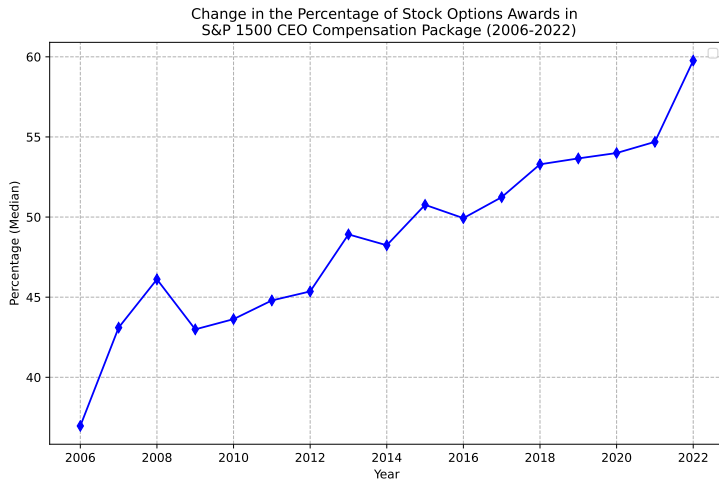
Compensation Package for S&P 1500 CEOs

Source: Authors' analysis of data from ExecuComp database via WRDS



Stock Options Increasingly Account for a Higher Portion in the Compensation Package

Source: Authors' analysis of data from ExecuComp database via WRDS



Research Question

- CEO total compensation has risen significantly over time, and so has stock options as a percentage of their compensation packages
- Stock option awards are attempts to align the interests of the CEO to the long-run success of a firm
- Might this incentivize CEOs to partake in risky behavior due to potential gains?

Does a CEO's compensation affect risk-taking behavior?

Literature Review

- Jensen & Murphy (1990)
 - Performance-based pay can incentivize excessive risk-taking if executives benefit from positive outcomes and are sheltered from negative outcomes
 - Compensation packages must reward performance all while motivating executives to seek long-term gains as opposed to short-term gains
- Shue & Townsend (2017)
 - Larger stock option grants are associated with risk-taking
 - Shorter vesting periods might encourage short-term risk-taking
- Guo et al. (2015)
 - Compensation often rewards short-term performance, which is especially deleterious in the banking sector
 - Positive relationship between incentive compensation and risk-taking, where the Altman Z-Score and stock volatility are risk proxies
- Huang (2020)
 - Risk-taking is magnified in banks with high past-performance, particularly for short-term incentives
 - Long-term equity incentives might deter excessive risk-taking

Two Stage Least Squares Regression

First Stage

$$totalcomp = \pi_0 + \pi_1 tenure + \pi_2 firmsize + \pi_3 payczar \\ + \pi_4 doddfrank + \pi_5 CBOE + \pi_6 MOM + v$$

$$stockoptions = \gamma_0 + \gamma_1 tenure + \gamma_2 firmsize + \gamma_3 payczar \\ + \gamma_4 doddfrank + \gamma_5 CBOE + \gamma_6 MOM + \epsilon$$

Second Stage

$$Risk = \beta_0 + \beta_1 \overbrace{totalcomp} + \beta_2 \overbrace{stockoptions} + \beta_3 payczar \\ + \beta_4 doddfrank + \beta_5 CBOE + \beta_6 MOM + u$$

First Stage

$$totalcomp = \pi_0 + \pi_1 tenure + \pi_2 firmsize + \pi_3 payczar + \pi_4 doddfrank + \pi_5 CBOE + \pi_6 MOM + v$$

$$stockoptions = \gamma_0 + \gamma_1 tenure + \gamma_2 firmsize + \gamma_3 payczar + \gamma_4 doddfrank + \gamma_5 CBOE + \gamma_6 MOM + \epsilon$$

- **total comp** is the value of a CEO's total compensation, measured in millions of dollars
- **stock options** is the value of a CEO's stock option as a percentage of total compensation
- **tenure** is the years since a CEO took their position
- **firm size** is the number of employees at a firm, measured in thousands
- **pay czar** is a policy dummy variable
- **dodd frank** is a policy dummy variable
- **Chicago Board Options Exchange (CBOE)** is an asset pricing control
- **Fama & French Monthly Momentum Factor (MOM)** is an asset pricing control

Second Stage

$$Risk = \beta_0 + \beta_1 \overbrace{totalcomp} + \beta_2 \overbrace{stockoptions} + \beta_3 payczar + \beta_4 doddfrank + \beta_5 CBOE + \beta_6 MOM + u$$

- $\overbrace{total\ comp}$ are the fitted values of total compensation
- $\overbrace{stock\ options}$ are the fitted values of stock options as a percent of total compensation
- **Risk** is according to Altman's z-score or stock volatility

Summary Statistics

Variable	No. of obs.	Mean	SD	Min	Max
Total Compensation (millions USD, adjusted)	21,684	7.64	3.71	0.007	15.75
Stock Options (% of total compensation)	21,684	55.69	21.38	0.018	100.00
Tenure (years)	21,684	6.65	4.98	1.00	22.00
Firm size (thousands of employees)	21,684	39.27	92.88	0.023	2300.00
Stock Volatility (%)	20,298	4.39	1.15	0.00	14.86
Altman's Z-Score	15,084	4.29	4.65	-11.96	81.69

Altman Z Score

Altman's Z-Score predicts likelihood of bankruptcy based on five financial ratios: ¹

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.64X_4 + 0.999X_5$$

- X_1 : Working capital / total assets
- X_2 : Retained earnings / total assets
- X_3 : Earnings before interest and taxes / total assets
- X_4 : Market value of equity / book value of total liabilities
- X_5 : Sales / total assets

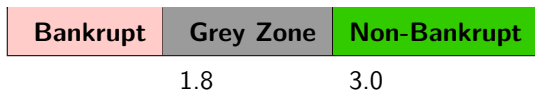


Figure 1: Altman's Z-score Application

¹Using the Z-score Model for public firms (1968).

First Stage: Determinants of CEO Compensation

	Total Compensation	Stock Options
Firm Size (thousands of employees)	0.009*** (0.001)	0.007*** (0.002)
Tenure (years)	-0.035*** (0.005)	-0.130*** (0.032)
Pay Czar dummy	-1.057*** (0.083)	-7.399*** (0.512)
Dodd-Frank dummy	1.374*** (0.075)	8.975*** (0.445)
Mom control	0.394*** (0.051)	1.494*** (0.294)
CBOE control	-0.001 (0.004)	0.139*** (0.026)
Constant	6.711*** (0.132)	47.829*** (0.761)
F-Statistic of IVs	F(2, 21677) = 101.81 Prob > F = 0.0000	F(2, 21677) = 15.71 Prob > F = 0.0000
Observations	21,684	21,684
R^2	0.102	0.054

Significance Levels:

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Robust standard errors in parentheses

Second Stage: CEO Compensation and Risk Taking

	In σ	Altman's Z-score
Total Compensation (millions USD)	-0.013*** (0.003)	1.070*** (0.092)
Stock Options (percent of total compensation)	0.003 (0.003)	-1.423*** (0.106)
Pay Czar dummy	0.165*** (0.021)	-9.775*** (0.730)
Dodd-Frank dummy	-0.010 (0.024)	10.737*** (0.801)
Mom control	-0.008 (0.005)	1.774*** (0.147)
CBOE control	0.013*** (0.001)	0.167*** (0.015)
Constant	1.135*** (0.127)	65.402*** (4.484)
Observations	20,298	15,084
R^2	0.182	0.025

Significance Levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Robust standard errors in parentheses

Conclusion

- Stock option awards increases risk-taking while total compensation decreases risk-taking when controlling for exogenous shocks to compensation
 - These results are consistent with the literature, in finding a positive relationship between stock-option awards and risk-taking
 - Driving the results in total compensation might be the nature of our sample
- Overall, we underline how stock option awards might influence CEOs' decision to take on more risk in our sample of SP 1500 firms

Further Research

- Further examining the components of compensation
 - Performance, based bonuses, long-term incentive plans
- Consider other exogenous shocks to compensation
 - COVID-19 pandemic, business cycles
- Consider a sample by market capitalization and industry
 - Split the sample by S&P 500, S&P 400 mid-cap, S&P 600 small-cap
 - Split the sample by industry. technology, financial services

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