Internet Appendix for: "Sticks or Carrots? Optimal CEO Compensation when Managers are Loss Averse"*

INGOLF DITTMANN, ERNST MAUG and OLIVER SPALT

This internet appendix provides proofs and additional tables that have not been included in the printed version of the paper due to space restrictions.

I. Additional theoretical material

A. Proof of Lemma 1

Consider first the contract $w(P_T)$ that pays off $\underline{w} < w(P_T) < w^R$ at some price P_T with certainty. Since the value function in the loss space, $-\lambda\left(w^R - w(P_T)\right)^\beta$, is monotonically increasing in $w(P_T)$, there exists a unique number $l(P_T) \in (0,1)$ for each $w(P_T)$ such that

$$l(P_T)\lambda\left(w^R - w^R\right)^\beta + (1-l(P_T))\,\lambda\left(w^R - \underline{w}\right)^\beta = \lambda\left(w^R - w(P_T)\right)^\beta \ . \tag{IA.1}$$

From (IA.1), replacing the payoff $w(P_T)$ with the lottery $\left\{l(P_T), w^R; 1-l(P_T), \underline{w}\right\}$ leaves the participation constraint (5) and the incentive compatibility constraint (7) unchanged. From equation (IA.1) and the strict concavity of $\lambda\left(w^R - w(P_T)\right)^\beta$ in $w(P_T)$ we have:

$$\lambda\left(w^R - w(P_T)\right)^\beta < \lambda\left(w^R - \left(l(P_T)w^R + (1-l(P_T))\,\underline{w}\right)\right)^\beta . \tag{IA.2}$$

The transformation of both sides of (IA.2) is monotone, which implies that

$$l(P_T)w^R + (1-l(P_T))\,\underline{w} < w(P_T)\,. \tag{IA.3}$$

Hence, the lottery $\left\{l(P_T), w^R; 1-l(P_T), \underline{w}\right\}$ improves on the original contract $w(P_T)$ because it provides the same incentives and the same utility to the manager at lower costs to the firm.

Finally, consider a contract that pays off w' with $\underline{w} < w' < w^R$ with some probability p less than one. Then we can use the same argument as above, but we replace the random payoff w' with the lottery $\left\{l(P_T)p, w^R; (1-l(P_T))\,p, \underline{w}\right\}$. ■

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B. Proof of Lemma 2

From Lemma 1, we can represent any candidate contract by three functions:

1. $\widetilde{w}(P_T) = (l(P_T), w_G(P_T), w_L(P_T))$, where $w_G(P_T) \geq w^R$ represents the payoffs in the gain space
2. $w_L(P_T)$, which represents the payoffs in the loss space, so $w_L(P_T) = \underline{w}$
3. $l(P_T) \in [0, 1]$, which is the probability that the contract pays off in the gain space if the stock price is P_T.

We can them write $\widetilde{w}(P_T) = w_G(P_T)$ with probability $l(P_T)$ and $\widetilde{w}(P_T) = w_L(P_T)$ with probability $1 - l(P_T)$.

We prove Lemma 2 by contradiction. We show that whenever a candidate optimal contract $\widetilde{w}(P_T)$ without a cut-off between the gain-space and the loss-space exists, then there exists an alternative contract that strictly dominates the candidate contract $\widetilde{w}(P_T)$, so that $\widetilde{w}(P_T)$ cannot be optimal. If there is no cut-off value that separates the loss space from the gain space, then there exists a unique point $\widetilde{P} \in (0, \infty)$ such that the probability that the contract pays out in the gain space below $\widetilde{P}$ is positive and equal to the probability that the contract pays out in the loss space above $\widetilde{P}$. We denote both probabilities by s:

$$s \equiv \int_0^{\widetilde{P}} l(P_T) f(P_T|\widehat{e}) dP_T = \int_{\widetilde{P}}^{\infty} (1 - l(P_T)) f(P_T|\widehat{e}) dP_T > 0. \tag{IA.4}$$

$\widetilde{P}$ exists because $f(P_T|\widehat{e})$ is continuous in P_T. Now we construct an alternative contract, where we exchange the gains to the left of $\widetilde{P}$ with the losses to the right of $\widetilde{P}$. More precisely, we replace the gains below $\widetilde{P}$ by the lowest possible loss $\underline{w}$, and all losses above $\widetilde{P}$ by a constant payout in the gain space $\overline{w}$ that is chosen such that the costs of the new contract and the original candidate contract $\widetilde{w}$ to the firm are identical:

$$\overline{w} \equiv \frac{1}{s} \int_0^{\widetilde{P}} w_G(P_T) l(P_T) f(P_T|\widehat{e}) dP_T \geq w^R. \tag{IA.5}$$

Hence, we replace the candidate contract $\widetilde{w}(P_T)$ with a new contract $\widetilde{w}'(P_T)$, which pays off $\underline{w}$ whenever $\widetilde{w}(P_T)$ pays off in the gain space and the stock price is below $\widetilde{P}$, and which pays off $\overline{w}$ whenever $\widetilde{w}(P_T)$ pays off in the loss space and the stock price is above $\widetilde{P}$. The alternative contract therefore has $l'(P_T) = l(P_T)$ and:

$$w'_G(P_T) = \begin{cases} \underline{w}, & \text{if } P_T \leq \widetilde{P} \\ w_G(P_T), & \text{if } P_T > \widetilde{P} \end{cases}, \tag{IA.6}$$

$$w'_L(P_T) = \begin{cases} \underline{w}, & \text{if } P_T \leq \widetilde{P} \\ \overline{w}, & \text{if } P_T > \widetilde{P} \end{cases}. \tag{IA.7}$$

By construction, the costs to the principal of both contracts are identical. To see this, note that losses in the candidate contract are replaced with an expected payoff $\overline{w}$ if $P_T > \widetilde{P}$, which increases the expected costs of the contract by $s(\overline{w}-\underline{w})$. At the same time, gains in the candidate contract are replaced with a payoff $\underline{w}$ if $P_T \leq \widetilde{P}$, which reduces the costs of the contract by $s(\overline{w}-\underline{w})$.

In the next step we show that the new contract $\widetilde{w}'(P_T)$ relaxes the participation constraint as well as the incentive compatibility constraint.

Participation Constraint: We need to show that the following difference is positive:

$$\begin{aligned}&\int \left[l'(P_T)V(w_G'(P_T)) + (1-l'(P_T))V(w_L'(P_T))\right] f(P_T|\widehat{e})dP_T \\ &- \int \left[l(P_T)V(w_G(P_T)) + (1-l(P_T))V(\underline{w})\right] f(P_T|\widehat{e})dP_T.\end{aligned} \tag{IA.8}$$

Substituting definitions (IA.6) and (IA.7) and rearranging gives:

$$\begin{aligned}&\int_0^{\widetilde{P}} l(P_T)\left[V(\underline{w}) - V\left(w_G(P_T)\right)\right] f(P_T|\widehat{e})dP_T \\ &+ \int_{\widetilde{P}}^{\infty} (1-l(P_T))\left[V\left(\overline{w}\right) - V(\underline{w})\right] f(P_T|\widehat{e})dP_T.\end{aligned} \tag{IA.9}$$

From (IA.4), the expressions in $V(\underline{w})$ cancel, so (IA.8) and (IA.9) can be rewritten as (use (IA.4) again):

$$s\left[V\left(\overline{w}\right) - \frac{1}{s}\int_0^{\widetilde{P}} V\left(w_G(P_T)\right) l(P_T) f(P_T|\widehat{e})dP_T\right]. \tag{IA.10}$$

Define $h(P_T) \equiv l(P_T)f(P_T|\widehat{e})/s$ and observe that $h(P_T)$ is a density on the interval on $(0,\widetilde{P}]$. Then we can rewrite the bracketed expression in (IA.10) as

$$V\left(E_h\left[w_G(P_T)\,|\widehat{e}\right]\right) - E_h\left[V\left(w_G(P_T)\right)|\widehat{e}\right], \tag{IA.11}$$

where E_h denotes expectations taken with respect to the density h and the substitution $\overline{w} = E_h\left[w_G(P_T)\,|\widehat{e}\right]$ follows from (IA.5). From Jensen's inequality and the strict concavity of the agent's preferences in the gain space, it follows that (IA.11) and by implication (IA.8) are strictly positive. We have therefore shown that the alternative contract $\widetilde{w}'(P_T)$ costs the same as the candidate contract $\widetilde{w}'(P_T)$, but it relaxes the participation constraint.

Incentive Compatibility Constraint: We define the likelihood ratio $LR(P_T) = f_e(P_T|\widehat{e})/f(P_T|\widehat{e})$. Then we repeat the same argument, where (IA.8) is replaced by:

$$\begin{aligned}&\int \left[l'(P_T)V(\overline{w}'(P_T)) + (1-g'(P_T))V(\underline{w}'(P_T))\right] LR\left(P_T|\widehat{e}\right) f(P_T|\widehat{e})dP_T \\ &- \int \left[l(P_T)V(\overline{w}(P_T)) + (1-l(P_T))V(\underline{w}(P_T))\right] LR\left(P_T|\widehat{e}\right) f(P_T|\widehat{e})dP_T > 0.\end{aligned} \tag{IA.12}$$

We assume that $LR(P_T)$ is monotone in P_T. So, the gains in the integrands in (IA.12) are multiplied by bigger numbers than the losses. Consequently, (IA.12) is also strictly positive, which shows that switching from the candidate contract $\widetilde{w}(P_T)$ to the alternative contract $\widetilde{w}'(P_T)$ also relaxes the incentive compatibility constraint. Hence, if there is no cut-off between the gain space and the loss space, then we can always construct an alternative contract with higher payoffs in the gain space above $\widetilde{P}$ and lower payoffs in the loss space below $\widetilde{P}$. This alternative contract always improves on the candidate contract, contradicting the assumption that the candidate contract is optimal. ■

C. Proof of sufficiency

This subsection shows that the functional form (19) from Proposition 1 is also a sufficient condition for the optimal contract. We have shown in the proof of Proposition 1 that $\widehat{P}$ exists and that it is finite and unique. Therefore, to show that the first order conditions of the Lagrangian are sufficient, we only need to consider the simplified problem where the threshold $\widehat{P}$ is already given. If the constraints (A.2) and (A.3) define a quasiconcave set, then this simplified problem has a unique solution. Together with the uniqueness of $\widehat{P}$ this implies that the full optimization problem also has a unique solution.

Consider the left hand side of the participation constraint (A.2) and define:

$$g(w(P_T)) \equiv \int_{\widehat{P}}^{\infty} V(w(P_T))f(P_T|\widehat{e})dP_T + V(\underline{w})F(\widehat{P}|\widehat{e}). \tag{IA.13}$$

Let $w_1(P_T)$ and $w_2(P_T)$ be two feasible contracts with $g(w_1(P_T)) \geq g(w_2(P_T))$. The participation constraint (A.2) defines a quasiconcave set if $g(\delta w_1(P_T) + (1-\delta)w_2(P_T)) \geq g(w_2(P_T))$ for any $\delta \in [0,1]$:

$$\begin{aligned}
&g(\delta w_1(P_T) + (1-\delta)w_2(P_T)) \\
&= \int_{\widehat{P}}^{\infty} V(\delta w_1(P_T) + (1-\delta)w_2(P_T))f(P_T|\widehat{e})dP_T + V(\underline{w})F(\widehat{P}|\widehat{e}) \\
&\geq \delta \int_{\widehat{P}}^{\infty} V(w_1(P_T))f(P_T|\widehat{e})dP_T + (1-\delta)\int_{\widehat{P}}^{\infty} V(w_2(P_T))f(P_T|\widehat{e})dP_T + V(\underline{w})F(\widehat{P}|\widehat{e}) \\
&= \delta g(w_1(P_T)) + (1-\delta)g(w_2(P_T)) \geq g(w_2(P_T)).
\end{aligned} \tag{IA.14}$$

This proves quasiconcavity for the participation constraint (A.2). The proof is analogous for the incentive compatibility constraint (A.3) and shows that the solution is unique.

Finally, the solution must be a minimum, because it is associated with finite costs; as the objective function is linear and there are no upward restrictions, a maximum would involve infinite costs. Therefore, equation (19) is also a sufficient condition for the optimal contract.■

D. Proof of Corollary 1

Total differentiation of equation (A.17) yields:

$$\frac{d\widehat{P}}{d\lambda} = -\frac{\left(\gamma_0 + \gamma_1 \ln \widehat{P}\right)\lambda\left(w^R - \underline{w}\right)^{\beta}\widehat{P}}{\gamma_1\left(\lambda\left(w^R - \underline{w}\right)^{\beta} + \left(\gamma_0 + \gamma_1 \ln \widehat{P}\right)^{\frac{\alpha}{1-\alpha}}\right)} < 0. \tag{IA.15}$$

The sign follows from $w^R > \underline{w}$ and because condition (A.17) can then only be satisfied if $\gamma_0 + \gamma_1 \ln \widehat{P} > 0$.

Differentiating the optimal contract in the gain space twice gives:

$$\frac{\partial^2 w^* (P_T)}{\partial P_T^2} = \frac{\gamma_1}{P_T^2} \frac{1}{1-\alpha} (\gamma_0 + \gamma_1 \ln P_T)^{\frac{2\alpha-1}{1-\alpha}} \times \left[\frac{\gamma_1 \alpha}{1-\alpha} - \gamma_0 - \gamma_1 \ln P_T \right]. \tag{IA.16}$$

Convexity requires that $\frac{\partial^2 w^*(P_T)}{\partial P_T^2} \geq 0$. $\frac{\partial^2 w^*(P_T)}{\partial P_T^2} = 0$ defines the inflection point above which $w^* (P_T)$ becomes concave. From (IA.16), this is the case when the bracketed expression is zero, so $P_T^I = \exp (\alpha / (1-\alpha) - \gamma_0/\gamma_1)$. ■

II. Additional empirical material

The next subsection produces the complete version of two tables that are reported in the paper in a condensed format. The remaining seven sections contain detailed results for the robustness checks mentioned in the paper.

A. Extended tables from the paper

Tables A.II and A.V are extended versions of, respectively, Table II, Panel A and Table V in the paper. Tables A.II and A.V display the results for eleven values of θ between 0 and 1, while Table II, Panel A and Table V only report results for a subset of these θ-values. To enhance readability, we refer to these tables with the same numbers as in the paper and use the prefix "A". There are no tables with the numbers A.I, A.III, or A.IV.

B. CARA utility function

We repeat our analysis with the risk-aversion model where the agent has constant absolute risk-aversion (CARA) instead of constant relative risk-aversion (CRRA):

$$V^{CARA} (w (P_T)) = -\exp (-\rho (W_0 + w (P_T))),$$

where W_0 denotes wealth and ρ the coefficient of absolute risk aversion. Table B.I shows the calibration results for seven values of the CRRA-parameter γ. The coefficient of absolute risk aversion ρ is calculated from γ as $\rho = \gamma/(W_0 + \pi_0)$, where π_0 is the market value of the manager's contract (i.e., the costs of the contract to the firm).

A comparison of Table B.I with Table II, Panel B shows that our results are not sensitive to the choice between absolute and relative risk-aversion. This first impression is corroborated in Table B.II, which replicates Table III for CARA utility. For each CEO and each reference wage, we calculate the equivalent parameter of absolute risk aversion ρ_e that results in the same certainty equivalent of the observed contract as the LA-model: $CE^{LA}(w^d, \theta) \equiv CE^{CARA}(w^d, \rho_e)$ (see equation (18)). We numerically calculate the optimal linear contract for the LA-model with the reference wage given by θ and for the CARA-model with parameter ρ_e and compare the two contracts across CEOs in Table B.II. The results are very similar to the results shown in Table III.

C. Owners versus managers

Table B.III contains our results for Table III when we split the sample according to CEO ownership. Table B.III, Panel A shows the results for the 54 owner-executives who own 5% or more of the shares of their firm, and Panel B shows the results for the remaining 541 CEOs who own less than 5% of their firm. We discuss this robustness check in Section V of the paper.

D. Restrict salaries and option holdings to be non-negative

Table B.IV displays the results for Table III when we repeat our analysis and require that salary and option holdings cannot become negative, i.e. $\phi \geq 0$ and $n_O \geq 0$. We discuss this robustness check in Section V of the paper.

E. Remove outliers

We remove two outliers from our sample (Warren Buffett and Steven Ballmer) and reproduce three tables for the sample without these outliers: the descriptive statistics from Table I, the results for the piecewise linear contract from Table III, and the results for the non-linear LA-contract from Table IV. The results can be found in Tables B.V to B.VII. We discuss this robustness check in Section V of the paper.

F. Biases in our sample

To analyze the biases in our sample, we break down our results from Tables III and IV into quintiles formed according to the firm's stock return volatility (Tables B.VIII and B.IX) and according to the CEO's observed option holdings (Tables B.X and B.XI). We discuss this robustness check in Section V of the paper.

G. Analysis for 1997

We repeat our analysis for 1997 instead of 2005. Table B.XII contains the descriptive statistics for 1997, and Table B.XIII shows our analysis from Table III for the 1997 sample. We discuss this robustness check in Section V of the paper.

H. Wealth robustness check

We multiply our wealth estimate W_0 by 0.5 and repeat our analysis from Table III. Table B.XIV, Panel A shows the results. Table B.XIV, Panel B displays the results if we multiply W_0 by 2 instead. We discuss this robustness check in Section V of the paper.

Table A.II: Optimal piecewise linear contracts in the LA model

This table describes the optimal piecewise linear contract for the loss-aversion model. It is an extension of Table II, Panel A, which does not contain the results for all values of θ. The table shows the median of the three parameters of the optimal contract, namely base salary ϕ^*, stock holdings n_S^*, and option holdings n_O^*. It also shows the mean of the scaled errors: $error(\phi)=(\phi^* - \phi^d)/\sigma_\phi$, $error(n_S)=(n_S^* - n_S^d)/\sigma_S$, and $error(n_O)=(n_O^* - n_O^d)/\sigma_O$, where σ_ϕ, σ_S, and σ_O denote the cross-sectional standard deviations of base salaries, stock holdings, and option holdings, respectively, and where superscript 'd' denotes parameter values from the observed contract.. The table also shows the mean and median of the distance metric D from equation (17), and the average probability of a loss, defined as Prob($w^*(P_T) < w^R$). Results are displayed for eleven different reference wages parameterized by θ from equation (16). The last row shows the corresponding values of the observed contract.

θ	Obs.	Avg. Prob. of Loss	Salary (ϕ)		Stock (n_S)		Options (n_O)		Distance D	
			Median	Mean Error	Median	Mean Error	Median	Mean Error	Mean	Median
0.0	594	4.1%	0.29	-1.594	0.005	0.103	0.007	-0.429	0.54	0.16
0.1	578	13.6%	1.47	0.346	0.005	0.015	0.009	-0.022	0.71	0.15
0.2	571	20.1%	1.29	-0.049	0.006	0.050	0.007	-0.135	1.44	0.40
0.3	578	26.0%	-0.44	2.306	0.009	0.179	0.003	-0.657	1.93	0.70
0.4	585	31.3%	-2.89	3.027	0.011	0.285	0.001	-1.136	2.40	0.87
0.5	587	35.9%	-5.05	2.416	0.014	0.424	0.000	-1.774	2.72	0.94
0.6	586	41.1%	-6.74	2.337	0.017	0.526	-0.002	-2.271	3.07	1.13
0.7	585	46.3%	-7.92	3.691	0.017	0.583	-0.003	-2.557	3.27	1.19
0.8	585	51.0%	-8.26	-3.294	0.018	0.647	-0.003	-2.921	3.32	1.23
0.9	581	54.9%	-8.84	-10.415	0.018	0.714	-0.004	-3.198	3.41	1.28
1.0	582	58.3%	-8.89	-10.729	0.019	0.708	-0.005	-3.292	3.47	1.28
Data	595	N/A	1.67	N/A	0.003	N/A	0.010	N/A	N/A	N/A

Table A.V: Comparison of linear and nonlinear loss-aversion models

This table compares the optimal piecewise linear loss-aversion contract with the optimal nonlinear loss-aversion contract. It is an extension of Table V which does not contain the results for all values of θ. For both models, the table shows the median change in wealth if the stock price changes by -30% or +30%. In addition, the table shows the savings [E($w^d(P_T)$) – E($w^*(P_T)$)] / E($w^d(P_T)$) the models predict from switching from the observed contract to the optimal contract. Results are shown for eleven different reference wages parameterized by θ. Some observations are lost because of numerical problems.

θ	Obs.	Linear option contract			General nonlinear contract		
		Median change in wealth if stock price changes by		Mean savings	Median change in wealth if stock price changes by		Mean savings
		-30%	+30%		-30%	+30%	
0.0	570	-39.0%	47.1%	0.2%	-37.9%	41.3%	0.5%
0.1	557	-39.5%	49.8%	0.4%	-35.9%	41.8%	1.5%
0.2	547	-38.6%	47.7%	1.0%	-32.5%	40.1%	3.3%
0.3	559	-35.3%	42.2%	1.7%	-27.7%	36.8%	5.2%
0.4	567	-34.3%	37.4%	2.3%	-22.2%	32.2%	6.9%
0.5	571	-32.7%	34.6%	3.0%	-16.8%	26.4%	8.4%
0.6	570	-32.9%	32.5%	3.7%	-12.1%	20.4%	10.1%
0.7	573	-33.2%	31.7%	4.3%	-8.8%	16.3%	11.6%
0.8	569	-33.7%	30.6%	4.9%	-6.4%	12.7%	13.0%
0.9	561	-34.3%	30.4%	5.3%	-4.7%	9.8%	14.1%
1.0	546	-34.8%	30.7%	5.6%	-3.5%	7.5%	15.0%

Table B.I: Optimal contracts for managers with CARA utility

This table contains the results from repeating the analysis shown in Table II, Panel B if the manager exhibits constant absolute risk-aversion (CARA) utility instead of constant relative risk-aversion (CRRA). For seven different values of the CRRA parameter γ, we calculate the CEO's coefficient of absolute risk aversion ρ as $\rho = \gamma / (W_0 + \pi_0)$, where π_0 is the market value of her observed compensation package. The table shows the median of the three parameters of the optimal contract, namely base salary ϕ^*, stock holdings n_S^*, and option holdings n_O^*. It also shows the mean of the scaled errors: $error(\phi)=(\phi^* - \phi^d)/\sigma_\phi$, $error(n_S)=(n_S^* - n_S^d)/\sigma_S$, and $error(n_O)=(n_O^* - n_O^d)/\sigma_O$, where σ_ϕ, σ_S, and σ_O denote the cross-sectional standard deviations of base salaries, stock holdings, and option holdings, respectively, and where superscript 'd' denotes parameter values from the observed contract. The table also shows the mean and median of the distance metric D from equation (17). Some observations are lost because of numerical problems.

γ	Obs.	Salary (ϕ)		Stock (n_S)		Options (n_O)		Distance D	
		Median	Mean Error	Median	Mean Error	Median	Mean Error	Mean	Median
0.1	595	-9.21	-10.986	0.019	0.777	-0.005	-3.586	3.67	1.26
0.2	595	-9.10	-10.908	0.019	0.752	-0.006	-3.600	3.68	1.34
0.5	595	-9.02	-10.587	0.020	0.700	-0.008	-3.634	3.70	1.49
1	595	-8.27	-9.964	0.020	0.633	-0.010	-3.631	3.69	1.60
3	594	-6.09	-7.583	0.016	0.492	-0.013	-3.709	3.75	1.83
6	595	-3.16	-5.237	0.012	0.346	-0.011	-3.484	3.51	1.86
20	590	0.54	-1.292	0.007	0.103	-0.007	-2.793	2.80	1.53

Table B.II: Comparison of LA-model with matched RA-model with CARA utility

This table contains the results from repeating the analysis shown in Table III if the manager exhibits constant absolute risk-aversion (CARA) utility instead of constant absolute risk-aversion (CRRA). It compares the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant absolute risk aversion with parameter ρ, which is chosen such that both models predict the same certainty equivalent for the observed contract. Contracts are piecewise linear. The table shows the mean and median of the difference between the metric D between the RA-model and the LA-model (see equation (17)), and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

θ	Obs.	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
		Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	329	97.3%	3.25***	1.60***	41.0%	90.3%	1.2%	62.9%	0.0%	55.9%
0.1	350	98.9%	3.50***	1.72***	37.7%	90.3%	1.1%	74.3%	0.0%	70.9%
0.2	401	91.3%	1.84***	0.70***	33.2%	79.8%	1.2%	56.1%	0.2%	53.6%
0.3	441	86.8%	1.37***	0.39***	29.9%	63.7%	0.9%	38.8%	0.2%	36.1%
0.4	483	88.6%	1.04***	0.27***	28.4%	52.4%	1.4%	27.1%	0.2%	25.3%
0.5	510	91.4%	0.90***	0.25***	24.9%	45.3%	1.2%	17.1%	0.0%	15.7%
0.6	529	90.2%	0.68***	0.23***	24.0%	39.7%	1.7%	10.4%	0.2%	8.7%
0.7	547	88.7%	0.53***	0.20***	22.5%	36.6%	2.2%	6.9%	0.2%	4.9%
0.8	549	86.2%	0.38***	0.19***	22.8%	33.7%	2.4%	5.5%	0.2%	3.1%
0.9	534	84.6%	0.27***	0.16***	22.8%	33.5%	2.2%	3.7%	0.2%	2.2%
1.0	527	83.7%	0.19***	0.13***	24.7%	33.6%	2.1%	3.2%	0.2%	1.9%

Table B.III: Ownership robustness check

This table contains the results from repeating the analysis shown in Table III when we split our sample according to the stock ownership of the CEOs. Panel A displays the results for CEOs who own more than 5% of their firm's equity, while Panel B displays the corresponding results for the remaining CEOs in our sample. The table compares the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the distance metric D for the LA-model (see equation (17)), the mean and median of the difference between the metric D between the RA-model and the LA-model, and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

Panel A: Results for owner-managers ($n_S \geq 5\%$)

θ	Obs.	Average equivalent γ	D_{LA} Mean	D_{LA} Median	$D_{RA}-D_{LA}$ Percent > 0	$D_{RA}-D_{LA}$ Mean	$D_{RA}-D_{LA}$ Median	Percent with positive option holdings RA	Percent with positive option holdings LA	Percent with positive fixed salary RA	Percent with positive fixed salary LA	Percent with positive options and salary RA	Percent with positive options and salary LA
0.0	54	0.16	1.80	1.46	90.7%	11.06 ***	6.60 ***	3.7%	24.1%	0.0%	14.8%	0.0%	5.6%
0.1	51	0.19	2.40	2.24	90.2%	11.02 ***	6.79 ***	3.9%	88.2%	0.0%	84.3%	0.0%	82.4%
0.2	54	0.26	6.17	4.09	81.5%	7.24 ***	6.01 ***	3.7%	90.7%	0.0%	92.6%	0.0%	90.7%
0.3	53	0.34	7.79	4.12	71.7%	6.20 ***	4.00 ***	3.8%	81.1%	0.0%	79.2%	0.0%	79.2%
0.4	54	0.46	9.97	6.04	74.1%	5.13 ***	1.65 ***	3.7%	59.3%	0.0%	59.3%	0.0%	57.4%
0.5	54	0.62	11.41	7.39	75.9%	4.29 ***	3.01 ***	3.7%	40.7%	0.0%	38.9%	0.0%	38.9%
0.6	54	0.77	13.22	9.45	81.5%	3.05 **	3.43 ***	3.7%	29.6%	0.0%	24.1%	0.0%	24.1%
0.7	54	0.86	14.12	9.77	81.5%	2.72 *	3.32 ***	1.9%	16.7%	0.0%	14.8%	0.0%	13.0%
0.8	54	0.92	13.71	10.83	83.3%	3.49 ***	2.79 ***	1.9%	13.0%	0.0%	9.3%	0.0%	9.3%
0.9	53	0.92	13.98	10.16	84.9%	3.44 ***	1.81 ***	0.0%	5.7%	0.0%	1.9%	0.0%	1.9%
1.0	54	0.86	14.13	10.64	83.3%	2.76 ***	1.84 ***	1.9%	3.7%	0.0%	0.0%	0.0%	0.0%

Panel B: Results for non-owner managers ($n_S < 5\%$)

θ	Obs.	Average equivalent γ	D_{LA} Mean	D_{LA} Median	$D_{RA}-D_{LA}$ Percent > 0	$D_{RA}-D_{LA}$ Mean	$D_{RA}-D_{LA}$ Median	Percent with positive option holdings RA	Percent with positive option holdings LA	Percent with positive fixed salary RA	Percent with positive fixed salary LA	Percent with positive options and salary RA	Percent with positive options and salary LA
0.0	540	0.21	0.42	0.14	97.2%	1.92 ***	0.79 ***	33.5%	89.3%	1.9%	64.1%	0.4%	57.2%
0.1	527	0.29	0.55	0.13	97.9%	1.83 ***	0.77 ***	32.6%	91.3%	1.7%	76.9%	0.0%	73.4%
0.2	517	0.43	0.94	0.36	92.8%	1.50 ***	0.56 ***	30.8%	81.0%	2.1%	59.6%	0.4%	57.1%
0.3	524	0.54	1.32	0.58	89.3%	1.07 ***	0.41 ***	30.5%	67.0%	1.7%	43.5%	0.4%	40.5%
0.4	531	0.70	1.63	0.72	91.3%	0.80 ***	0.28 ***	28.1%	56.7%	1.5%	29.9%	0.0%	27.9%
0.5	532	0.85	1.84	0.85	92.5%	0.61 ***	0.23 ***	27.8%	49.1%	1.9%	18.8%	0.4%	17.3%
0.6	532	0.97	2.04	0.95	91.2%	0.48 ***	0.23 ***	24.4%	42.5%	1.7%	11.7%	0.0%	9.8%
0.7	528	1.06	2.16	0.99	89.4%	0.37 ***	0.21 ***	22.7%	38.6%	2.3%	8.0%	0.0%	5.7%
0.8	528	1.11	2.25	1.01	86.7%	0.29 ***	0.19 ***	22.9%	35.8%	2.3%	6.3%	0.0%	3.6%
0.9	526	1.07	2.34	1.05	84.0%	0.21 ***	0.16 ***	23.4%	35.2%	2.5%	4.4%	0.2%	2.7%
1.0	527	1.00	2.38	1.05	82.0%	0.14 ***	0.12 ***	24.3%	34.3%	2.3%	3.6%	0.0%	2.1%

Table B.IV: Restricted models with positive salaries and positive option holdings

This table contains the results from repeating the analysis shown in Table III with the stricter constraints that option holdings and salaries must be non-negative ($n_O \geq 0$, $\phi \geq 0$). The table compares the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the distance metric D for the RA-model (see equation (17)), the mean and median of the difference between the metric D between the RA-model and the LA-model, and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

θ	Obs.	Average equivalent γ	D_{RA} Mean	D_{RA} Median	$D_{RA}-D_{LA}$ Percent > 0	$D_{RA}-D_{LA}$ Mean	$D_{RA}-D_{LA}$ Median	Percent with positive option holdings RA	Percent with positive option holdings LA	Percent with positive fixed salary RA	Percent with positive fixed salary LA	Percent with positive options and salary RA	Percent with positive options and salary LA
0.0	588	0.21	0.33	0.15	49.5%	-0.02	0.00***	84.2%	89.8%	15.8%	65.3%	0.3%	58.3%
0.1	574	0.28	0.34	0.15	50.9%	-0.22 ***	0.00	82.9%	94.4%	16.6%	81.7%	0.0%	78.2%
0.2	569	0.41	0.35	0.16	39.0%	-0.54 ***	0.00***	81.4%	94.7%	17.9%	67.1%	0.2%	64.5%
0.3	573	0.53	0.36	0.16	50.3%	-0.68 ***	0.00***	81.3%	92.5%	17.5%	53.2%	0.0%	49.9%
0.4	584	0.68	0.38	0.17	61.5%	-0.61 ***	0.00	79.8%	90.6%	19.0%	39.7%	0.0%	37.3%
0.5	584	0.83	0.40	0.18	74.1%	-0.46 ***	0.01***	79.5%	89.6%	19.5%	29.1%	0.2%	27.1%
0.6	586	0.95	0.41	0.18	78.5%	-0.39 ***	0.02***	78.8%	87.7%	20.0%	20.5%	0.0%	18.1%
0.7	585	1.05	0.41	0.19	82.4%	-0.35 ***	0.02***	78.8%	87.0%	20.2%	15.2%	0.0%	12.6%
0.8	582	1.09	0.41	0.19	83.2%	-0.19 ***	0.02***	79.0%	86.1%	20.1%	14.8%	0.0%	12.2%
0.9	583	1.06	0.40	0.19	82.8%	-0.11 **	0.02***	78.9%	85.6%	20.4%	12.2%	0.0%	9.6%
1.0	577	0.98	0.40	0.18	82.3%	-0.11 **	0.02***	80.9%	85.1%	18.7%	9.0%	0.3%	6.9%

Table B.V: Description of the data set after the removal of two outliers

This table replicates Table I, Panel A after two outliers (Warren Buffett and Steven Ballmer, who have a contract value that exceeds $10 billion) have been removed. It displays mean, standard deviation, and the 10%, 50%, and 90% quantiles of the variables in our data set. "Value of contract" is the market value of the compensation package $\pi = \phi + n_S*P_0 + n_O*BS$, where BS is the Black-Scholes option value. All dollar amounts are in millions.

Variable		Mean	Std. dev.	10% Quantile	Median	90% Quantile
Stock	n_S	1.82%	5.03%	0.04%	0.31%	3.73%
Options	n_O	1.44%	1.42%	0.16%	1.04%	3.24%
Fixed salary	ϕ	2.50	3.11	0.60	1.68	4.69
Value of contract	π	85.2	256.4	5.5	29.8	154.0
Non-firm wealth	W_0	30.2	85.0	2.3	10.3	60.1
Firm value	P_0	9,936	27,211	342	2,253	19,047
Strike price	K	7,520	22,531	242	1,461	13,508
Moneyness	K/P_0	70.0%	20.5%	40.3%	70.7%	98.8%
Maturity	T	4.6	1.3	3.4	4.4	6.0
Stock volatility	σ	42.9%	21.4%	22.9%	36.1%	75.1%
Dividend rate	d	1.24%	2.71%	0.00%	0.62%	3.28%
Age		56.6	6.6	48	57	64

Table B.VI: Comparison of LA-model with matched RA-model after the removal of two outliers

This table contains the results from repeating the analysis shown in Table III after two outliers (Warren Buffett and Steven Ballmer) have been removed. It compares the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the difference between the metric D between the RA-model and the LA-model (see equation (17)), and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	592	0.21	96.8%	2.76***	0.92***	30.9%	83.6%	1.7%	59.8%	0.3%	52.7%
0.1	576	0.28	97.4%	2.65***	0.87***	30.2%	91.1%	1.6%	77.6%	0.0%	74.3%
0.2	569	0.41	91.7%	2.05***	0.63***	28.3%	81.9%	1.9%	62.6%	0.4%	60.1%
0.3	575	0.52	88.0%	1.56***	0.44***	28.2%	68.2%	1.6%	46.6%	0.3%	43.8%
0.4	583	0.68	90.1%	1.22***	0.30***	25.9%	56.8%	1.4%	32.4%	0.0%	30.4%
0.5	584	0.83	91.1%	0.98***	0.27***	25.7%	48.1%	1.7%	20.4%	0.3%	19.0%
0.6	584	0.96	90.4%	0.76***	0.25***	22.6%	41.3%	1.5%	12.7%	0.0%	11.0%
0.7	580	1.05	88.8%	0.65***	0.24***	20.9%	36.6%	2.1%	8.4%	0.0%	6.2%
0.8	580	1.09	86.6%	0.62***	0.22***	21.0%	33.6%	2.1%	6.4%	0.0%	4.0%
0.9	578	1.06	84.1%	0.50***	0.18***	21.3%	32.5%	2.2%	4.2%	0.2%	2.6%
1.0	579	0.99	82.0%	0.38***	0.14***	22.3%	31.6%	2.1%	3.3%	0.0%	1.9%

Table B.VII: Optimal nonlinear loss-aversion contracts after the removal of two outliers

This table contains the results from repeating the analysis shown in Table IV after two outliers (Warren Buffett and Steven Ballmer) have been removed. It describes the optimal nonlinear loss-aversion contract. The table shows the median change in wealth if the stock price changes by -50%, -30%, +30%, or +50%. In addition, the table shows the average dismissal probability, defined as the probability with which the contract pays the minimum wage $\underline{w}$ (from equation (20)), the incentives from dismissals that are generated by the drop to the minimum wage $\underline{w}$, and the mean inflection quantile, which is the quantile at which the curvature of the optimal wage function changes from convex to concave. Results are shown for eleven different reference wages parameterized by θ. Some observations are lost because of numerical problems.

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	**-30%**	**+30%**	**+50%**
0.0	569	0.00%	0.01%	98.9%	-59.7%	-37.9%	41.3%	70.2%
0.1	570	0.05%	0.30%	99.9%	-55.6%	-35.9%	41.8%	71.9%
0.2	569	0.58%	2.70%	100.0%	-49.4%	-32.6%	39.9%	70.4%
0.3	573	1.84%	8.79%	100.0%	-40.8%	-27.8%	36.9%	65.8%
0.4	571	4.12%	17.08%	100.0%	-31.3%	-22.3%	32.2%	58.4%
0.5	571	6.53%	24.61%	100.0%	-23.0%	-16.8%	26.5%	49.6%
0.6	571	9.30%	32.84%	100.0%	-16.8%	-12.1%	20.4%	39.1%
0.7	573	12.11%	40.19%	100.0%	-12.6%	-8.8%	16.4%	31.1%
0.8	568	14.79%	47.34%	100.0%	-9.8%	-6.4%	12.7%	24.5%
0.9	562	17.28%	53.63%	100.0%	-8.4%	-4.7%	9.8%	19.5%
1.0	546	19.84%	59.32%	100.0%	-8.2%	-3.5%	7.5%	15.3%

Table B.VIII: Comparison of LA-model with matched RA-model for quintiles according to stock volatility σ

This table shows a breakdown of the results from Table III when we divide our sample into five quintiles according to the firm's stock return volatility σ. Each panel shows the result for one of the quintiles from the lowest volatility (Panel A) to the highest volatility (Panel E). All panels compare the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the difference between the metric D between the RA-model and the LA-model (see equation (17)), and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

Panel A: Quintile 1, where $\sigma \leq 26.6\%$

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	119	0.20	96.6%	0.69***	0.30***	48.7%	82.4%	4.2%	37.0%	0.8%	28.6%
0.1	116	0.24	97.4%	0.81***	0.39***	48.3%	90.5%	3.4%	69.8%	0.0%	63.8%
0.2	111	0.37	93.7%	0.68***	0.26***	47.7%	93.7%	4.5%	86.5%	0.9%	82.9%
0.3	113	0.41	82.3%	0.29***	0.15***	46.0%	92.0%	3.5%	71.7%	0.9%	68.1%
0.4	115	0.53	84.3%	-0.02	0.06***	45.2%	88.7%	2.6%	56.5%	0.0%	53.9%
0.5	117	0.72	85.5%	-0.14	0.06***	47.0%	84.6%	2.6%	43.6%	0.0%	41.9%
0.6	117	0.91	86.3%	-0.51	0.08***	41.9%	73.5%	2.6%	29.1%	0.0%	27.4%
0.7	118	1.11	89.8%	-0.61	0.09***	39.8%	69.5%	2.5%	22.9%	0.0%	20.3%
0.8	116	1.29	90.5%	0.05	0.11***	40.5%	62.1%	2.6%	17.2%	0.0%	14.7%
0.9	114	1.38	93.9%	0.37***	0.13***	37.7%	57.0%	2.6%	8.8%	0.0%	7.0%
1.0	117	1.38	92.3%	0.26**	0.08***	39.3%	51.3%	3.4%	6.8%	0.0%	3.4%

Panel B: Quintile 2, where 26.6% < $\sigma \le$ 32.3%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	118	0.20	95.8%	1.27***	0.52***	44.9%	92.4%	0.8%	57.6%	0.8%	55.1%
0.1	110	0.24	96.4%	1.28***	0.57***	44.5%	98.2%	0.9%	88.2%	0.0%	87.3%
0.2	112	0.35	90.2%	1.16***	0.35***	42.0%	96.4%	0.9%	71.4%	0.0%	70.5%
0.3	115	0.45	83.5%	0.72***	0.15***	40.9%	85.2%	0.9%	53.0%	0.0%	52.2%
0.4	117	0.69	88.0%	0.35*	0.14***	38.5%	71.8%	0.9%	34.2%	0.0%	34.2%
0.5	118	0.85	92.4%	0.24	0.12***	38.1%	64.4%	1.7%	19.5%	0.8%	19.5%
0.6	118	1.03	96.6%	0.45**	0.18***	33.1%	56.8%	0.8%	12.7%	0.0%	11.9%
0.7	116	1.19	98.3%	0.53***	0.20***	31.0%	46.6%	1.7%	6.0%	0.0%	3.4%
0.8	117	1.27	99.1%	0.44***	0.19***	29.9%	44.4%	1.7%	2.6%	0.0%	1.7%
0.9	117	1.22	97.4%	0.37***	0.16***	29.9%	43.6%	1.7%	1.7%	0.0%	1.7%
1.0	117	1.09	94.0%	0.28***	0.12***	33.3%	43.6%	0.9%	1.7%	0.0%	1.7%

Panel C: Quintile 3, where 32.3% < $\sigma \le$ 40.4%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	118	0.20	95.8%	1.88***	0.68***	35.6%	89.0%	0.0%	55.9%	0.0%	52.5%
0.1	114	0.26	98.2%	2.06***	0.68***	35.1%	94.7%	0.0%	84.2%	0.0%	82.5%
0.2	114	0.38	89.5%	1.36***	0.42***	32.5%	92.1%	0.9%	65.8%	0.9%	65.8%
0.3	114	0.54	86.0%	1.22***	0.26***	35.1%	76.3%	0.0%	45.6%	0.0%	44.7%
0.4	118	0.67	90.7%	0.70**	0.18***	30.5%	63.6%	0.0%	28.8%	0.0%	28.8%
0.5	116	0.83	93.1%	0.76***	0.16***	27.6%	51.7%	0.0%	18.1%	0.0%	18.1%
0.6	116	0.97	93.1%	0.95***	0.20***	25.0%	44.8%	0.0%	8.6%	0.0%	8.6%
0.7	114	1.08	91.2%	1.02**	0.22***	21.9%	40.4%	0.0%	5.3%	0.0%	4.4%
0.8	115	1.12	91.3%	0.87***	0.23***	21.7%	36.5%	0.0%	4.3%	0.0%	1.7%
0.9	115	1.06	90.4%	0.64***	0.20***	24.3%	36.5%	0.9%	1.7%	0.9%	1.7%
1.0	114	0.97	89.5%	0.52***	0.17***	23.7%	36.8%	0.0%	1.8%	0.0%	1.8%

Panel D: Quintile 4, where 40.4% < $\sigma \leq$ 56.7%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	120	0.22	98.3%	2.90***	1.51***	19.2%	82.5%	1.7%	73.3%	0.0%	66.7%
0.1	120	0.35	97.5%	2.72***	1.34***	19.2%	95.8%	1.7%	82.5%	0.0%	80.8%
0.2	115	0.49	88.7%	1.84***	0.98***	17.4%	83.5%	1.7%	54.8%	0.0%	53.9%
0.3	117	0.57	89.7%	1.45***	0.66***	15.4%	63.2%	0.9%	40.2%	0.0%	38.5%
0.4	118	0.73	93.2%	2.00***	0.69***	12.7%	49.2%	0.8%	31.4%	0.0%	30.5%
0.5	118	0.90	94.9%	1.83***	0.68***	12.7%	30.5%	1.7%	13.6%	0.8%	12.7%
0.6	118	1.00	91.5%	1.35***	0.57***	11.0%	23.7%	0.8%	7.6%	0.0%	5.1%
0.7	119	1.03	86.6%	1.07***	0.48***	9.2%	19.3%	2.5%	2.5%	0.0%	1.7%
0.8	119	0.99	84.9%	0.88***	0.39***	10.1%	18.5%	2.5%	2.5%	0.0%	0.8%
0.9	118	0.91	80.5%	0.61***	0.31***	11.0%	18.6%	2.5%	2.5%	0.0%	0.8%
1.0	118	0.82	76.3%	0.42**	0.25***	11.0%	18.6%	2.5%	0.8%	0.0%	0.8%

Panel E: Quintile 5, where σ > 56.7%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	119	0.21	96.6%	7.00***	3.21***	5.9%	70.6%	1.7%	73.9%	0.0%	59.7%
0.1	118	0.31	96.6%	6.20***	3.03***	5.1%	76.3%	1.7%	63.6%	0.0%	57.6%
0.2	119	0.47	96.6%	4.98***	2.46***	3.4%	46.2%	1.7%	37.0%	0.0%	30.3%
0.3	118	0.61	96.6%	3.94***	1.78***	4.2%	26.3%	2.5%	24.6%	0.8%	17.8%
0.4	117	0.76	92.3%	2.93***	1.34***	2.6%	12.0%	2.6%	12.8%	0.0%	6.0%
0.5	117	0.84	88.9%	2.05***	1.05***	2.6%	10.3%	2.6%	8.5%	0.0%	4.3%
0.6	117	0.86	83.8%	1.36***	0.78***	1.7%	7.7%	3.4%	6.0%	0.0%	2.6%
0.7	115	0.82	77.4%	0.96***	0.50***	1.7%	7.0%	3.5%	6.1%	0.0%	1.7%
0.8	115	0.77	66.1%	0.70***	0.35***	2.6%	7.0%	3.5%	6.1%	0.0%	1.7%
0.9	115	0.72	58.3%	0.54**	0.22**	3.5%	7.0%	3.5%	6.1%	0.0%	1.7%
1.0	115	0.67	58.3%	0.42**	0.15	3.5%	7.0%	3.5%	5.2%	0.0%	1.7%

Table B.IX: Optimal nonlinear loss-aversion contracts for quintiles according to stock volatility σ

This table contains the results from repeating the analysis shown in Table IV when we divide our sample into five quintiles according to the firm's stock return volatility σ. Each panel shows the result for one of the quintiles from the lowest volatility (Panel A) to the highest volatility (Panel E). All panels describe the optimal non-linear loss-aversion contract. The table shows the median change in wealth if the stock price changes by -50%, -30%, +30%, or +50%. In addition, the table shows the average dismissal probability, defined as the probability with which the contract pays the minimum wage $\underline{w}$ (from equation (20)), the incentives from dismissals that are generated by the drop to the minimum wage $\underline{w}$, and the mean inflection quantile, which is the quantile at which the curvature of the optimal wage function changes from convex to concave. Results are shown for eleven different reference wages parameterized by θ. Some observations are lost because of numerical problems.

Panel A: Quintile 1, where $\sigma \leq 26.6\%$

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	109	0.00%	0.00%	100.0%	-65.9%	-42.9%	49.1%	85.0%
0.1	111	0.00%	0.00%	100.0%	-61.2%	-41.0%	50.3%	88.1%
0.2	112	0.00%	0.00%	100.0%	-55.0%	-38.2%	51.3%	90.9%
0.3	113	0.00%	0.06%	100.0%	-47.2%	-33.6%	50.6%	94.4%
0.4	111	0.24%	2.20%	100.0%	-38.0%	-28.4%	48.3%	90.6%
0.5	112	1.31%	9.10%	100.0%	-28.7%	-21.8%	40.8%	82.0%
0.6	111	3.25%	17.96%	100.0%	-22.1%	-16.1%	33.9%	67.8%
0.7	113	5.36%	27.42%	100.0%	-19.9%	-10.9%	27.8%	56.0%
0.8	111	7.65%	37.31%	100.0%	-22.0%	-7.4%	20.8%	45.6%
0.9	112	10.63%	46.43%	100.0%	-111.7%	-5.0%	15.7%	34.9%
1.0	106	13.03%	54.05%	100.0%	-120.3%	-3.7%	11.5%	27.0%

Panel B: Quintile 2, where $26.6\% < \sigma \leq 32.3\%$

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	113	0.00%	0.00%	100.0%	-63.4%	-40.8%	47.6%	82.0%
0.1	111	0.00%	0.01%	100.0%	-59.0%	-38.6%	48.7%	84.9%
0.2	111	0.04%	0.23%	100.0%	-51.4%	-35.4%	49.3%	88.2%
0.3	113	0.48%	2.25%	100.0%	-42.3%	-30.8%	44.1%	81.6%
0.4	115	1.98%	8.41%	100.0%	-30.5%	-23.4%	38.7%	73.7%
0.5	117	4.13%	18.19%	100.0%	-21.4%	-16.9%	32.4%	62.4%
0.6	115	6.84%	28.43%	100.0%	-15.2%	-11.9%	24.4%	50.5%
0.7	115	10.09%	37.17%	100.0%	-11.8%	-8.6%	18.8%	38.7%
0.8	116	12.74%	46.31%	100.0%	-10.3%	-6.0%	14.4%	29.5%
0.9	113	14.53%	53.55%	100.0%	-10.3%	-4.2%	11.1%	23.1%
1.0	114	17.67%	61.56%	100.0%	-17.2%	-2.9%	8.1%	17.7%

Panel C: Quintile 3, where 32.3% < $\sigma \leq$ 40.4%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	114	0.00%	0.00%	99.7%	-62.0%	-39.4%	44.2%	75.3%
0.1	114	0.02%	0.08%	100.0%	-56.7%	-37.1%	44.9%	77.5%
0.2	113	0.28%	1.12%	100.0%	-50.7%	-34.1%	42.6%	75.7%
0.3	114	1.36%	5.50%	100.0%	-41.7%	-29.1%	40.4%	74.2%
0.4	113	3.53%	13.37%	100.0%	-31.2%	-23.0%	34.9%	65.9%
0.5	113	6.14%	22.31%	100.0%	-22.1%	-17.0%	28.3%	55.3%
0.6	112	8.49%	30.50%	100.0%	-15.5%	-11.8%	22.3%	43.7%
0.7	114	11.32%	38.13%	100.0%	-10.8%	-8.5%	17.1%	33.0%
0.8	111	13.67%	45.62%	100.0%	-8.2%	-6.2%	12.7%	25.4%
0.9	111	16.73%	52.46%	100.0%	-6.3%	-4.4%	9.4%	19.4%
1.0	108	19.58%	58.32%	100.0%	-5.4%	-3.2%	7.0%	14.4%

Panel D: Quintile 4, where 40.4% < $\sigma \leq$ 56.7%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	116	0.03%	0.14%	96.1%	-58.0%	-36.3%	38.9%	66.2%
0.1	116	0.36%	1.66%	99.5%	-54.3%	-34.8%	39.6%	68.3%
0.2	115	1.76%	7.23%	100.0%	-47.2%	-31.7%	38.0%	67.1%
0.3	116	4.27%	15.11%	100.0%	-37.8%	-25.9%	34.4%	60.9%
0.4	116	7.17%	22.51%	100.0%	-28.5%	-20.1%	28.3%	49.7%
0.5	116	9.94%	30.33%	100.0%	-21.0%	-15.0%	22.7%	41.8%
0.6	119	13.25%	37.92%	100.0%	-15.0%	-10.9%	17.6%	32.5%
0.7	117	16.30%	44.68%	100.0%	-11.1%	-8.0%	13.3%	24.9%
0.8	118	19.08%	51.04%	100.0%	-8.1%	-5.9%	10.1%	19.4%
0.9	117	21.97%	57.14%	100.0%	-6.0%	-4.3%	7.6%	14.8%
1.0	113	24.85%	61.76%	100.0%	-5.2%	-3.3%	5.8%	11.2%

Panel E: Quintile 5, where σ > 56.7%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	119	1.71%	3.98%	82.3%	-53.6%	-32.6%	32.8%	55.1%
0.1	119	3.66%	10.64%	91.8%	-50.8%	-31.8%	33.9%	57.2%
0.2	119	6.65%	19.43%	97.1%	-44.7%	-28.0%	31.1%	53.9%
0.3	118	9.39%	26.50%	98.5%	-37.1%	-23.7%	27.5%	48.1%
0.4	117	13.19%	32.91%	99.2%	-29.1%	-19.1%	23.4%	40.5%
0.5	115	16.73%	38.69%	99.5%	-22.8%	-15.4%	19.4%	33.6%
0.6	116	19.80%	44.31%	99.6%	-17.3%	-11.9%	15.4%	27.1%
0.7	115	22.90%	49.15%	99.7%	-13.3%	-9.2%	12.5%	21.9%
0.8	113	25.69%	53.87%	99.8%	-10.3%	-7.1%	9.9%	17.8%
0.9	110	29.33%	57.54%	99.8%	-8.6%	-5.7%	8.0%	14.5%
1.0	106	31.79%	60.29%	99.9%	-7.0%	-4.7%	6.4%	11.6%

Table B.X: Comparison of LA-model with matched RA-model for quintiles according to CEO option holdings

This table shows a breakdown of the results from Table III when we divide our sample into five quintiles according to the CEO's observed option holdings n_O^d. Each panel shows the result for one of the quintiles from the lowest option holdings (Panel A) to the highest option holdings (Panel E). All panels compare the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the difference between the metric D between the RA-model and the LA-model (see equation (17)), and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

Panel A: Quintile 1, where $n_O^d \leq 0.37\%$

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	119	0.23	95.0%	1.90***	0.21***	21.8%	60.5%	4.2%	56.3%	0.0%	34.5%
0.1	113	0.36	98.2%	1.81***	0.23***	23.0%	82.3%	4.4%	79.6%	0.0%	69.9%
0.2	114	0.55	92.1%	1.32***	0.17***	21.1%	89.5%	4.4%	86.0%	0.0%	80.7%
0.3	114	0.49	84.2%	0.82	0.15***	20.2%	80.7%	3.5%	75.4%	0.9%	69.3%
0.4	115	0.66	84.3%	0.75*	0.10***	18.3%	73.9%	2.6%	60.0%	0.0%	56.5%
0.5	115	0.81	87.8%	0.89*	0.08***	18.3%	60.0%	2.6%	43.5%	0.0%	40.9%
0.6	114	0.97	85.1%	0.57	0.07***	18.4%	50.0%	2.6%	35.1%	0.0%	30.7%
0.7	114	1.09	86.8%	0.49	0.09***	15.8%	43.9%	5.3%	26.3%	0.0%	20.2%
0.8	114	1.20	86.8%	0.73*	0.08***	18.4%	35.1%	5.3%	18.4%	0.0%	12.3%
0.9	111	1.25	87.4%	0.84***	0.08***	17.1%	31.5%	5.4%	10.8%	0.0%	7.2%
1.0	113	1.25	84.1%	0.59***	0.06***	16.8%	27.4%	5.3%	8.0%	0.0%	5.3%

Panel B: Quintile 2, where 0.37% < n_O^d ≤ 0.80%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	119	0.19	96.6%	1.35***	0.47***	30.3%	87.4%	0.8%	46.2%	0.0%	42.0%
0.1	117	0.25	99.1%	1.40***	0.52***	29.9%	95.7%	0.9%	82.1%	0.0%	79.5%
0.2	114	0.35	93.0%	1.27***	0.44***	29.8%	86.0%	0.9%	73.7%	0.0%	71.1%
0.3	117	0.49	86.3%	1.02***	0.33***	30.8%	76.1%	1.7%	62.4%	0.9%	58.1%
0.4	118	0.64	86.4%	0.92***	0.25***	28.0%	61.0%	1.7%	41.5%	0.0%	38.1%
0.5	116	0.81	91.4%	0.80***	0.18***	26.7%	55.2%	1.7%	27.6%	0.0%	25.9%
0.6	117	0.96	93.2%	0.61***	0.16***	24.8%	44.4%	1.7%	12.8%	0.0%	12.0%
0.7	116	1.09	93.1%	0.44***	0.17***	23.3%	38.8%	1.7%	8.6%	0.0%	6.9%
0.8	117	1.15	90.6%	0.35***	0.16***	23.1%	34.2%	0.9%	6.8%	0.0%	4.3%
0.9	117	1.13	88.0%	0.31***	0.14***	23.1%	33.3%	0.9%	5.1%	0.0%	3.4%
1.0	117	1.04	86.3%	0.25***	0.11***	23.1%	32.5%	0.9%	3.4%	0.0%	1.7%

Panel C: Quintile 3, where 0.80% < n_O^d ≤ 1.29%

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	117	0.20	98.3%	2.23***	0.79***	37.6%	86.3%	0.9%	66.7%	0.9%	62.4%
0.1	116	0.26	99.1%	2.07***	0.84***	36.2%	94.0%	0.9%	81.0%	0.0%	81.0%
0.2	114	0.38	93.9%	1.44***	0.69***	33.3%	87.7%	0.9%	57.9%	0.0%	57.9%
0.3	116	0.53	86.2%	1.10***	0.49***	32.8%	69.0%	0.9%	35.3%	0.0%	35.3%
0.4	117	0.71	93.2%	0.64**	0.27***	27.4%	51.3%	0.9%	22.2%	0.0%	22.2%
0.5	118	0.87	90.7%	0.52**	0.24***	26.3%	45.8%	0.8%	11.9%	0.0%	11.9%
0.6	117	1.00	91.5%	0.53***	0.25***	20.5%	37.6%	1.7%	7.7%	0.0%	6.0%
0.7	117	1.11	90.6%	0.37***	0.24***	18.8%	34.2%	1.7%	3.4%	0.0%	1.7%
0.8	117	1.14	88.0%	0.31***	0.23***	18.8%	34.2%	1.7%	3.4%	0.0%	1.7%
0.9	117	1.05	82.9%	0.23**	0.19***	20.5%	34.2%	2.6%	2.6%	0.9%	1.7%
1.0	117	0.93	82.9%	0.21***	0.15***	20.5%	34.2%	1.7%	2.6%	0.0%	1.7%

Panel D: Quintile 4, where 1.29% < n_O^d ≤ 2.23%

θ	Obs.	Average equivalent γ	$D_{RA}-D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	120	0.20	97.5%	3.41***	1.66***	31.7%	91.7%	1.7%	65.0%	0.8%	61.7%
0.1	116	0.27	95.7%	3.30***	1.62***	29.3%	91.4%	0.9%	77.6%	0.0%	75.0%
0.2	114	0.40	93.0%	2.74***	1.27***	28.1%	77.2%	1.8%	52.6%	0.9%	50.9%
0.3	115	0.55	93.0%	2.17***	0.66***	27.0%	57.4%	0.9%	32.2%	0.0%	29.6%
0.4	118	0.69	94.1%	1.65***	0.47***	28.0%	49.2%	0.8%	22.9%	0.0%	19.5%
0.5	119	0.84	95.0%	1.05***	0.55***	26.9%	39.5%	1.7%	12.6%	0.8%	10.1%
0.6	120	0.93	91.7%	0.68***	0.35***	24.2%	35.8%	0.8%	5.0%	0.0%	4.2%
0.7	118	0.98	88.1%	0.56***	0.30***	22.9%	32.2%	0.8%	2.5%	0.0%	1.7%
0.8	118	1.01	86.4%	0.69***	0.30***	21.2%	30.5%	0.8%	1.7%	0.0%	0.8%
0.9	117	0.96	85.5%	0.54***	0.31***	22.2%	29.1%	0.9%	0.9%	0.0%	0.0%
1.0	117	0.88	83.8%	0.46***	0.27***	24.8%	29.9%	0.9%	0.9%	0.0%	0.0%

Panel E: Quintile 5, where n_O^d > 2.23%

θ	Obs.	Average equivalent γ	$D_{RA}-D_{LA}$ Percent > 0	Mean	Median	Percent with positive option holdings RA	LA	Percent with positive fixed salary RA	LA	Percent with positive options and salary RA	LA
0.0	119	0.20	95.8%	4.85***	2.82***	32.8%	90.8%	0.8%	63.9%	0.0%	62.2%
0.1	116	0.27	94.0%	4.62***	2.59***	31.9%	91.4%	0.9%	67.2%	0.0%	65.5%
0.2	115	0.39	87.0%	3.43***	2.16***	28.7%	69.6%	1.7%	43.5%	0.9%	40.9%
0.3	115	0.53	88.7%	2.61***	1.23***	29.6%	58.3%	0.9%	28.7%	0.0%	27.8%
0.4	117	0.68	90.6%	2.00***	0.83***	27.4%	49.6%	0.9%	17.1%	0.0%	17.1%
0.5	118	0.81	89.8%	1.47***	0.71***	29.7%	41.5%	1.7%	8.5%	0.8%	8.5%
0.6	118	0.90	89.8%	1.20***	0.63***	24.6%	39.0%	0.8%	4.2%	0.0%	3.4%
0.7	117	0.96	84.6%	1.09***	0.56***	23.1%	34.2%	0.9%	2.6%	0.0%	1.7%
0.8	116	0.96	80.2%	0.87***	0.46***	23.3%	34.5%	1.7%	2.6%	0.0%	1.7%
0.9	117	0.91	76.9%	0.60***	0.35***	23.1%	34.2%	1.7%	1.7%	0.0%	0.9%
1.0	117	0.84	73.5%	0.39*	0.30***	25.6%	33.3%	1.7%	1.7%	0.0%	0.9%

Table B.XI: Optimal nonlinear loss-aversion contracts for quintiles according to CEO option holdings

This table contains the results from repeating the analysis shown in Table IV when we divide our sample into five quintiles according to the CEO's observed option holdings n_O^d. Each panel shows the result for one of the quintiles from the lowest option holdings (Panel A) to the highest option holdings (Panel E). All panels describe the optimal non-linear loss-aversion contract. The table shows the median change in wealth if the stock price changes by -50%, -30%, +30%, or +50%. In addition, the table shows the average dismissal probability, defined as the probability with which the contract pays the minimum wage $\underline{w}$ (from equation (20)), the incentives from dismissals that are generated by the drop to the minimum wage $\underline{w}$, and the mean inflection quantile, which is the quantile at which the curvature of the optimal wage function changes from convex to concave. Results are shown for eleven different reference wages parameterized by θ. Some observations are lost because of numerical problems.

Panel A: Quintile 1, where $n_O^d \leq 0.37\%$

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	113	0.00%	0.00%	93.9%	-54.5%	-33.0%	33.4%	56.4%
0.1	114	0.00%	0.02%	98.9%	-53.0%	-32.6%	34.3%	57.9%
0.2	111	0.03%	0.23%	100.0%	-49.4%	-31.7%	35.1%	60.1%
0.3	111	0.32%	1.92%	100.0%	-42.1%	-28.5%	34.9%	61.9%
0.4	108	1.35%	6.82%	100.0%	-34.7%	-24.1%	33.0%	57.8%
0.5	113	3.12%	15.28%	100.0%	-27.2%	-19.3%	28.9%	51.8%
0.6	111	5.88%	25.59%	100.0%	-19.4%	-14.4%	23.0%	44.3%
0.7	108	8.51%	32.96%	100.0%	-14.7%	-10.6%	19.3%	36.8%
0.8	107	10.65%	40.30%	100.0%	-11.1%	-7.5%	15.2%	29.4%
0.9	107	13.61%	47.49%	100.0%	-8.5%	-5.8%	12.2%	23.4%
1.0	104	15.57%	53.45%	100.0%	-7.2%	-4.3%	9.4%	18.8%

Panel B: Quintile 2, where $0.37\% < n_O^d \leq 0.80\%$

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	116	0.00%	0.00%	99.4%	-59.1%	-37.1%	41.1%	69.9%
0.1	116	0.00%	0.02%	100.0%	-55.5%	-35.6%	41.6%	71.7%
0.2	119	0.08%	0.49%	100.0%	-50.7%	-33.1%	40.2%	71.3%
0.3	117	0.82%	3.60%	100.0%	-43.8%	-29.6%	38.9%	69.1%
0.4	118	2.37%	11.24%	100.0%	-34.1%	-24.3%	36.0%	66.5%
0.5	114	5.41%	20.70%	100.0%	-24.5%	-18.0%	30.2%	56.9%
0.6	117	7.77%	29.48%	100.0%	-17.4%	-13.3%	23.3%	45.2%
0.7	117	10.34%	38.38%	100.0%	-13.0%	-9.4%	18.0%	35.5%
0.8	116	13.15%	47.03%	100.0%	-9.7%	-6.6%	13.9%	27.4%
0.9	115	15.52%	54.05%	100.0%	-8.0%	-4.8%	10.9%	21.9%
1.0	112	17.85%	62.48%	100.0%	-8.7%	-3.5%	8.3%	17.3%

Panel C: Quintile 3, where 0.80% < n_O^d ≤ 1.29%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	118	0.00%	0.04%	99.4%	-61.6%	-38.9%	43.0%	73.1%
0.1	116	0.10%	0.49%	100.0%	-57.0%	-37.6%	44.3%	77.0%
0.2	117	0.67%	3.52%	100.0%	-49.7%	-32.9%	44.7%	78.9%
0.3	117	2.34%	10.55%	100.0%	-39.0%	-27.6%	38.4%	69.7%
0.4	117	4.45%	18.63%	100.0%	-28.9%	-20.9%	32.1%	59.6%
0.5	116	6.70%	26.36%	100.0%	-21.3%	-15.5%	25.9%	49.7%
0.6	116	9.97%	33.88%	100.0%	-15.1%	-11.5%	19.8%	38.6%
0.7	116	13.09%	42.30%	100.0%	-11.0%	-8.2%	15.1%	29.6%
0.8	116	15.50%	48.32%	100.0%	-9.0%	-5.9%	12.0%	23.6%
0.9	112	18.13%	55.73%	100.0%	-7.9%	-4.3%	9.5%	19.3%
1.0	111	20.57%	62.20%	100.0%	-8.0%	-3.1%	7.0%	14.6%

Panel D: Quintile 4, where 1.29% < n_O^d ≤ 2.23%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	116	0.01%	0.04%	97.7%	-59.7%	-37.4%	40.6%	69.0%
0.1	116	0.19%	1.03%	99.9%	-55.4%	-35.5%	40.9%	70.4%
0.2	115	1.35%	6.24%	100.0%	-48.0%	-32.2%	39.4%	69.1%
0.3	117	3.91%	13.83%	100.0%	-38.8%	-26.3%	34.7%	62.0%
0.4	117	6.44%	21.72%	100.0%	-29.3%	-20.6%	27.9%	49.7%
0.5	116	8.75%	29.25%	100.0%	-21.6%	-15.3%	23.0%	42.0%
0.6	113	12.35%	37.16%	100.0%	-15.9%	-11.0%	17.4%	32.4%
0.7	117	13.90%	42.83%	100.0%	-12.2%	-8.0%	14.4%	26.7%
0.8	116	16.60%	48.84%	100.0%	-9.2%	-5.7%	11.0%	21.0%
0.9	115	19.43%	54.65%	100.0%	-7.9%	-4.4%	8.4%	15.9%
1.0	109	22.74%	59.94%	100.0%	-7.5%	-3.3%	6.4%	12.6%

Panel E: Quintile 5, where n_O^d > 2.23%

θ	Obs.	Mean dismissal probability	Incentives from dismissals	Mean inflection quantile	Median change in wealth if stock price changes by			
					-50%	-30%	+30%	+50%
0.0	108	0.11%	0.23%	99.1%	-62.5%	-39.6%	43.9%	74.7%
0.1	109	0.78%	3.06%	99.9%	-57.6%	-37.8%	44.8%	77.4%
0.2	108	2.49%	9.05%	100.0%	-48.3%	-32.8%	41.7%	73.6%
0.3	112	4.81%	14.92%	100.0%	-39.9%	-27.0%	37.0%	66.3%
0.4	112	7.58%	23.11%	100.0%	-30.6%	-21.3%	30.0%	54.9%
0.5	114	9.08%	29.66%	100.0%	-21.5%	-16.8%	23.9%	44.0%
0.6	116	11.77%	36.57%	100.0%	-15.4%	-11.9%	19.6%	35.6%
0.7	116	14.68%	44.50%	100.0%	-11.7%	-8.4%	15.0%	28.8%
0.8	114	18.01%	50.33%	100.0%	-11.6%	-6.0%	11.9%	22.6%
0.9	114	20.28%	55.52%	100.0%	-10.0%	-4.3%	9.2%	18.0%
1.0	111	22.32%	59.54%	100.0%	-9.9%	-3.3%	7.4%	14.6%

Table B.XII: Description of the data set for the year 1997

This table replicates Table I, Panel A for the year 1997 (576 CEOs). It displays mean, standard deviation, and the 10%, 50% and 90% quantiles of the variables in our dataset. "Value of contract" is the market value of the compensation package $\pi = \phi + n_S * P_0 + n_O * BS$, where BS is the Black-Scholes option value. All dollar amounts are in millions.

Variable		Mean	Std. dev.	10% Quantile	Median	90% Quantile
Stock	n_S	2.50%	6.01%	0.02%	0.28%	8.32%
Options	n_O	1.01%	1.35%	0.00%	0.56%	2.54%
Fixed salary	ϕ	2	4	0	1	3
Value of contract	π	118	1,047	2	16	94
Non-firm wealth	W_0	15	68	1	4	26
Firm value	P_0	5,237	11,209	258	1,540	11,284
Strike price	K	3,778	8,252	193	1,086	8,187
Moneyness	K/P_0	76.27%	22.43%	47.93%	77.15%	100.00%
Maturity	T	5.58	1.86	4.10	5.22	7.34
Stock volatility	σ	29.28%	13.11%	16.20%	26.00%	47.40%
Dividend rate	d	1.83%	1.90%	0.00%	1.46%	4.42%

Table B.XIII: Comparison of loss-aversion model with matched risk-aversion model for the year 1997

This table contains the results from repeating the analysis shown in Table III for the year 1997. It compares the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the distance metric D for the LA-model (see equation (17)), the mean and median of the difference between the metric D between the RA-model and the LA-model, and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

θ	Obs.	Average equivalent γ	D_{LA}		$D_{RA}-D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Mean	Median	Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	569	0.20	0.54	0.21	95.1%	1.83***	0.43***	27.1%	70.5%	6.3%	50.3%	0.0%	37.8%
0.1	545	0.22	0.36	0.11	97.4%	1.80***	0.51***	27.7%	86.6%	7.0%	85.9%	0.2%	74.3%
0.2	547	0.26	0.78	0.14	92.9%	1.70***	0.41***	26.1%	88.3%	6.9%	88.8%	0.2%	80.1%
0.3	557	0.33	1.34	0.19	89.2%	1.22***	0.31***	26.2%	84.4%	7.2%	82.2%	0.5%	75.0%
0.4	555	0.42	1.93	0.31	85.9%	0.77***	0.22***	25.0%	77.8%	6.8%	70.1%	0.2%	63.8%
0.5	557	0.53	2.26	0.43	84.2%	0.44***	0.18***	24.8%	70.7%	6.8%	59.2%	0.0%	53.5%
0.6	565	0.64	2.39	0.49	85.8%	0.47***	0.15***	24.6%	63.7%	6.9%	48.0%	0.2%	41.9%
0.7	558	0.76	2.34	0.53	89.6%	0.67***	0.16***	24.4%	57.5%	6.8%	39.1%	0.2%	33.7%
0.8	564	0.89	2.23	0.53	93.3%	0.92***	0.17***	23.4%	51.1%	6.9%	30.9%	0.4%	26.1%
0.9	564	1.01	2.21	0.55	94.9%	1.02***	0.19***	23.0%	44.9%	6.7%	22.7%	0.0%	18.3%
1.0	567	1.10	2.38	0.59	94.2%	0.92***	0.18***	21.5%	40.7%	6.9%	18.3%	0.2%	13.9%

Table B.XIV: Wealth robustness check

This table contains the results from repeating the analysis shown in Table III when we decrease or increase our wealth estimates by a factor of two. For Panel A, our wealth estimate W_0 is multiplied by 0.5. For Panel B, it is multiplied by 2. Both panels compare the optimal loss-aversion contract with the equivalent optimal risk-aversion contract where each CEO has constant relative risk aversion with parameter γ, which is chosen such that both models predict the same certainty equivalent for the observed contract (equation (18)). Contracts are piecewise linear. The table shows the average equivalent γ, the mean and median of the difference between the metric D between the RA-model and the LA-model (see equation (17)), and the frequency of this difference being positive. The table also shows the frequency of positive optimal option holdings, the frequency of positive optimal salaries, and the frequency of both (options and salary) being positive. Results are shown for eleven different reference wages parameterized by θ from equation (16). Some observations are lost because of numerical problems. ***, **, * denote significance of the T-test for zero mean and, respectively, the Wilcoxon signed rank test for zero median at the 1%, 5%, and 10% level.

Panel A: Results for lower wealth (-50%)

θ	Obs.	Average equivalent	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
		γ	Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	594	0.17	92.6%	1.70***	0.53***	49.3%	83.8%	1.9%	59.9%	0.3%	53.2%
0.1	577	0.23	92.9%	1.61***	0.44***	48.2%	91.7%	1.6%	77.6%	0.0%	74.5%
0.2	572	0.33	84.6%	1.10***	0.27***	46.7%	85.5%	1.6%	62.2%	0.0%	59.8%
0.3	574	0.42	81.2%	0.71***	0.16***	46.3%	75.8%	1.6%	47.0%	0.2%	44.3%
0.4	588	0.54	85.2%	0.52***	0.12***	44.2%	67.5%	1.9%	32.0%	0.3%	30.1%
0.5	586	0.66	89.6%	0.50***	0.14***	41.8%	62.1%	1.5%	20.5%	0.0%	18.9%
0.6	591	0.77	91.5%	0.48***	0.17***	39.4%	57.4%	1.9%	13.0%	0.0%	11.3%
0.7	585	0.84	92.6%	0.43***	0.17***	39.0%	54.0%	2.4%	8.4%	0.2%	6.3%
0.8	587	0.88	92.7%	0.51***	0.17***	38.5%	51.3%	2.0%	6.3%	0.0%	3.9%
0.9	583	0.86	92.5%	0.50***	0.16***	39.3%	50.4%	2.1%	4.1%	0.0%	2.6%
1.0	585	0.81	91.6%	0.43***	0.14***	40.3%	49.4%	2.1%	3.2%	0.0%	1.9%

Panel B: Results for higher wealth (+100%)

θ	Obs.	Average equivalent γ	$D_{RA} - D_{LA}$			Percent with positive option holdings		Percent with positive fixed salary		Percent with positive options and salary	
			Percent > 0	Mean	Median	RA	LA	RA	LA	RA	LA
0.0	592	0.27	97.8%	4.00***	1.57***	16.0%	83.6%	1.5%	59.5%	0.5%	52.5%
0.1	576	0.38	98.3%	3.85***	1.59***	15.1%	91.3%	1.2%	77.8%	0.2%	74.5%
0.2	568	0.57	94.7%	3.12***	1.18***	13.6%	80.3%	1.1%	62.7%	0.0%	60.2%
0.3	577	0.71	92.7%	2.48***	0.88***	13.2%	62.6%	1.0%	46.8%	0.2%	44.0%
0.4	585	0.93	92.6%	1.87***	0.65***	12.3%	48.0%	1.5%	32.1%	0.3%	30.4%
0.5	579	1.14	92.2%	1.47***	0.52***	11.4%	38.0%	1.2%	20.7%	0.0%	19.3%
0.6	587	1.31	88.2%	1.04***	0.37***	10.6%	27.6%	1.7%	12.9%	0.2%	11.2%
0.7	581	1.42	84.5%	0.78***	0.31***	9.5%	21.0%	1.9%	8.4%	0.0%	6.4%
0.8	578	1.48	79.2%	0.70***	0.26***	9.2%	18.0%	2.4%	6.6%	0.2%	4.2%
0.9	577	1.43	74.9%	0.46***	0.19***	9.0%	17.0%	2.1%	4.2%	0.0%	2.6%
1.0	575	1.33	71.3%	0.21**	0.14***	9.6%	16.0%	2.1%	3.3%	0.0%	1.9%