Internet Appendix

CEO Compensation Incentives and Playing It Safe: Evidence from FAS 123R

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Preface

The results that we present in the paper represent the impact of treatment (above-median average pre-FAS 123R pro-forma option expense deflated by fully-diluted shares) on the outcomes of interest (imputed risk and value of firms' business segments). The treatment captures the greater extent to which earnings per share are likely to decrease after the removal of preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall pay due to FAS 123R requirement to recognize stock options at fair value. Thus, this reform amounts to a negative exogenous shock to expensing of stock options for treated firms in particular. Our difference-in-differences (DiD) results suggest that the option-expensing impact causes managers of treated firms to reduce imputed risk and value of business segments relative to counterparts at firms less affected by FAS 123R, implying that stock options create convexity in executive compensation and thus incentives for value-enhancing risk-taking behavior.

In this Internet Appendix to the paper, we present supplementary explanations and results, as itemized in the contents below.

Contents

Item IA

CEO Stock Option, Delta and Vega Valuation

CEO stock option grants are valued using the model of Black and Scholes (1973) for valuing European call options, but as modified by Merton (1974) to account for dividends. Estimation of the value of stock options in grant *K*, as well as the Black and Scholes (1973) delta and vega for a CEO stock option portfolio, follows Core and Guay (1999), Core, Guay, and Verrecchia (2003), and Hayes, Lemmon, and Qiu (2012):

$$Value_K = S_t e^{-dT_K} N(d_1) - X_K e^{-rT_K} N(d_2) \quad (1)$$

$$Delta = \sum_K N_K [e^{-dT_K} N(d_1)\, S_t \times 0.01] \quad (2)$$

$$Vega = \sum_K N_K [e^{-dT_K} N'(d_1)\, S_t \sqrt{T_K} \times 0.01] \quad (3)$$

where

S_t ≡ price of the underlying stock at time *t*

d ≡ expected dividend yield over option time-to-maturity, computed as the cash dividends paid in the fiscal year the grant is made divided by the year-end stock price

T_K ≡ time-to-maturity of stock options in grant *K*, which is 70% of option time-to-maturity. For current grants, T_K is the difference between the option expiration date reported in *Execucomp* and the grant date (assumed to be July 1 in a given year), expressed in years. For prior non-exercisable grants, T_K is the time-to-maturity of current grants minus 1 year, or 9 years if there are no current grants. For prior exercisable grants, T_K is equal to 3 years less than the time-to-maturity of prior non-exercisable grants, or 6 years if there are no current grants

$N(\,)$ ≡ function of the cumulative standard normal distribution

$$d_1 \equiv \frac{\ln(\frac{S_t}{X_K}) + (r - d + \frac{\sigma^2}{2}) T_K}{\sigma\sqrt{T_K}}$$

X_K ≡ exercise price of stock options in grant *K*. For current grants, X_K is the price reported in *Execucomp*. For prior grants, X_K is computed as the difference between the fiscal year-end underlying stock price and the ratio of realizable value over the number of non-exercisable or exercisable options

r ≡ risk-free rate over option time-to-maturity, using as a proxy treasury-bond rates corresponding to option time-to-maturity

$d_2 \equiv d_1 - \sigma\sqrt{T_K}$

$N_K \equiv$ number of stock options in grant K

$N'(\,) \equiv$ function of the standard normal density

$\sigma \equiv$ expected annual stock-return volatility, computed as the annualized standard deviation of monthly stock returns over the prior 3 years

Item IB.1

The Effect of FAS 123R on CEO Stock Option Compensation and Vega – Multivariate Regressions

In Section IV.A and Table 1 of the paper, we present DiD univariate results from tests of the validity of FAS 123R as a negative exogenous shock to CEO stock option compensation and vega. However, the concern is that by failing to account for controls and fixed effects, we could be distorting the implied extent to which the option-expensing impact of this reform causes treated firms to reduce CEO stock option compensation and vega relative to firms less affected by FAS 123R. Therefore, here in Item IB.1 and Table IB.1, we also present multivariate regression results from testing this validity. The controls and (industry and year) fixed effects are the same as those that we go on to use for modelling imputed risk of firms' business segments, all of which are also salient for modelling CEO stock option compensation and vega.

The DiD terms (*POST* × *Treated*) in columns (1) and (2) are negative and significant, indicating that the weight in CEO compensation and annual dollar value of stock options, respectively, decrease after the reform removes their preferential accounting treatment vis-à-vis other sources of convexity in the structure of overall pay by requiring firms to recognize stock options at fair value. Specifically, treated firms reduce CEO compensation attributable to stock options, on average, by 12.5 percentage points – a quarter of average pre-FAS 123R weight in CEO compensation (12.5% / 50.3%) – relative to less-affected firms. This equates to a reduction in annual dollar value of CEO stock option compensation by about 60% ($1 - \exp^{(-0.916)}$), from an average value of \$3.8 mln before the reform (1999–2004) to \$1.5 mln after the FAS 123R reform (2006–2011). The DiD terms in columns (3) and (4) are also significantly negative, indicating that current and total CEO vega for treated firms decline, on average, by \$7,258 and \$21,517, respectively, relative to firms less affected by FAS 123R. These declines equate to 19% and 13% in treated firms' average current and total CEO vega, respectively, for the pre-reform period.

These supplementary results therefore corroborate our univariate results and are consistent with evidence in prior studies (e.g., Bakke, Mahmudi, Fernando, and Salas (2016), Brown and Lee (2011), Carter, Lynch, and Tuna (2007), Hayes et al. (2012), and Mao and Zhang (2018)). Crucially, they confirm that FAS 123R is a valid shock to managerial risk-taking incentives and thus for establishing likely causality in the relationship between risk-taking incentives and risk-taking behavior and policies.

Table IB.1
The Effect of FAS 123R on CEO Stock Option Compensation and Vega – Multivariate Regressions

	% Option	*LN (Option)*	*Current Vega*	*Total Vega*
	1	2	3	4
POST × Treated	-0.125***	-0.916***	-7.258***	-21.517**
	(0.016)	(0.214)	(2.126)	(8.454)
Treated	0.128***	0.822***	7.443***	45.429***
	(0.014)	(0.159)	(1.912)	(7.900)
LN (Assets)	0.028***	0.605***	14.263***	69.927***
	(0.003)	(0.050)	(0.691)	(2.922)
LN (Firm Age)	-0.020**	0.025	0.856	3.800
	(0.008)	(0.106)	(1.094)	(5.010)
ROA	0.060***	0.227	-0.497	-2.898
	(0.016)	(0.238)	(3.622)	(13.783)
Market-to-Book Assets	0.004*	0.026	2.291***	7.534***
	(0.002)	(0.024)	(0.372)	(1.144)
Leverage	-0.140***	-1.559***	-40.041***	-167.649***
	(0.033)	(0.456)	(4.184)	(19.369)
Cash	0.048***	0.298*	-1.029	-9.981
	(0.016)	(0.180)	(2.025)	(7.247)
PP&E	-0.031	-0.387	-11.622***	-49.299***
	(0.025)	(0.329)	(3.264)	(15.029)
LN (CEO Age)	-0.134***	-1.370***	-7.070	-35.749*
	(0.034)	(0.470)	(4.379)	(20.951)
LN (CEO Tenure)	0.006	-0.141**	0.851	17.327***
	(0.005)	(0.066)	(0.649)	(3.010)
Constant	0.619***	5.720***	-62.143***	-332.930***
	(0.137)	(1.985)	(18.136)	(86.814)
Observations	8,191	8,191	8,191	8,191
Adjusted R-squared	0.238	0.133	0.307	0.411

This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on CEO stock option compensation and vega. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST × Treated* is the DiD term of interest. Firm and CEO based independent variables are lagged 1 year with respect to the CEO stock option compensation and vega related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.2

Summary Statistics for the Full Sample and Pre- and Post-FAS 123R-Reform Periods

In Section III.B of the paper, we explain the variables for CEO compensation, managerial risk-taking and firm value, and other firm and CEO characteristics. To enumerate these variables, here in Item IB.2 and Table IB.2, we present summary statistics for the full sample (Panel A) and pre- and post-FAS 123R-reform periods (Panel B).

The full-sample summary statistics show that mean (median) total CEO compensation is $5.0 mln ($3.3 mln). Stock option compensation is the largest component of overall CEO pay in both absolute and relative terms based on means and medians. On average, CEO compensation includes $2.1 mln in annual dollar value of stock options, representing 31.2% of overall pay. Average annual dollar values of the other components of CEO compensation are noticeably smaller, ranging from $0.6 mln to $0.8 mln. Expressed as a percentage of overall CEO pay, basic salary is the second largest component on average (30.3%), followed by bonus pay (18.9%), restricted stock (12.3%), and long-term incentive awards (LTIAs) (7.2%). In addition, current (total) vega indicates that CEO option-portfolio value changes, on average, by $26,290 ($126,910) for a 1% change in annualized volatility of stock returns, whilst current (total) delta indicates that CEO equity-portfolio value changes, on average, by $50,470 ($601,990) for a 1% change in stock price. These CEO compensation characteristics are comparable to those reported by Hayes et al. (2012). With respect to the main outcome variables, imputed total risk, systematic risk, idiosyncratic risk and value (Q) of our sample firms' business segments average 35.1%, 13.8%, 31.8% and 2.4, respectively. Lastly, the other firm and CEO characteristics are also similar to those reported in other studies using comparable datasets (e.g., Bakke et al. (2016), and Hayes et al. (2012)). On average, our sample firms have $3.5 bln in book assets, market-to-book value of assets of 2.3, leverage of 26.0%, and hold 24.0% of their assets in cash. Average age and tenure of their CEOs are 54.7 and 7.3 years, respectively.

Turning to Panel B, although mean and median total CEO compensation remain relatively stable across the pre- and post-FAS 123R-reform periods, there are noticeable changes in the structure of overall pay. In particular, stock option compensation decreases by more than half in both absolute and relative terms, from a pre-FAS 123R average annual dollar value of $2.8 mln (41.6% of overall CEO pay) to a post-FAS 123R-reform value of $1.3 mln (20.4% of overall CEO pay). Current and total CEO vega also decline significantly. However, consistent with prior studies (e.g., Hayes et al. (2012), Mao and Zhang (2018), and Vo and Canil (2019)), summary statistics for the pre- and post-FAS 123R-reform periods also show significant increases in average percentages of CEO compensation attributable to bonus pay (16.7% before and 21.1% after), restricted stock (5.4% before and 19.4% after), and LTIAs (3.9% before and 10.5% after). This suggests that firms have a tendency following the FAS 123R reform to substitute stock options with other forms of CEO compensation. With respect to the main outcome variables, imputed total risk of

our sample firms' business segments decreases significantly, from a pre-FAS 123R average level of 38.5% to a post-FAS 123R-reform level of 32.0%. Idiosyncratic risk experiences a larger decline (from 35.2% to 28.6%) than systematic risk (from 14.6% to 13.3%). In addition, imputed value of our sample firms' business segments decreases by a significant 0.6 points based on average levels before and after the FAS 123R reform.

Table IB.2
Summary Statistics for the Full Sample and Pre- and Post-FAS 123R-Reform Periods

Panel A: Full sample

	Mean	Standard deviation	25th percentile	Median	75th percentile
	1	2	3	4	5
CEO compensation					
Total Compensation ($000)	4988.90	4922.99	1458.95	3253.79	6938.51
Salary ($000)	730.54	311.66	500.00	699.33	933.53
Bonus ($000)	781.04	867.96	164.27	570.29	995.24
Option ($000)	2061.37	3341.01	0.00	752.47	2212.75
Restricted Stock ($000)	799.13	1479.32	0.00	0.00	1101.70
LTIAs ($000)	616.82	1552.08	0.00	0.00	0.00
% Salary	30.34	25.97	11.36	21.22	40.34
% Bonus	18.86	17.38	6.04	14.87	27.34
% Option	31.17	29.76	0.00	25.62	54.79
% Restricted Stock	12.28	18.34	0.00	0.00	21.93
% LTIAs	7.18	14.76	0.00	0.00	0.00
Current Vega ($000)	26.29	39.90	0.00	9.99	31.51
Total Vega ($000)	126.91	164.70	18.98	62.18	156.30
Current Delta ($000)	50.47	72.07	4.65	23.91	60.79
Total Delta ($000)	601.99	845.62	106.06	280.39	682.18
Managerial risk-taking and firm value					
Total Risk (%)	35.07	15.30	23.88	31.37	42.25
Systematic Risk (%)	13.84	7.90	7.86	12.22	18.13
Idiosyncratic Risk (%)	31.76	13.90	21.62	28.40	38.09
Imputed Q	2.40	1.18	1.58	2.17	2.89
Other firm and CEO characteristics					
Assets ($MLN)	3,510.93	8,434.48	383.21	926.04	2,628.12
Firm Age	20.45	14.38	9.00	16.00	29.00
ROA	0.04	0.23	0.01	0.06	0.11
Market-to-Book Assets	2.29	2.50	1.21	1.68	2.56
Capex	0.07	0.08	0.02	0.04	0.08
R&D	0.05	0.10	0.00	0.00	0.07
Sales Growth	0.15	0.46	-0.01	0.09	0.21
Leverage	0.26	0.19	0.11	0.22	0.37
Cash	0.24	0.34	0.03	0.12	0.33
PP&E	0.30	0.27	0.10	0.21	0.41
CEO Age	54.71	7.68	49.00	55.00	60.00
CEO Tenure	7.33	7.35	2.00	5.00	10.00

(*continued on next page*)

Table IB.2 (*continued*)

Panel B: Pre- and post-FAS 123R-reform periods				
	Pre-FAS 123R		Post-FAS 123R-reform	
	Mean	Median	Mean	Median
	1	2	3	4
CEO compensation				
Total Compensation ($000)	4960.58	2955.11	5018.03	3538.67***
Salary ($000)	718.40	670.45	743.03***	714.46***
Bonus ($000)	666.65	420.22	898.69***	704.35***
Option ($000)	2839.20	1265.96	1261.39***	398.54***
Restricted Stock ($000)	381.56	0.00	1228.59***	552.29***
LTIAs ($000)	354.76	0.00	886.34***	0.00***
% Salary	32.17	22.60	28.46***	20.21***
% Bonus	16.73	12.30	21.05***	17.25***
% Option	41.61	42.19	20.43***	14.49***
% Restricted Stock	5.40	0.00	19.36***	16.02***
% LTIAs	3.94	0.00	10.5***	0.00***
Current Vega ($000)	31.39	12.44	21.05***	7.03***
Total Vega ($000)	137.35	64.36	116.18***	59.45***
Current Delta ($000)	54.11	22.93	46.72***	24.77
Total Delta ($000)	684.11	310.41	517.53***	249.51***
Managerial risk-taking and firm value				
Total Risk (%)	38.45	34.50	31.96***	28.96***
Systematic Risk (%)	14.64	13.15	13.29***	10.93***
Idiosyncratic Risk (%)	35.19	31.41	28.59***	26.09***
Imputed Q	2.68	2.35	2.12***	1.99***
Other firm and CEO characteristics				
Assets ($MLN)	3,084.29	859.08	3949.72***	1036.88***
Firm Age	18.26	13.00	22.71***	17.00***
ROA	0.03	0.06	0.05***	0.06
Market-to-Book Assets	2.57	1.73	2.00***	1.62***
Capex	0.08	0.05	0.06***	0.03***
R&D	0.06	0.00	0.04***	0.01
Sales Growth	0.19	0.10	0.12***	0.08***
Leverage	0.14	0.09	0.13***	0.22***
Cash	0.25	0.11	0.22***	0.14***
PP&E	0.33	0.24	0.27***	0.18***
CEO Age	54.30	54.00	55.13***	55.00***
CEO Tenure	7.26	5.00	7.39	5.00**

This table presents summary statistics for CEO compensation, managerial risk-taking and firm value, and other firm and CEO characteristics for the full sample and pre- and post-FAS 123R-reform periods. The full sample covers 1999–2011, but excluding 2005 when FAS 123R came into effect by requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. Summary statistics for the full sample are presented in Panel A. Summary statistics for the pre- and post-FAS 123R-reform periods are presented in Panel B. The number of firm-year observations is 8,191 for all variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. *, ** and *** denote statistical significance of differences in means and medians for the pre- and post-FAS 123R-reform periods at the 10%, 5% and 1% level, respectively.

Item IB.3

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for CEO Delta

In Section IV.B and Table 2, and Section IV.C and Table 3, of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments, respectively, without controlling for CEO delta. However, the concern is that by failing to account for changes in CEO pay-for-performance sensitivity due to changes in the structure of overall pay, we could be distorting the implied extent to which the negative option-expensing impact of this reform causes managers of treated firms to reduce imputed risk and value of business segments relative to counterparts at firms less affected by FAS 123R. Therefore, here in Item IB.3 and Table IB.3, we also present results from alternatively independently including controls for current and total CEO delta.

Consistent with Low (2009), these supplementary results show a negative relationship between current and total CEO delta and imputed risk of firms' business segments, but crucially without altering the negative DiD terms. The negative DiD terms for imputed value of firms' business segments are also robust to controlling for current and total CEO delta.

Table IB.3
The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for CEO Delta

	Total Risk		*Systematic Risk*		*Idiosyncratic Risk*		*Imputed Q*	
	1	2	3	4	5	6	7	8
POST × Treated	-8.167***	-8.074***	-4.400***	-4.391***	-6.888***	-6.794***	-0.301***	-0.324***
	(0.838)	(0.839)	(0.393)	(0.394)	(0.755)	(0.756)	(0.058)	(0.062)
Treated	4.439***	4.347***	2.512***	2.510***	3.739***	3.642***	0.193***	0.204***
	(0.673)	(0.671)	(0.304)	(0.304)	(0.613)	(0.610)	(0.059)	(0.065)
LN (Current Delta)	-0.303***		-0.039		-0.304***		0.032***	
	(0.103)		(0.048)		(0.095)		(0.009)	
LN (Total Delta)		-0.411***		-0.160**		-0.376***		0.051***
		(0.157)		(0.072)		(0.142)		(0.012)
LN (Assets)	-0.271	-0.187	-0.076	0.004	-0.255	-0.195	-0.013	-0.027*
	(0.174)	(0.189)	(0.075)	(0.083)	(0.159)	(0.173)	(0.014)	(0.015)
LN (Firm Age)	-0.336	-0.432	-0.018	-0.056	-0.364	-0.453	-0.019	-0.006
	(0.356)	(0.353)	(0.156)	(0.155)	(0.329)	(0.327)	(0.031)	(0.035)
Current ROA							0.298***	0.310***
							(0.084)	(0.100)
Lagged ROA	-2.965***	-2.954***	-1.603***	-1.570***	-2.477***	-2.477***	0.267***	0.285***
	(0.729)	(0.710)	(0.370)	(0.364)	(0.652)	(0.634)	(0.057)	(0.068)
Market-to-Book Assets	0.447***	0.477***	0.178***	0.194***	0.419***	0.444***		
	(0.077)	(0.078)	(0.041)	(0.042)	(0.069)	(0.070)		
Capex							-0.033	-0.188
							(0.217)	(0.238)
R&D							1.781***	2.026***
							(0.267)	(0.335)
Sales Growth							-0.013	-0.023
							(0.030)	(0.033)
Leverage	6.579***	5.956***	2.538***	2.211***	5.791***	5.250***	-0.485***	-0.424***
	(1.995)	(2.007)	(0.818)	(0.830)	(1.830)	(1.843)	(0.114)	(0.121)
Cash	2.157***	2.130***	1.462***	1.477***	1.773***	1.739***	0.148**	0.150**
	(0.644)	(0.645)	(0.318)	(0.316)	(0.590)	(0.591)	(0.063)	(0.073)
PP&E	0.275	0.362	0.399	0.433	0.065	0.144	-0.178*	-0.142
	(1.199)	(1.202)	(0.528)	(0.528)	(1.101)	(1.105)	(0.104)	(0.111)
LN (CEO Age)	-2.327	-2.177	-1.244*	-1.243*	-2.035	-1.878	-0.012	0.008
	(1.491)	(1.486)	(0.681)	(0.676)	(1.352)	(1.349)	(0.126)	(0.139)
LN (CEO Tenure)	0.254	0.533**	0.200*	0.298***	0.179	0.439**	0.023	-0.014
	(0.225)	(0.243)	(0.102)	(0.110)	(0.204)	(0.220)	(0.018)	(0.023)
Constant	56.274***	56.279***	20.260***	20.340***	52.148***	52.126***	2.301***	2.230***
	(6.650)	(6.656)	(2.945)	(2.942)	(6.031)	(6.039)	(0.505)	(0.556)
Observations	8,079	8,079	8,079	8,079	8,079	8,079	8,079	8,079
Adjusted R-squared	0.471	0.471	0.492	0.492	0.458	0.458	0.438	0.418

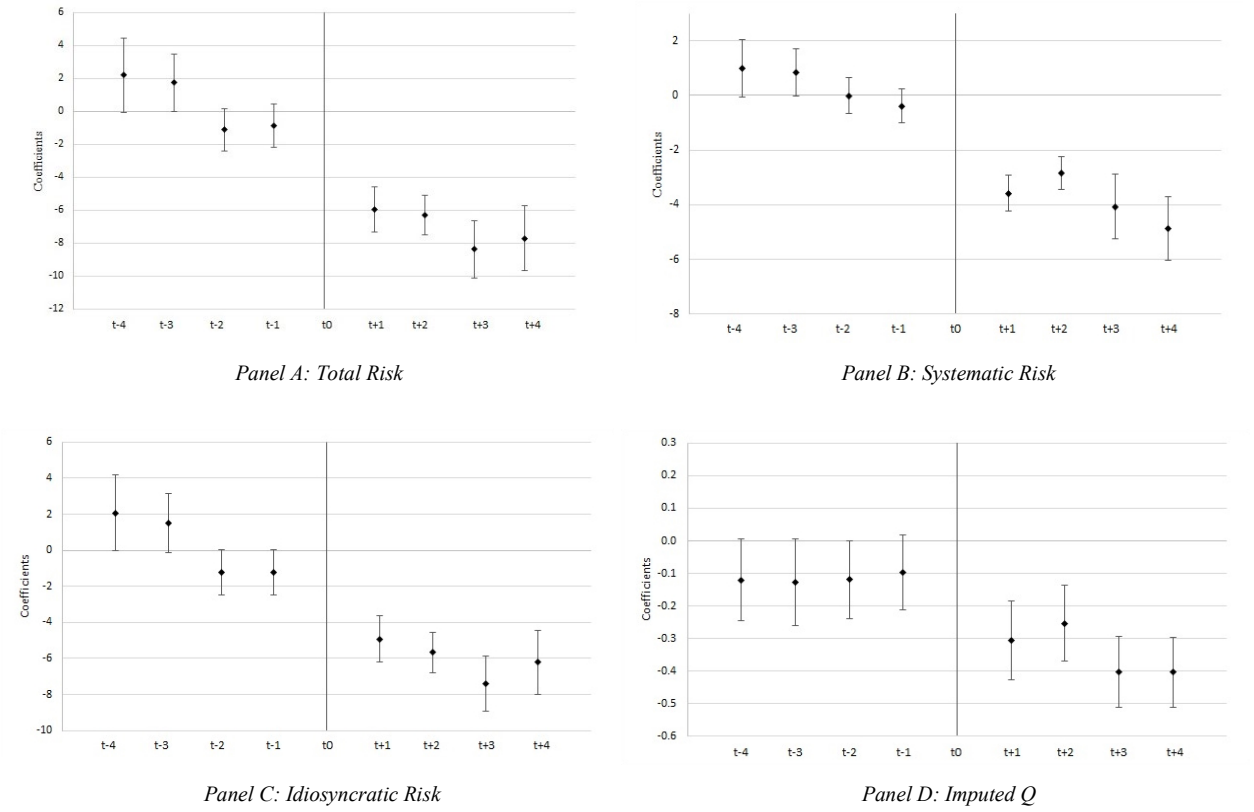
This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on managerial risk-taking and firm value (Q) after accounting for CEO delta by alternatively independently including *Current Delta* and *Total Delta*. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST* × *Treated* is the DiD term of interest. Firm and CEO based independent variables are lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.4

Precise Timing of the Effect of FAS 123R on Managerial Risk-Taking and Firm Value

In Section IV.D.1 and Table 4 of the paper, we present results from various tests of likely validity of the assumption underpinning our DiD analysis that treated firms and firms less affected by FAS 123R have parallel trends in imputed risk and value of business segments before the reform. One of these tests involves a dynamic multivariate regression in which we replace a single DiD term with terms for individual immediate years and groups of more distant years surrounding the FAS 123R reform. However, this does not identify the precise timing of the effect of FAS 123R on imputed risk and value of firms' business segments. Therefore, here in Item IB.4 and Figure IB.4, we also follow Deng, Mao, and Xia (2021) and Gopalan, Gormley, and Kalda (2021) in plotting results from a dynamic multivariate regression in which the plotted DiD terms track four individual years either side of the reform (*t0*).

The span of DiD terms for the pre-FAS 123R period (*t–4* to *t–1*) are insignificant in each panel. Hence, absent the reform, it is plausible that treated and less-affected firms can be expected to have continued behaving similarly with regard to imputed total risk (Panel A), systematic risk (Panel B), idiosyncratic risk (Panel C) and value (Panel D) of business segments. These supplementary figures therefore corroborate our other tests of likely validity of the parallel pre-trends assumption. In contrast, the span of DiD terms for the post-FAS 123R period (*t+1* to *t+4*) are significantly negative, implying that the negative option-expensing impact of this reform causes managers of treated firms to reduce imputed risk and value of business segments relative to counterparts at firms less affected by FAS 123R and that this behavior persists for up to 4 years.



Panel A: Total Risk

Panel B: Systematic Risk

Panel C: Idiosyncratic Risk

Panel D: Imputed Q

Figure IB.4
Precise Timing of the Effect of FAS 123R on Managerial Risk-Taking and Firm Value

This figure presents difference-in-differences (DiD) multivariate regression results for precise timing of the effect of FAS 123R on managerial risk-taking and firm value (Q) by plotting coefficients for DiD terms tracking four individual years either side of the reform, replacing primary focus on the coefficient for a single DiD term (*POST* × *Treated*) elsewhere in the paper. The sample covers 1999–2011, but excluding 2005 (*t0*) when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is replaced with firm-year dummies before (*t-4* to *t-1*) and after (*t+1* to *t+4*) FAS 123R came into effect. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. Firm and CEO based independent variables are the same as primarily elsewhere in the paper and similarly lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC dummies. Vertical bars through the coefficients represent 90% confidence intervals corrected for heteroscedasticity and clustering at the firm level.

Item IB.5

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for Performance-Vesting Grants – Full Multivariate Regression Results

In Section IV.D.5 and Table 8 of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments after accounting for firm-year observations with performance-vesting grants. However, these results do not show the controls. Therefore, here in Item IB.5 and Table IB.5, we also present the results showing the controls. These supplementary full multivariate regression results are after excluding the relevant observations (Panel A) and independently controlling for them by way of the performance-vesting dummy (Panel B).

Table IB.5

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for Performance-Vesting Grants – Full Multivariate Regression Results

Panel A: Excluding firm-years with performance-vesting grants				
	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated	-7.845***	-4.507***	-6.527***	-0.393***
	(0.962)	(0.455)	(0.864)	(0.065)
Treated	3.874***	2.392***	3.188***	0.251***
	(0.727)	(0.328)	(0.663)	(0.061)
LN (Assets)	-0.233	-0.022	-0.234	0.008
	(0.202)	(0.087)	(0.186)	(0.015)
LN (Firm Age)	-0.071	0.059	-0.110	-0.013
	(0.402)	(0.179)	(0.370)	(0.034)
Current ROA				0.240***
				(0.066)
Lagged ROA	-2.776***	-1.479***	-2.307***	0.226***
	(0.690)	(0.365)	(0.614)	(0.055)
Market-to-Book Assets	0.377***	0.157***	0.353***	
	(0.073)	(0.038)	(0.067)	
Capex				-0.120
				(0.245)
R&D				1.982***
				(0.290)
Sales Growth				-0.029
				(0.032)
Leverage	7.058***	2.649***	6.355***	-0.551***
	(2.160)	(0.894)	(1.997)	(0.127)
Cash	1.976***	1.145***	1.724***	0.092
	(0.666)	(0.325)	(0.613)	(0.070)
PP&E	0.052	0.020	-0.051	-0.091
	(1.349)	(0.604)	(1.237)	(0.114)
LN (CEO Age)	-4.269**	-1.996**	-3.771**	-0.124
	(1.755)	(0.819)	(1.581)	(0.136)
LN (CEO Tenure)	0.393	0.188	0.328	0.041**
	(0.270)	(0.119)	(0.245)	(0.019)
Constant	61.398***	22.110***	56.729***	2.629***
	(7.636)	(3.424)	(6.900)	(0.557)
Observations	6,052	6,052	6,052	6,052
Adjusted R-squared	0.476	0.484	0.468	0.450

(*continued on next page*)

Table IB.5 (*continued*)

Panel B: Controlling for firm-years with performance-vesting grants				
	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated	-8.029***	-4.357***	-6.764***	-0.317***
	(0.833)	(0.391)	(0.750)	(0.059)
Treated	4.262***	2.474***	3.569***	0.213***
	(0.665)	(0.302)	(0.605)	(0.059)
Performance Vesting	-1.420***	-0.773***	-1.172***	0.044
	(0.485)	(0.217)	(0.444)	(0.039)
LN (Assets)	-0.219	0.016	-0.239	-0.000
	(0.176)	(0.076)	(0.162)	(0.013)
LN (Firm Age)	-0.346	-0.008	-0.377	-0.016
	(0.352)	(0.154)	(0.326)	(0.031)
Current ROA				0.306***
				(0.074)
Lagged ROA	-2.895***	-1.541***	-2.419***	0.271***
	(0.702)	(0.360)	(0.627)	(0.058)
Market-to-Book Assets	0.426***	0.178***	0.395***	
	(0.072)	(0.040)	(0.065)	
Capex				-0.058
				(0.219)
R&D				1.808***
				(0.269)
Sales Growth				-0.009
				(0.029)
Leverage	6.510***	2.266***	5.855***	-0.519***
	(1.972)	(0.802)	(1.812)	(0.112)
Cash	2.072***	1.350***	1.739***	0.148**
	(0.629)	(0.310)	(0.577)	(0.063)
PP&E	0.000	0.304	-0.187	-0.182*
	(1.195)	(0.526)	(1.098)	(0.102)
LN (CEO Age)	-2.074	-1.183*	-1.804	-0.060
	(1.487)	(0.679)	(1.349)	(0.123)
LN (CEO Tenure)	0.239	0.186*	0.169	0.022
	(0.223)	(0.100)	(0.202)	(0.018)
Constant	54.816***	19.562***	50.939***	2.458***
	(6.728)	(2.997)	(6.090)	(0.498)
Observations	8,191	8,191	8,191	8,191
Adjusted R-squared	0.470	0.491	0.457	0.437

This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on managerial risk-taking and firm value (Q) after accounting for performance-vesting grants. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST × Treated* is the DiD term of interest. Results from excluding firm-years with performance-vesting grants of equity (according to *Incentive Lab*), reducing the number of firm-year observations to 6,052, are presented in Panel A. Results from independently including a dummy variable, *Performance Vesting*, equal to one for firm-years with performance-vesting grants of equity and zero for other firm-years are presented in Panel B. Firm and CEO based independent variables are lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.6

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for Cross-sectional Changes in CEO Compensation Attributable to Long-Term Incentive Awards and Bonus Pay

In Section IV.D.5 and Table 8 of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments after controlling for performance-vesting grants independently of the variables that give rise to the DiD terms. However, in removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall pay by requiring firms to recognize stock options at fair value, this reform possibly makes these sources more substitutable and particularly for treated firms. Indeed, in unreported multivariate regression results, we find that treated firms increase CEO compensation attributable to LTIAs, which are closely related to performance-vesting grants (see Hayes et al. (2012)), and bonus pay in the structure of overall pay relative to firms less affected by FAS 123R. Hence, the concern is that there could be cross-sectional variation in other sources of convexity in CEO compensation that runs counter to the negative DiD terms. Therefore, here in Item IB.6 and Table IB.6, we also present results from interacting controls for changes in CEO compensation attributable to these components in the structure of overall pay with the variables that give rise to the DiD terms.

Specifically, similar to Hayes et al. (2012), we create dummies that equal one for firms with median CEO compensation attributable to LTIAs and bonus pay in the structure of overall pay in the post-reform period greater than in the pre-reform period, and zero otherwise. We then alternatively interact these dummies (*Increased % LTIAs* and *Increased % Bonus*) with the variables (*POST* and *Treated*) that give rise to the DiD terms. The results show that all triple-interaction terms are insignificant for LTIAs (Panel A) and significantly negative for bonus pay (Panel B) and thus that cross-sectional variation in other sources of convexity in CEO compensation does not run counter to the negative DiD terms. These supplementary results therefore corroborate our results for performance-vesting grants and are consistent with the notion that stock options exemplify convexity in executive compensation (see Brisley (2006)).

Table IB.6

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Accounting for Cross-sectional Changes in CEO Compensation Attributable to Long-Term Incentive Awards and Bonus Pay

Panel A: Controlling for cross-sectional changes in CEO compensation attributable to long-term incentive awards				
	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated × Increased % LTIAs	0.001	0.598	-0.258	-0.041
	(1.171)	(0.585)	(1.039)	(0.083)
POST × Treated	-8.094***	-4.693***	-6.688***	-0.295***
	(1.055)	(0.509)	(0.942)	(0.071)
Treated	4.191***	2.681***	3.394***	0.197***
	(0.892)	(0.418)	(0.807)	(0.075)
Treated × Increased % LTIAs	0.132	-0.381	0.321	0.029
	(1.033)	(0.492)	(0.933)	(0.086)
Increased % LTIAs	-0.411	-0.168	-0.408	0.005
	(0.645)	(0.258)	(0.600)	(0.047)
LN (Assets)	-0.387**	-0.075	-0.378**	0.005
	(0.166)	(0.071)	(0.153)	(0.013)
LN (Firm Age)	-0.372	-0.013	-0.403	-0.016
	(0.352)	(0.154)	(0.326)	(0.031)
Current ROA				0.310***
				(0.075)
Lagged ROA	-2.948***	-1.595***	-2.452***	0.275***
	(0.702)	(0.361)	(0.625)	(0.058)
Market-to-Book Assets	0.408***	0.169***	0.380***	
	(0.073)	(0.040)	(0.066)	
Capex				-0.060
				(0.219)
R&D				1.821***
				(0.269)
Sales Growth				-0.009
				(0.029)
Leverage	6.725***	2.384***	6.026***	-0.527***
	(1.978)	(0.807)	(1.815)	(0.112)
Cash	2.097***	1.367***	1.756***	0.147**
	(0.633)	(0.312)	(0.580)	(0.063)
PP&E	0.114	0.371	-0.094	-0.185*
	(1.195)	(0.526)	(1.098)	(0.102)
LN (CEO Age)	-2.096	-1.183*	-1.824	-0.060
	(1.493)	(0.686)	(1.352)	(0.124)
LN (CEO Tenure)	0.273	0.201*	0.197	0.021
	(0.225)	(0.102)	(0.203)	(0.018)
Constant	56.021***	20.086***	52.003***	2.431***
	(6.659)	(2.964)	(6.031)	(0.502)
Observations	8,191	8,191	8,191	8,191
Adjusted R-squared	0.469	0.490	0.456	0.437

(*continued on next page*)

Table IB.6 (*continued*)

Panel B: Controlling for cross-sectional changes in CEO compensation attributable to bonus pay				
	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated × Increased % Bonus	-3.615***	-1.745**	-3.140***	-0.152
	(1.348)	(0.691)	(1.183)	(0.096)
POST × Treated	-5.262***	-3.027***	-4.357***	-0.198**
	(1.316)	(0.668)	(1.158)	(0.094)
Treated	1.806	1.380***	1.381	0.125
	(1.125)	(0.522)	(1.019)	(0.097)
Treated × Increased % Bonus	3.228***	1.434**	2.876***	0.115
	(1.192)	(0.557)	(1.081)	(0.099)
Increased % Bonus	-0.219	-0.020	-0.218	-0.066
	(0.675)	(0.276)	(0.625)	(0.054)
LN (Assets)	-0.412**	-0.088	-0.400***	0.004
	(0.164)	(0.070)	(0.152)	(0.013)
LN (Firm Age)	-0.349	-0.010	-0.379	-0.016
	(0.350)	(0.154)	(0.324)	(0.031)
Current ROA				0.310***
				(0.074)
Lagged ROA	-2.879***	-1.536***	-2.403***	0.274***
	(0.698)	(0.359)	(0.623)	(0.058)
Market-to-Book Assets	0.401***	0.165***	0.375***	
	(0.073)	(0.040)	(0.066)	
Capex				-0.044
				(0.219)
R&D				1.823***
				(0.269)
Sales Growth				-0.008
				(0.029)
Leverage	6.823***	2.418***	6.120***	-0.514***
	(1.989)	(0.811)	(1.827)	(0.113)
Cash	2.106***	1.369***	1.766***	0.145**
	(0.631)	(0.312)	(0.579)	(0.064)
PP&E	0.028	0.326	-0.169	-0.193*
	(1.187)	(0.522)	(1.092)	(0.102)
LN (CEO Age)	-1.926	-1.111	-1.672	-0.060
	(1.489)	(0.682)	(1.350)	(0.123)
LN (CEO Tenure)	0.262	0.201**	0.186	0.020
	(0.223)	(0.101)	(0.202)	(0.018)
Constant	55.186***	19.737***	51.221***	2.486***
	(6.668)	(2.972)	(6.044)	(0.492)
Observations	8,191	8,191	8,191	8,191
Adjusted R-squared	0.471	0.491	0.458	0.437

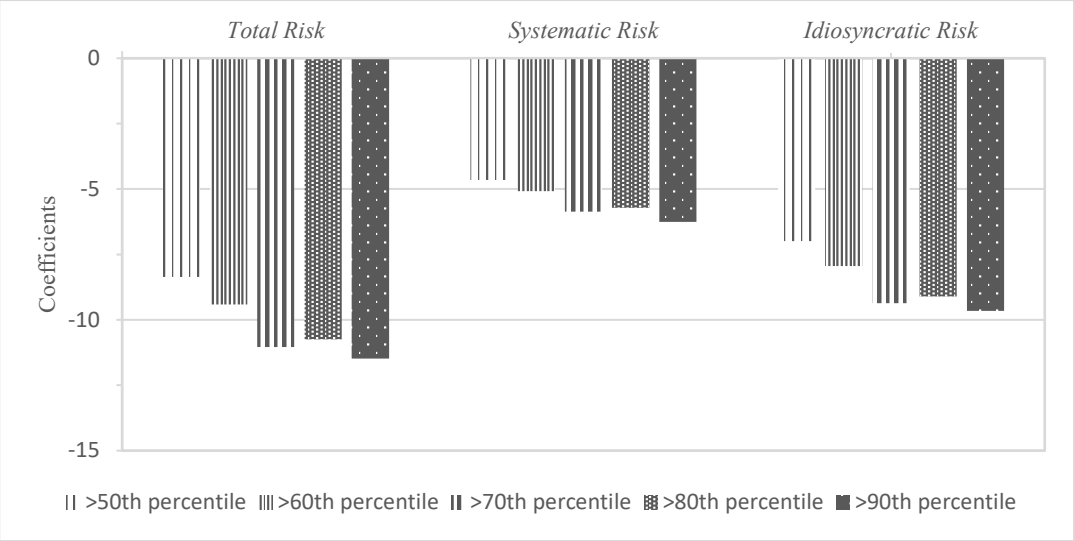
This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on managerial risk-taking and firm value (Q) after accounting for cross-sectional changes in CEO compensation attributable to long-term incentive awards (LTIAs) and bonus pay. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST × Treated* is the DiD term of interest. Results from interacting a dummy variable, *Increased % LTIAs* (*Increased % Bonus*), equal to one for firms with median *% LTIAs* (*% Bonus*) in the post-FAS 123R-reform period greater than in the pre-FAS 123R period and zero for other firms, creating a triple-interaction (cross-sectional) part of the DiD term, are presented in Panel A (Panel B). Firm and CEO based independent variables are lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.7

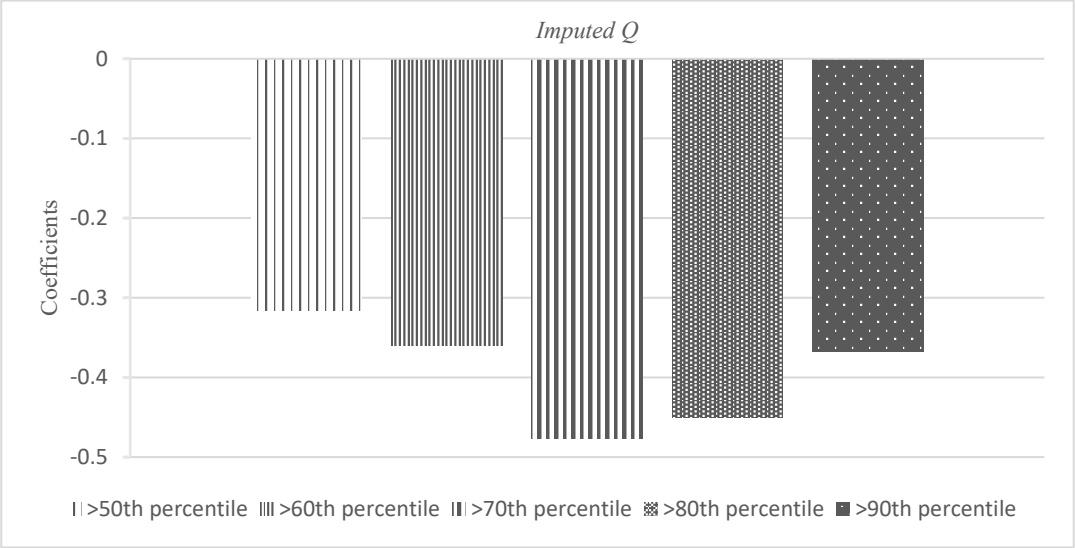
Sensitivity to the Effect of FAS 123R on Managerial Risk-Taking and Firm Value

In Section IV.B and Table 2, and Section IV.C and Table 3, of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments, respectively, after identifying treated firms as having above-median average pro-forma option expense deflated by fully-diluted shares for the pre-reform period. However, these results do not account for firms' sensitivity to the negative exogenous shock to expensing of stock options after FAS 123R removes preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall pay by requiring firms to recognize stock options at fair value. Therefore, here in Item IB.7 and Figure IB.7, we also consecutively raise the identification threshold for treated firms to above 60th, 70th, 80th and 90th percentiles and chart the DiD terms.

The charts show an almost monotonically negative effect on imputed risk (Panel A) and value (Panel B) of treated firms' business segments relative to firms less affected by this reform as the threshold is raised. In addition, the incremental effects in raising the threshold from above median to above 90th percentile are economically significant. For instance, the suggestion is that this causes managers of treated firms to reduce imputed total risk of business segments by a further 300 basis points (8.4% – 11.5%) relative to counterparts at less-affected firms. These supplementary figures therefore suggest that sensitivity to the effect of FAS 123R on value-enhancing managerial risk-taking behavior depends on the prior extent of firms' implied option expense.



Panel A: Managerial risk-taking



Panel B: Firm value

Figure IB.7
Sensitivity to the Effect of FAS 123R on Managerial Risk-Taking and Firm Value

This figure presents difference-in-differences (DiD) multivariate regression results for sensitivity to the effect of FAS 123R on managerial risk-taking and firm value (Q) by charting coefficients for the DiD term of interest (*POST* × *Treated*) after consecutively raising the identification threshold for treated (control) firms to above (below) the 50th, 60th, 70th, 80th and 90th percentile of *Option Expensing Impact*. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firm and CEO based independent variables are the same as primarily elsewhere in the paper and similarly lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies.

Item IB.8

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Excluding Voluntary Adopters

In Section IV.B and Table 2, and Section IV.C and Table 3, of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments, respectively, from using all sample firms. However, the concern is that because debate around preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall pay occurred years before this reform (see Aboody, Barth, and Kasznik (2004)), our sample includes firms that started recognizing option expense at fair value in advance of being required to do so by FAS 123R. Not excluding these voluntary adopters could be problematic were they to differ from other firms along unobservable dimensions, potentially distorting the implied extent to which the negative option-expensing impact of the reform causes managers of treated firms to reduce imputed risk and value of business segments relative to counterparts at firms less affected by FAS 123R. Therefore, here in Item IB.8 and Table IB.8, we also present results from excluding voluntary adopters. According to a report by McConnell, Pegg, Mott, and Senyek (December 16, 2004), our sample includes 28 voluntary adopters, reducing the number of firm-year observations to 7,994. These supplementary results show that the negative DiD terms consistently hold and thus that they are not explained by confounding effects associated with voluntarily adopters.

Table IB.8
The Effect of FAS 123R on Managerial Risk-Taking and Firm Value after Excluding Voluntary Adopters

	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated	-8.284***	-4.622***	-6.925***	-0.339***
	(0.879)	(0.424)	(0.793)	(0.058)
Treated	4.492***	2.664***	3.713***	0.240***
	(0.710)	(0.321)	(0.655)	(0.057)
LN (Assets)	-0.418**	-0.098	-0.403**	-0.003
	(0.182)	(0.079)	(0.169)	(0.012)
LN (Firm Age)	-0.357	-0.048	-0.368	-0.009
	(0.370)	(0.165)	(0.344)	(0.029)
Current ROA				0.280***
				(0.067)
Lagged ROA	-2.884***	-1.544***	-2.412***	0.245***
	(0.761)	(0.401)	(0.674)	(0.053)
Market-to-Book Assets	0.472***	0.211***	0.428***	
	(0.087)	(0.048)	(0.076)	
Capex				-0.146
				(0.216)
R&D				1.760***
				(0.267)
Sales Growth				-0.008
				(0.029)
Leverage	8.062***	3.275***	7.207***	-0.478***
	(2.120)	(0.903)	(1.962)	(0.111)
Cash	1.961***	1.336***	1.627***	0.143**
	(0.660)	(0.333)	(0.607)	(0.063)
PP&E	-0.007	0.430	-0.234	-0.124
	(1.253)	(0.573)	(1.151)	(0.099)
LN (CEO Age)	-1.716	-1.006	-1.460	-0.097
	(1.578)	(0.732)	(1.442)	(0.121)
LN (CEO Tenure)	0.277	0.192*	0.209	0.029*
	(0.239)	(0.112)	(0.218)	(0.017)
Constant	54.132***	19.132***	50.206***	2.567***
	(6.927)	(3.123)	(6.319)	(0.495)
Observations	7,994	7,994	7,994	7,994
Adjusted R-squared	0.445	0.461	0.430	0.442

This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on managerial risk-taking and firm value (Q) after excluding firms that started recognizing option expense at fair value in advance of being required to do so by this reform (voluntary adopters). The sample covers 1999–2011, but excluding 2005 when FAS 123R came into effect, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. According to a report by McConnell, Pegg, Mott, and Senyek (December 16, 2004), there are 28 voluntary adopters in the sample, reducing the number of firm-year observations to 7,994. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST × Treated* is the DiD term of interest. Firm and CEO based independent variables are lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.9

The Effect of FAS 123R on Managerial Risk-Taking and Firm Value Using Alternative Pre- and Post-Reform Periods

In Section IV.B and Table 2, and Section IV.C and Table 3, of the paper, we present DiD multivariate regression results for the effect of FAS 123R on imputed risk and value of firms' business segments, respectively, from using full-sample periods either side of the reform. However, the concern is that by not excluding years of fundamental change in economic situation that could also cause shifts in managerial risk-taking and compensation policy, we could be distorting the implied extent to which the negative option-expensing impact of FAS 123R causes managers of treated firms to reduce imputed risk and value of business segments relative to counterparts at firms less affected by this reform. For instance, in the aftermath of the global financial crisis of 2008, firm risk greatly increased and firm values were negatively affected by overall market volatility (see Schwert (2011)). Furthermore, compensation policies associated with excessive risk-taking are blamed as having contributed to this market crash (see Murphy (2013)) and for triggering temporary overhauls in compensation practices by inducing firms to cut incentive pay (see Vo and Canil (2019)). Therefore, here in Item IB.9 and Table IB.9, we also present results from using alternative-sample periods either side of the FAS 123R reform.

Specifically, we follow Hayes et al. (2012) and Mao and Zhang (2018) in defining an alternative pre-FAS 123R period as 2002–2004, thereby excluding the high-tech crash around the millennium, and an alternative post-FAS 123R period as 2006–2008, thereby excluding the aftermath of the global financial crisis. Hence, we also re-identify treated firms as having above-median average pro-forma option expense deflated by fully-diluted shares for the alternative pre-reform period, reducing the number of firm-year observations to 4,175. These supplementary results show that the negative DiD terms consistently hold for these alternative periods and thus that they are not spurious outcomes of including market crashes.

Table IB.9
The Effect of FAS 123R on Managerial Risk-Taking and Firm Value Using Alternative Pre- and Post-Reform Periods

	Total Risk	*Systematic Risk*	*Idiosyncratic Risk*	*Imputed Q*
	1	2	3	4
POST × Treated	-6.616***	-3.765***	-5.467***	-0.072*
	(0.768)	(0.419)	(0.686)	(0.041)
Treated	2.605***	1.806***	2.039***	0.040
	(0.626)	(0.325)	(0.564)	(0.036)
LN (Assets)	-0.310*	-0.023	-0.318*	-0.006
	(0.175)	(0.080)	(0.163)	(0.008)
LN (Firm Age)	-0.887**	-0.269	-0.834**	-0.004
	(0.371)	(0.171)	(0.345)	(0.020)
Current ROA				0.317***
				(0.086)
Lagged ROA	-3.589***	-1.775**	-3.024**	0.359***
	(1.351)	(0.691)	(1.223)	(0.093)
Market-to-Book Assets	-0.070	-0.149*	-0.007	
	(0.155)	(0.078)	(0.142)	
Capex				0.166
				(0.170)
R&D				0.993***
				(0.201)
Sales Growth				0.043
				(0.032)
Leverage	2.706	0.976	2.360	-0.254***
	(2.247)	(1.073)	(2.016)	(0.090)
Cash	-1.235	0.214	-1.314*	0.142**
	(0.804)	(0.419)	(0.723)	(0.062)
PP&E	-0.692	0.055	-0.804	-0.309***
	(1.293)	(0.636)	(1.186)	(0.074)
LN (CEO Age)	-1.233	-0.854	-1.093	-0.022
	(1.547)	(0.759)	(1.402)	(0.086)
LN (CEO Tenure)	0.404*	0.363***	0.274	0.001
	(0.231)	(0.113)	(0.208)	(0.013)
Constant	64.083***	24.604***	59.056***	1.218***
	(6.849)	(3.322)	(6.180)	(0.362)
Observations	4,175	4,175	4,175	4,175
Adjusted R-squared	0.524	0.540	0.498	0.449

This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on managerial risk-taking and firm value (Q) from using alternative pre- and post-reform periods. The alternative sample covers 2002–2008, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. This reduces the number of firm-year observations to 4,175. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST × Treated* is the DiD term of interest. Firm and CEO based independent variables are lagged 1 year with respect to the managerial risk-taking and firm value related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

Item IB.10

The Effect of FAS 123R on Channels of Managerial Risk-Taking – Data-Type-Specific Multivariate Regressions

In Section IV.F and Table 11 of the paper, we present DiD multivariate regression results for the effect of FAS 123R on firms' investment activities and business composition from using an ordinary least squares (OLS) estimator. However, whilst this aids interpretation, the concern is that because these results are for zero-inflated, count, and binary outcome variables, OLS-based results could be unreliable. Therefore, here in Item IB.10 and Table IB.10, we also present results from using (tobit, poisson and binomial, and probit and logit) estimators that are specifically meant for these types of data. These supplementary results corroborate our OLS-based results by continuing to indicate that whilst the reform has no effect on treated firm's investment in mergers and acquisitions, research and development, and capital expenditure relative to firms less affected by FAS 123R (Panel A), treated firms open new segments, close existing ones, and change the focus of primary segments more frequently than less-affected firms (Panels B–D).

Table IB.10
The Effect of FAS 123R on Channels of Managerial Risk-Taking – Data-Type-Specific Multivariate Regressions

	Panel A: Tobit regressions			*Panel B: Poisson regressions*			*Panel C: Binomial regressions*			*Panel D: Probit and logit regressions*	
	M&A	*R&D*	*Capex*	*Segments*	*New Segments*	*Closed Segments*	*Segments*	*New Segments*	*Closed Segments*	*Change in Focus*	
	1	2	3	4	5	6	7	8	9	10	11
POST × Treated	0.002	0.002	-0.004	-0.004	0.466**	0.451**	-0.022	0.442**	0.427**	0.205*	0.470*
	(0.005)	(0.004)	(0.003)	(0.003)	(0.213)	(0.181)	(0.039)	(0.224)	(0.201)	(0.119)	(0.269)
Treated	0.000	0.026***	0.009***	0.009***	-0.174	-0.077	-0.027	-0.176	-0.058	-0.120	-0.264
	(0.005)	(0.004)	(0.003)	(0.003)	(0.134)	(0.128)	(0.029)	(0.144)	(0.144)	(0.087)	(0.193)
LN (Assets)	0.001	-0.009***	-0.004***	-0.004***	0.195***	0.172***	0.068***	0.198***	0.169***	0.017	0.045
	(0.001)	(0.002)	(0.001)	(0.001)	(0.041)	(0.036)	(0.008)	(0.043)	(0.040)	(0.025)	(0.056)
LN (Firm Age)	-0.006**	0.002	-0.005***	-0.005***	0.243***	0.461***	0.137***	0.251***	0.475***	0.132**	0.294**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.082)	(0.078)	(0.017)	(0.087)	(0.086)	(0.052)	(0.119)
ROA	0.008	-0.058***	0.015***	0.015***	-0.507***	-0.581***	-0.041	-0.511***	-0.695***	-0.302***	-0.589***
	(0.008)	(0.020)	(0.002)	(0.002)	(0.151)	(0.113)	(0.047)	(0.171)	(0.184)	(0.104)	(0.218)
Market-to-Book Assets	0.004***	0.006***	0.005***	0.005***	-0.005	-0.091**	-0.003	0.001	-0.089**	-0.055*	-0.137*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.032)	(0.041)	(0.005)	(0.032)	(0.042)	(0.029)	(0.074)
Leverage	-0.020**	-0.027***	-0.073***	-0.073***	-0.291	-0.470	-0.062	-0.290	-0.471	-0.410	-0.950*
	(0.009)	(0.010)	(0.007)	(0.007)	(0.395)	(0.369)	(0.079)	(0.427)	(0.421)	(0.257)	(0.559)
Cash	0.022***	0.034***	-0.012***	-0.012***	-0.652**	-0.562**	-0.112***	-0.620**	-0.545**	-0.185	-0.418
	(0.007)	(0.006)	(0.003)	(0.003)	(0.270)	(0.234)	(0.042)	(0.275)	(0.255)	(0.151)	(0.399)
PP&E	-0.000	-0.034***	0.152***	0.152***	-0.775**	-0.979***	-0.126**	-0.673**	-1.025***	-0.394*	-0.970*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.314)	(0.305)	(0.059)	(0.334)	(0.336)	(0.215)	(0.501)
LN (CEO Age)	-0.034***	-0.026**	-0.019***	-0.019***	0.770*	0.532	0.122	0.721*	0.453	0.231	0.500
	(0.011)	(0.011)	(0.007)	(0.007)	(0.398)	(0.368)	(0.078)	(0.421)	(0.407)	(0.243)	(0.559)
LN (CEO Tenure)	0.000	0.001	0.002**	0.002**	-0.130**	-0.060	-0.005	-0.122**	-0.052	-0.093***	-0.198**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.058)	(0.053)	(0.012)	(0.062)	(0.059)	(0.035)	(0.080)
M&A Liquidity	0.443***										
	(0.071)										
Constant	0.204***	0.152***	0.133***	0.133***	-22.119	-7.203***	-0.793**	-21.661	-6.923***	-2.221**	-4.252*
	(0.047)	(0.043)	(0.029)	(0.029)	(2,249.206)	(1.755)	(0.344)	(1,923.297)	(1.915)	(1.035)	(2.336)
Observations	8,191	8,191	8,191	8,191	7,566	7,566	8,191	7,566	7,566	6,815	6,815
Pseudo R-squared	0.048	0.300	0.377	0.377	0.141	0.095	0.030	0.123	0.079	0.078	0.078

This table presents difference-in-differences (DiD) multivariate regression results for the effect of FAS 123R on channels of managerial risk-taking. Results from tobit regressions for channel related dependent variables for firms' investment activities are presented in Panel A. Results from poisson and binomial, and probit (column (10)) and logit (column (11)), regressions for channel related dependent variables for firms' business composition are presented in Panels B–D. The sample covers 1999–2011, but excluding 2005 when FAS 123R started requiring firms to recognize option expense at fair value, removing preferential accounting treatment for stock options vis-à-vis other sources of convexity in the structure of overall CEO pay. *POST* is a dummy variable equal to one for firm-years after FAS 123R came into effect and zero for firm-years before. *Treated* is a dummy variable equal to one for treated firms and zero for control firms. Firms with above (below) median *Option Expensing Impact* are identified as treated (control) firms. *POST* × *Treated* is the DiD term of interest. Firm and CEO based independent variables are lagged 1 year with respect to the channel related dependent variables. Variable definitions are contained in Table A.1 of the Appendix in the paper. Each regression also includes 2-digit SIC and year dummies. Standard errors are in parentheses and corrected for heteroscedasticity and clustering at the firm level. *, ** and *** denote statistical significance of coefficients at the 10%, 5% and 1% level, respectively.

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