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Managerial Short-Termism and Investment: Evidence from Accelerated Option Vesting*

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Abstract

We show that executives cut investment when their incentives become more short term. We examine a unique event in which hundreds of firms eliminated option vesting periods to avoid a drop in income under accounting rule FAS 123-R. This event allowed executives to exercise options earlier and thus profit from boosting short-term performance. Our identification exploits that FAS 123-R's adoption was staggered almost randomly by firms' fiscal year-ends. CEOs cut investment and reported higher short-term earnings after option acceleration, and they subsequently increased equity sales.

JEL classification: G31, G32, G34

Keywords: Managerial short-termism, Corporate investment, Vesting duration, FAS 123-R

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1. Introduction

Do managers sometimes take actions that boost performance in the short term, but reduce value in the long term? When surveyed, the majority of managers attest that they would cut or delay long-term investment to meet short-term performance targets (Graham, Harvey, and Rajgopal, 2005).

Theory predicts that executives might engage in such myopic behavior if they can personally profit from it in the short term, and they face limited exposure to the consequences of their actions in the long term (Stein, 1988, 1989).[1] One implication is that executives are more likely to act myopically when they can quickly unwind their equity holdings (i.e., when their incentive horizons are short). A crucial determinant of executives' incentive horizons are stock option vesting periods, because options can only be exercised after they vest. Thus, incentives to engage in myopic behavior should become stronger when vesting periods are shortened or eliminated, because executives can more quickly sell their equity holdings before the long-term costs of their decisions are realized.

One likely target for managerial myopia is investment. Executives have broad leeway to downscale or postpone investment projects in order to boost short-term earnings and stock prices. They can then profit from this behavior by selling newly vested equity. At the same time, investors may not immediately discern the long-term consequences of investment cuts, because investment outcomes are uncertain and often materialize only years later.

Little empirical evidence exists on the prevalence of managerial myopia and its impact on corporate investment, because omitted variables complicate the identification of causal effects. Establishing the effect of incentive horizon on investment requires a plausibly exogenous shock to vesting periods. Simply examining the relationship between investment and vesting periods is unlikely to yield causal estimates, because boards may set vesting schedules to match the duration of investment opportunities (Gopalan *et al.*, 2014). Therefore, an observed association between shorter vesting periods and lower investment may be due to unobservable changes to a firm's investment environment, rather than to managerial myopia.

This paper's identification strategy exploits the adoption of accounting standard FAS 123-R (since recodified as ASC 718). FAS 123-R required firms to begin expensing the cost of option compensation in their income statements. Additionally, it generated retroactive expenses for unvested options that were granted years before the standard's adoption. Importantly, firms could avoid accounting charges on unvested options by accelerating them to fully vest before FAS 123-R's compliance date. As a result, 723 firms eliminated vesting periods, leading to a 57% reduction in incentive horizon length for the median CEO. The decision to accelerate option vesting was primarily undertaken to preserve accounting earnings—78% of firms cite this as their primary motivation (Choudhary, Rajgopal, and Venkatachalam, 2009). Moreover, CEO horizons remained short after option acceleration as accelerating firms did not replenish horizon incentives. Option acceleration thus led to a direct shift from long- to short-term incentives, potentially increasing executives' payoffs from myopic investment cuts.

A challenge to this research design is that unobservable characteristics may affect firms' decisions to accelerate option vesting and their investment rates. For example, firms with

1 See also Narayanan (1985); Thakor (1990); Bizjak, Brickley, and Coles (1993); or Bebchuk and Stole (1993).

weak corporate governance might be more likely to accelerate options and they also may invest less. Alternatively, firms that spend less on investment may also grant CEOs less option-based compensation, and therefore may be less likely to accelerate option vesting (as they face relatively low costs from FAS 123-R).[2] Overall, it is unclear whether the OLS relationship between option acceleration and investment is larger or smaller than the causal effect.

We overcome this challenge by exploiting almost-random variation in FAS 123-R's compliance date across firms. The standard took effect for each firm in the first fiscal year starting after June 15, 2005. Thus, the acceleration deadline for firms with fiscal years ending between June and December was already in calendar year 2005 ("late fiscal-year-end firms"), while the deadline for firms with fiscal years ending between January and May ("early fiscal-year-end firms") was only in 2006. This staggered timing enables us to use firms' fiscal year-ends as an instrument for the decision to accelerate option vesting in a specific calendar year.

Most firms set their fiscal year-end long before FAS 123-R was proposed—from 1996 to 2003, on average only 1.1% of firms per year changed their fiscal year-end.[3] We also verify that early and late fiscal-year-end firms had indistinguishable growth rates for investment and earnings prior to FAS 123-R. Thus, fiscal year-ends should be unrelated to investment opportunities around FAS 123-R's adoption. Jochem, Ladika, and Sautner (2018) use a similar identification strategy to examine CEO turnover following option acceleration.

We show that firms were three times more likely to accelerate option vesting in the fiscal year just prior to compliance with FAS 123-R. Among ExecuComp firms, we estimate that option acceleration led to a 78% decrease in the average CEO's delta (sometimes called pay-for-performance sensitivity) from unvested option holdings, from \$70,311 to \$15,310. Therefore, acceleration substantially increased the payoffs that CEOs could receive by exercising options following a short-term rise in the stock price. It also substantially shortened CEOs' overall incentive horizons, since accelerating firms mostly relied on option holdings to tie wealth to firm performance—only 28% of accelerating firms' CEOs had any unvested stock prior to FAS 123-R, and even among these CEOs the average delta of unvested stock was only \$23,429.

The reduction in incentive horizons led CEOs to cut investment. A one-standard deviation increase in the fraction of outstanding options that were accelerated caused firms to reduce the investment rate (the sum of R&D and capital expenditures) by 0.052, or 24% of the variable's standard deviation. This effect corresponds to a \$14m decrease in investment for the median accelerating firm with assets of \$277m. Such cuts could plausibly be achieved in the fiscal year in which options were accelerated, either by delaying or cancelling projects. Option acceleration led to cuts in both R&D and capital expenditures, and reduced-form regressions show that the timing of the cuts closely corresponds to FAS 123-R's compliance schedule. We also confirm a negative relationship between each investment measure and the delta of accelerated options.

2 Another possibility is that firms with weak growth opportunities around FAS 123-R's adoption were more motivated to reduce reported expenses by accelerating option vesting, and simultaneously may have cut investment.

3 From 2004 to 2006, 0.5% of firms changed fiscal year-end (seventy-three firms in total). These firms are omitted from our analysis.

Shortly after option acceleration, firms reported higher earnings and beat analysts' forecasts at a higher rate. If investment cuts and the rise in earnings were due to managerial myopia, then we should observe that accelerating firms' stock prices rose shortly thereafter and that their CEOs increased equity sales in response. Indeed, accelerating firms experienced short-term stock price increases, which suggests that market participants initially misinterpreted improved earnings as a positive signal about accelerating firms' fundamental values.[4] Accelerating firms' CEOs then increased option exercises by 65% during the following fiscal year, and sold most of the resulting shares. Thus, CEOs personally benefitted from stock price increases following investment cuts.

Overall, our results document that executives cut investment and received short-term payoffs after their incentive horizons were shortened, lending support to myopia theories. Our findings are also consistent with a recent trend among firms to manage earnings by changing corporate policies rather than using discretionary accruals. Since the Sarbanes-Oxley Act of 2002, accruals-based earnings manipulation has been more likely to draw the scrutiny of auditors or regulators, prompting firms to increasingly engage in real earnings management that is more difficult to detect (Cohen, Dey, and Lys, 2008).

We address several potential concerns with our analysis. One is that firm-fiscal years ending in different months do not completely overlap in calendar time, so treatment and control groups may be differentially exposed to aggregate shocks. Our results hold among firms with fiscal year-ends of March to May (complied in 2006, i.e., late in calendar time) and June to October (complied in 2005, early in calendar time). These firms' fiscal years largely overlap in calendar time, so aggregate shocks likely cannot explain our findings. Results also hold when we exploit variation in the timing of option acceleration among only those firms that accelerated option vesting.

Another potential concern is that firms' fiscal-year-end choices may be industry specific, so our findings could be affected by declining growth opportunities in certain industries around the adoption of FAS 123-R. We show that results are robust to the inclusion of industry-by-year-fixed effects and to the exclusion of the two sectors (retail and healthcare) that skew the distribution of industries across our treatment and control groups. Results are further robust to using firm-fixed effects.

Jochem, Ladika, and Sautner (2018) show that CEO turnover increased following option acceleration. Departing CEOs or their replacements may reduce investment for reasons unrelated to myopia. We show that our results hold when excluding CEO turnover events. We also verify that CEOs did not cut investment due to a reduction in risk taking. We perform this check because firms shifted from granting new options to restricted stock after FAS 123-R, potentially reducing CEO pay convexity (Hayes, Lemmon, and Qiu, 2012; Bakke *et al.*, 2016).

Our primary contribution to the literature on managerial myopia is to provide cleanly identified evidence using a novel identification strategy. Our estimates likely identify the local average treatment effect (LATE) among firms that responded to FAS 123-R by accelerating options. Our paper most closely relates to Edmans, Fang, and Lewellen (2017),

4 Our finding of a stock-market reaction is consistent with evidence that markets do not accurately value long-term investments (Cohen, Diether, and Malloy, 2013), leading to short-term overvaluations after investment cuts (Cremers, Pareek, and Sautner, 2019). It is inconsistent with the view that investors anticipated CEOs' attempts to boost earnings, as stock prices should then not rise (see Stein, 1989).

henceforth EFL. Their analysis shows that a reduction in incentive horizon, measured by the amount of equity that vests in a quarter, leads to investment cuts. Our contribution is to document complementary evidence using an identification strategy that differs from EFL's in two ways. First, EFL's identifying assumption is that boards do not set vesting schedules based on investment needs several years into the future, while ours is that investment opportunities were not lower in 2005 (and higher in 2006) for firms with late fiscal year-ends. Second, EFL use a broader sample and derive more general estimates, while our setting uses a large, locally random horizon shock among a subsample of firms. As a result, our estimated magnitude of the relationship between vesting equity and investment cuts is significantly larger.[5]

Our work relates to other recent advances in empirical research on managerial myopia and CEO horizons. These include papers documenting that higher reporting frequency induces myopic managerial behavior (Kraft, Vashishtha, and Venkatachalam, 2018; Ernstberger *et al.*, 2017). However, this evidence is not universal, as Nallareddy, Pozen, and Rajgopal (2017) find little evidence that the move to quarterly reporting in the UK impacted investment. Related empirical work shows that executives time releases of news around the vesting of their equity (Edmans *et al.*, 2018a). Edmans, Fang, and Huang (2018b) document the negative long-term consequences of managerial myopia by examining share repurchases and acquisitions. Jenter and Lewellen (2015) find that firms whose CEOs are about to retire are more likely to be acquired. Gopalan *et al.* (2014) show that equity vesting duration is positively correlated with investment opportunities, long-term assets, and R&D intensity. Additional work on managerial myopia compares public firms to private ones, whose executives may face less pressure to deliver short-term results (e.g., Asker, Farre-Mensa, and Ljungqvist, 2015; Gao, Hsu, and Li, 2018).

2. Background on FAS 123-R

The initial accounting treatment of stock options was set in 1972 by the Accounting Principles Board in Opinion 25. APB 25 set the accounting expense for options equal to their intrinsic value-the stock price on the option's grant date minus the strike price. Almost all firms granted options with a strike price equal to the stock price, and therefore did not claim accounting expenses. In June 1993, the Financial Accounting Standards Board (FASB) proposed to change this treatment by requiring firms to expense the grant-date fair value of options. This proposal attracted substantial opposition, prompting FASB to adopt a watered-down version that allowed firms to continue using APB 25 as long as the *pro forma* cost of options was disclosed in financial statement footnotes. The majority of firms continued to use APB 25.

The role of stock options in the corporate scandals of the early 2000s renewed momentum for changes to their accounting treatment. In March 2004, FASB released a new proposal that was adopted as FAS 123-R in December 2004. FAS 123-R required all publicly traded US firms to expense newly granted stock options using the fair-value method. It also required firms to expense the fair value of previously granted options that remained unvested on the regulation's compliance date, the start of each firm's first full fiscal year after June 15, 2005.

5 EFL find that a one-standard deviation increase in scheduled vesting of equity leads to investment cuts of $1.8m at the median firm, compared with our estimate of $14m.

FASB allowed firms to avoid charges on unvested options by accelerating them to fully vest prior to the compliance date. Firms accelerating out-of-the-money options faced no charges, while firms accelerating in-the-money options had to claim an expense equal to the difference between the stock price on the acceleration date and the strike price. For many options that were not deep in the money this expense was smaller than the options' fair value, so firms accelerated both in- and out-of-the-money options (Balsam, Reitenga, and Yin, 2008). Each firm's board of directors had to approve the option acceleration decision.

Firms likely did not anticipate the impact of FAS 123-R. First, FASB only decided to allow option acceleration in a narrow 4–3 vote in October 2004. Second, the regulation was originally scheduled to take effect for all firms at the same time in June 2005. However, on April 14, 2005 the compliance date was delayed to the start of each firm's new fiscal year. The delay occurred because regulators already had sizeable workloads, and because firms would have faced difficulty changing accounting standards in the middle of a fiscal year (McConnell *et al.*, 2005).

3. Data and Identification Strategy

3.1 Sample

Our baseline sample contains 4,486 publicly traded US firms and is constructed as in Jochem, Ladika, and Sautner (2018). This sample excludes 411 firms that voluntarily expensed the fair value of options prior to FAS 123-R, because they were unaffected by the accounting rule and their investment needs may have differed from those of other firms (Aboody, Barth, and Kasznik, 2004). It also excludes seventy-three firms that changed their fiscal year between 2004 and 2006, to address the possibility that firms with the greatest investment needs postponed FAS 123-R compliance. The sample also excludes thirty-two firms with assets below $5m, because their capital stock is not reliably measured (Peters and Taylor, 2017). From this baseline, we omit 1,097 financials and utilities. We also exclude thirty-six firms that restricted employees from selling the shares from accelerated options until after the original vesting date, because option acceleration had a smaller effect on executives' incentive horizons at these firms.

Our final sample contains 3,353 firms and covers fiscal years ending between January 2005 and December 2006. Within this sample, 558 firms (17% of the sample) accelerated option vesting during the fiscal years ending between January 2005 and December 2006. Almost all firms (554, or 99%) accelerated options only once. The remaining four firms accelerated options in two consecutive years, with a similar acceleration rate in each year. Of the 562 acceleration events, 492 occurred in fiscal years ending in 2005 and 70 in fiscal years ending in 2006.

We obtain data on investment, earnings, and firm characteristics from Compustat. We identify firms that accelerated option vesting using the Option Accelerated Vester Database, which R.G. Associates, Inc. compiled by searching through disclosures that accelerating firms were required to make. The database contains acceleration events between January 2005 and February 2006, and we manually extend it through December 2006. The data include the acceleration date and number of options accelerated, but do not contain information at the individual option grant level because most firms disclosed only aggregate figures. Data on unvested option holdings, option exercises, and stock sales come from combining information in Thomson Reuters Insiders and ExecuComp. Appendix A contains definitions of all variables.

3.2 Key Empirical Measures

3.2.a. Corporate investment

Our primary measure, Total investment, is the sum of R&D and capital expenditures. We scale investment by total capital from the end of the previous year, measured following Peters and Taylor (2017).[6] We also report results for R&D and capital expenditures separately. R&D directly affects earnings as it is expensed in income statements, and capital expenditures impact earnings through depreciation or interest payments (if financed by debt). Both expenditures reduce free cash flow, a key determinant of firm value in DCF models (Damodaran, 2007). Survey evidence shows that 76% of market participants use both earnings-based multiples and DCF models to value firms (Mukhlynina and Nyborg, 2019).

3.2.b. Option acceleration

We create three proxy variables for CEOs' unvested options that were accelerated. Our first measure is Frac. options accelerated, the number of options accelerated by the firm during the fiscal year, divided by the number of (vested and unvested) options outstanding at the beginning of the fiscal year. Frac. options accelerated is a proxy variable for CEOs' accelerated options because most firms reported only the aggregate number of options accelerated across all employees, instead of disclosing figures for individual executives.[7] We assume that firms accelerated the same proportion of unvested options for CEOs as for other employees. We validate this assumption below by showing that Frac. options accelerated is strongly associated with the actual decline in unvested option holdings among CEOs of ExecuComp firms in the year that options were accelerated. Frac. options accelerated is available for most sample firms, but it does not fully account for the quantity of incentives affected by option acceleration as it can take large values even when total options outstanding are small.

Our second measure is Log accelerated options delta, the natural logarithm of the delta of a CEO's accelerated options. We use data from Form 4 filings in Thomson Reuters Insiders to compile all options granted to CEOs since 2000, and measure unvested option holdings at the start of each fiscal year as the set of grants that had not yet vested. We calculate each grant's delta as the dollar change in its Black–Scholes value for a 1% change in the stock price, and then sum over all unvested grants. This aggregate delta is then multiplied by each firm's estimated fraction of unvested options that were accelerated (number of options accelerated during the fiscal year divided by the number of unvested options outstanding). Again, we assume that firms accelerated the same fraction of unvested options for CEOs as for other employees. A benefit of using Log accelerated options delta is that it represents the amount of equity incentives affected by option acceleration, and thus

6 Total capital is the sum of property, plant, and equipment and intangible assets (including capitalized R&D). Properly measuring intangible capital is important because recent research shows that firms are increasingly investing into this type of asset and that high-intangible firms invest differently than traditional manufacturing firms (e.g., Corrado and Hulten, 2010; Peters and Taylor, 2017; Alexander and Eberly, 2018).

7 In 2006, the SEC began to require that firms report grant-level data on CEOs' vested and unvested options. We cannot use these data to infer accelerated option grants since they only became available after almost all firms had accelerated option vesting. Information on option acceleration is not reported in Thomson Reuters Insiders.

captures the effect of boosting the stock price on the CEO's wealth. The variable is only available for firms in Thomson Reuters Insiders.

Our third measure, Accelerate, equals 1 if a firm accelerated options in a fiscal year, and 0 otherwise. It is available for all firms, but does not measure the quantity of options accelerated.

3.3 Summary Statistics

Table I, Panel A, presents descriptive statistics for all sample firms for fiscal years ending between January 2005 and December 2006, the period used in the baseline regressions. The panel shows that the average total investment rate in the sample is 0.16, with a standard deviation of 0.22.

Table I, Panel B, presents characteristics for accelerating firms only, reported for the fiscal year in which options are accelerated. Firms on average accelerated 28% of total (vested and unvested) options. The number of accelerated options relative to only unvested options was much higher.[8] Panel B also reports Unvested option moneyness, which is the value-weighted average of the moneyness of all of a CEO's unvested option grants. Unvested option moneyness has a mean of 1.3 for accelerating firms, indicating that CEOs could profitably exercise many newly vested options. Next to this measure, we report how long CEOs would have waited for their options to vest in the absence of acceleration (Unvested option duration). At accelerating firms, the average Unvested option duration is 17.4 months, indicating that the average option would have vested after 1.5 years in the absence of acceleration. We also calculate that the median CEO had to wait 39 months for all options to vest (untabulated). Option acceleration therefore allowed CEOs to exercise some options more than 3 years earlier than scheduled.

Table I, Panel C, presents the fiscal year-end distribution in 2005. Although most fiscal years follow the calendar year, our sample contains 448 firms with fiscal years ending between January and May. Online Appendix Table I reports the distribution of industries for early (January to May) and late (June to December) fiscal-year-end firms. Wholesale and retail firms more frequently choose early fiscal year-ends (usually in January), while healthcare firms more frequently choose late fiscal year-ends.

3.4 Identification Strategy

3.4.a. 2SLS model

Our hypothesis is that CEOs are more likely to cut investment when their incentive horizons decrease. Option acceleration due to FAS 123-R is a reasonable setting to test this hypothesis, because the elimination of vesting periods led to a large, sudden shift from long- to short-term incentives. A basic test would estimate the following OLS model for firm f in fiscal year t:

$$\text{Investment}_{ft} = \theta_1 \text{Option acceleration}_{ft} + \theta_2 X_{ft-1} + \lambda_i + \mu_t + \nu_{ft} \quad \text{(OLS)},$$

where Investment_{ft} is a measure of investment, $\text{Option acceleration}_{ft}$ is a measure of option acceleration, X_{ft-1} is a vector of firm characteristics, and λ_i and μ_t are industry- and year-fixed effects. Standard errors are clustered at the firm level.

8 Data on firms' total unvested options only become available in the middle of the sample period. For firms with sufficient data, we calculate that 58% of unvested options were accelerated on average.

Table I. Summary statistics

Panel A presents the summary statistics for all sample firms. Statistics are reported for firm-fiscal year observations ending between January 2005 and December 2006. Panel B presents summary statistics for accelerating firms only. Statistics are reported for the firm-fiscal year observations in which options are accelerated. Data on Frac. options accelerated are not available for all accelerating firms. Some variables are available only for firms in Thomson Reuters Insiders or ExecuComp. Panel C reports the distribution of fiscal year-ends across firms, using all firm-fiscal year observations ending between January and December 2005. Variable definitions are in Appendix A.

Panel A. All firms

Variable	Mean	Median	Std. Dev.	Obs.
Total investment	0.16	0.10	0.22	6,386
R&D	0.07	0.01	0.12	6,396
Capex	0.09	0.04	0.17	6,386
Frac. options accelerated	0.02	0.00	0.10	5,986
Accelerate	0.09			6,561
Log accelerated options delta	0.50	0.00	2.01	5,386
Unvested option duration	17.6	16.9	8.2	3,775
Unvested option moneyness	1.50	1.20	1.14	3,833
Log non-accelerated options delta	5.58	7.41	4.90	5,386
Log assets	5.72	5.69	1.95	6,524
Market-to-book ratio	2.43	1.79	3.42	6,213
Net leverage	0.02	0.00	0.29	6,212
Sales growth	0.19	0.12	0.32	6,273
Cash flow	0.12	0.12	0.40	5,454
Stock return	0.11	0.05	0.46	5,941
Net income	–0.15	0.03	0.55	6,399
Earnings surprise	0.58			4,471
Short-term stock return	0.14	0.16	0.48	4,631
Options exercised/option holdings	0.21	0.00	0.32	2,299
Stock sold/option holdings	0.33	0.00	0.95	2,299

Panel B. Accelerating firms

Variable	Mean	Median	Std. Dev.	Obs.
Frac. options accelerated	0.28	0.22	0.21	502
Log accelerated options delta	7.99	8.23	2.07	338
Unvested option duration	17.4	17.2	6.9	386
Unvested option moneyness	1.31	1.03	1.17	397
Log non-accelerated options delta	6.86	7.75	3.48	338
All options vest	0.14	0.00	0.35	230
ΔLog unvested option value	–2.33	–0.94	5.27	224
ΔLog unvested option delta	–1.64	–0.61	3.92	224

(continued)

Table I. Continued

Panel C. Distribution of fiscal year-ends across firms			
Fiscal year-end months	Number of firms	% Firms	Cumulative %
	Early fiscal year-ends		
January	141	4.3	4.3
February	31	0.9	5.2
March	164	5.0	10.2
April	54	1.6	11.9
May	58	1.8	13.6
Early fiscal year-end	448	13.6	
	Late fiscal year-ends		
June	203	6.2	19.8
July	44	1.3	21.1
August	48	1.5	22.6
September	197	6.0	28.6
October	67	2.0	30.6
November	33	1.0	31.6
December	2,251	68.4	100.0
Late fiscal year-end	2,843	86.4	
Total	3,291	100.0	100.0

The problem with this model is that θ_1 likely does not represent a causal estimate, because unobservable variables may simultaneously impact firms' acceleration and investment decisions. We overcome this challenge by exploiting that FAS 123-R compliance dates were staggered quasi-randomly across calendar time based on firms' fiscal year-ends. We use the following 2SLS model:

$$\text{Option acceleration}_{ft} = \pi_1 \text{FAS 123-R takes effect}_{ft} + \pi_2 X_{ft-1} + \lambda_i + \mu_t + u_{ft} \text{ (First Stage)}.$$

$$\text{Investment}_{ft} = \gamma_1 \text{Option acceleration}_{ft} + \gamma_2 X_{ft-1} + \lambda_i + \mu_t + \nu_{ft} \quad \text{(Second Stage)}.$$

Each regression contains two observations per firm: one for the fiscal year ending between January and December 2005, and one for the fiscal year ending between January and December 2006. All variables are measured at the firm-fiscal year level. Firm-level controls X_{ft-1} are measured at the end of the previous fiscal year, to ensure they are not affected by FAS 123-R. The controls include Log assets, Sales growth, and Market-to-book ratio because large or high-growth firms have different investment opportunities than small or stable-growth firms. We control for Net leverage because highly levered firms may prioritize debt repayments over investment. We further control for Cash flow because cash flows affect the extent to which firms are constrained from funding investments following negative shocks (Almeida, Campello, and Weisbach, 2004). We control for stock-market performance using

Stock return. In regressions using Log accelerated options delta, we control for CEOs' incentives from non-accelerated unvested options (Log non-accelerated options delta).

The first-stage regresses measures of option acceleration on the instrument FAS 123-R takes effect$_{ft}$, an indicator that varies across calendar time due to FAS 123-R's staggered compliance dates. It equals 1 for firm-fiscal year observations ending between June 2005 and May 2006, and 0 for all other firm-fiscal year observations. The first stage compares each firm's acceleration decision in the fiscal year just prior to FAS 123-R compliance to adjacent, control-period fiscal years. For late fiscal-year-end firms complying with FAS 123-R in calendar year 2005, the control group is firms with fiscal years ending between January and May 2005 that had not yet complied. For early fiscal-year-end firms complying in 2006, the control group is firms with fiscal years ending between June and December 2006 that had already complied. A positive value of π_1 would indicate that firms were more likely to accelerate option vesting during the fiscal year just prior to FAS 123-R compliance than the fiscal year before or afterward. We expect this because firms had to eliminate vesting periods prior to their compliance dates to avoid expensing unvested options. Additionally, early fiscal-year-end firms likely benefitted more from waiting until 2006 to accelerate than by doing so a full fiscal year before compliance, as waiting allowed some previously granted options to vest under their normal schedule.

The second-stage regresses measures of investment on instrumented option acceleration. A negative value of γ_1 would indicate that firms that accelerated option vesting due to upcoming FAS 123-R compliance also cut investment in the same fiscal year, relative to firms that did not have to comply or had already complied.

Figure 1 illustrates our identification strategy. A key feature is that the control group switches across years. Our model compares investment among late fiscal-year-end firms prior to FAS 123-R compliance in 2005 to that of early fiscal-year-end firms that had not yet complied. It also compares investment among early fiscal-year-end firms prior to FAS 123-R compliance in 2006 to that of late fiscal-year-end firms that had already complied. This design mitigates the concern that results are affected by time-invariant differences in investment across fiscal year-ends, or by shocks that led all firms to cut investment in the same year.

3.4.b. Validity of key identifying assumptions

Our instrument must satisfy three key assumptions to identify the causal effect of acceleration:

1. Relevance Condition: $\pi_1 \neq 0$. Option acceleration$_{ft}$ must correlate with FAS 123-R takes effect$_{ft}$ after controlling for other firm characteristics X_{ft-1}.
2. Exclusion Restriction: Cov(FAS 123-R takes effect$_{ft}$, ν_{ft})=0. Differences in FAS 123-R compliance dates across firms only affect investment through their effect on acceleration decisions.
3. Monotonicity: All firms are affected by FAS 123-R takes effect$_{ft}$ in the same way.

The next section provides evidence supporting the relevance condition, by showing that firms were substantially more likely to accelerate option vesting in the fiscal year just prior to FAS 123-R compliance. While we cannot directly test the exclusion restriction, Table II shows that our key outcome variables exhibited parallel trends in the pre-FAS 123-R period (1995–2004). Following Lemmon and Roberts (2010), we compare growth rates in investment, earnings, and earnings surprises between firms with early and late fiscal year-ends. The table shows that growth rates in total investment, capex, and R&D are statistically

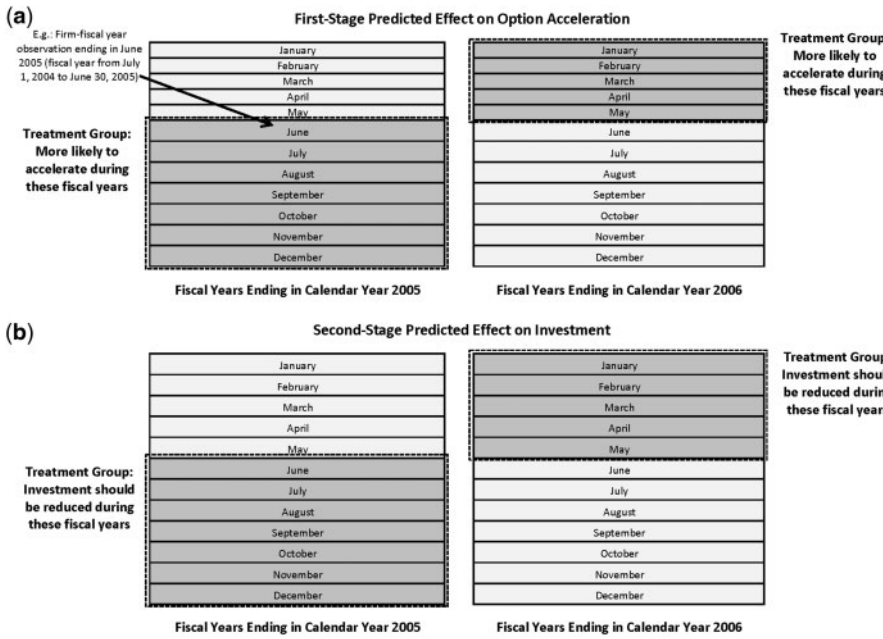

Figure 1. Hypothesis testing using staggered FAS 123-R compliance. (**a**) Shows the treatment and control groups for testing the effect of FAS 123-R compliance on option acceleration (first-stage), and (**b**) shows these groups for testing the effect of option acceleration on corporate investment (second-stage).

indistinguishable between the two sets of firms.[9] The same holds for the growth rate in earnings and earnings surprises. In Section 6, we further address the concern that unobserved heterogeneity across early and late fiscal-year-end firms may have affected investment, by showing that no relation exists between the instrumented acceleration decision and investment before FAS 123-R.

Instrument monotonicity ensures that our estimates represent the LATE when treatment effects are heterogeneous. When this condition does not hold, 2SLS estimates equal the LATE plus a bias term that increases with the proportion of firms defying treatment (Angrist, Imbens, and Rubin, 1996). Monotonicity requires that all firms are affected by the instrument in the same way (Imbens and Angrist, 1994). This means that FAS 123-R should not discourage any firm from accelerating options. The condition would be violated if an early fiscal-year-end firm accelerated in 2005, but would not have done so if it had a late fiscal year (and thus had to comply with FAS 123-R in 2005). This is unlikely, as firms that accelerated in a non-compliance year would not have experienced additional costs from accelerating in a compliance year.

9 In Table II, mean values sometimes exceed medians because growth rates have a lower bound of –1 but no upper bound. The negative median growth rates for investment are consistent with recent evidence documenting a secular decline in investment spending since the 1990s (Alexander and Eberly, 2018). Negative growth rates in Net income and Earnings surprise are largely due to the economic recession in the early 2000s.

Table II. Early and late fiscal-year-end firms: Parallel trends prior to FAS 123-R

The table compares key dependent variables across early and late fiscal-year-end firms. Early fiscal-year-end firms have a fiscal year ending in January to May. Late fiscal-year-end firms have a fiscal year ending in June to December. Statistics are reported for all firm-fiscal year observations ending between January 1995 and December 2004, and all variables are measured at the firm-fiscal year level. The *t*-statistic of the difference in means is presented in parentheses. The Wilcoxon *p*-value is from the two-sample Wilcoxon test, based on the hypothesis that the two groups are taken from populations with the same median. The statistics are calculated for firms that are included in the regression sample in Table V. Variable definitions are in Appendix A.

	Early fiscal-year-end firms			Late fiscal-year-end firms			Difference in means	Wilcoxon *p*-value
Variable	Mean	Median	Obs.	Mean	Median	Obs.		
Total investment growth	0.048	–0.045	2,999	0.043	–0.059	16,281	–0.005 (–0.45)	0.35
R&D growth	–0.044	–0.060	1,369	–0.034	–0.042	9,048	0.010 (1.06)	0.24
Capex growth	0.115	–0.060	2,997	0.119	–0.066	16,258	0.004 (0.28)	0.51
Net income growth	–0.305	–0.069	3,146	–0.278	–0.073	17,207	0.027 (0.95)	0.50
Earnings surprise growth	–0.893	–0.871	2,002	–0.713	–0.903	11,128	0.180 (0.85)	0.74

4. Effect of Option Acceleration on CEO Incentive Horizon

Table III shows that option acceleration led to a sharp decline in the quantity of CEOs' unvested option incentives. The sample in this table contains firms in ExecuComp, which contains detailed data on equity holdings both before and after option acceleration. In Column (1), All options vest equals 1 when the Black–Scholes value of a CEO's unvested option holdings decreased from a positive number at the start of the fiscal year to zero at the end of the fiscal year, and 0 otherwise. We regress this variable on Accelerate and control variables. CEOs at accelerating firms were 10.9% more likely to experience a complete elimination of vesting periods than CEOs of non-accelerating firms. The estimate implies that the percentage of CEOs for whom all options vested rose from 5.4% in years prior to acceleration to 16.3% in the year of acceleration. Columns (2) and (3) examine changes in the delta and Black–Scholes value of unvested options.[10] Both columns show that option

10 In this table, we measure changes in the delta/value of unvested options only for firms in the ExecuComp database, using the Core and Guay (2002) procedure. The reason is that the filings in Thomson Reuters Insiders (which we use to measure Log accelerated options delta) do not contain information on option acceleration, and thus allow us to calculate CEOs' unvested option holdings only up to the start of the fiscal year in which acceleration occurred. ExecuComp reports the exact number of unvested options for CEOs at the end of each fiscal year, allowing us to measure the change in the delta/value of unvested options during the year of acceleration. The same applies to Online Appendix Table II (see below).

Table III. Effect of option acceleration on unvested options

The regressions contain CEO-fiscal year observations ending between January 2005 and December 2006. The regressions contain only firms in ExecuComp. We report marginal effects for the logistic regression. All options vest equals 1 when a CEO's unvested option holdings decrease from a positive value at the start of the fiscal year to zero at the end of the fiscal year, and 0 otherwise. ΔLog unvested option delta is the fiscal-year-on-fiscal year change in the natural log of the delta of a CEO's unvested stock options. Delta is the dollar change in the value of stock options for a 1% change in the stock price, measured at the end of the fiscal year. ΔLog unvested option value is fiscal-year-on-fiscal year change in the natural log of the dollar value of a CEO's unvested stock options, measured at the end of the fiscal year. Accelerate equals 1 if a firm accelerated option vesting during the fiscal year, and 0 otherwise. Year-fixed effects equal 1 for firm-fiscal year observations that end in the same calendar year. Industry-fixed effects are based on the Fama–French forty-eight industries. *t*-statistics are based on robust standard errors that are clustered at the firm level. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	All options vest	ΔLog unvested option delta	ΔLog unvested option value
Model	Logit	OLS	OLS
Sample		ExecuComp firms	
Window of analysis	2005–06	2005–06	2005–06
	(1)	(2)	(3)
Accelerate	0.109***	–1.524***	–2.163***
	(3.30)	(–4.56)	(–4.82)
Log assets (*t*–1)	–0.012***	0.089	0.140*
	(–2.94)	(1.58)	(1.83)
Market-to-book ratio (*t*–1)	–0.008	–0.057	–0.067
	(–1.28)	(–0.99)	(–0.85)
Net leverage (*t*–1)	0.036	–0.504	–0.683
	(1.43)	(–1.18)	(–1.16)
Sales growth (*t*–1)	–0.017	0.067	0.151
	(–0.63)	(0.15)	(0.26)
Cash flow (*t*–1)	–0.054*	1.353*	1.722*
	(–1.69)	(1.82)	(1.79)
Stock return (*t*–1)	–0.002	–0.506**	–0.781**
	(–0.11)	(–2.06)	(–2.34)
Stock return (*t*–2)	0.008	0.113	0.073
	(0.72)	(0.58)	(0.27)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Observations	1,809	1,785	1,785
Pseudo/Adjusted R^2	0.075	0.013	0.014

acceleration led to a large drop in the quantity of unvested option incentives. Column (2) implies that at the average accelerating firm, the CEO's unvested option delta fell by 78%, from $70,311 in the year prior to acceleration to $15,310 afterward. Column (3) documents an even larger 88% drop in the value of unvested options, from $4.1m to $0.5m.

Importantly, option acceleration affected the majority of horizon incentives that CEOs received from unvested compensation. This is because only 28% of CEOs at accelerating firms had unvested stock prior to FAS 123-R, and even among these CEOs the delta of unvested stock was just $23,429, far lower than the delta of unvested options.

Figure 2 confirms that for accelerating firms' CEOs, total unvested equity dropped by a far larger amount in the year of option acceleration than in any of the 5 years before or after FAS 123-R, while non-accelerating firms' CEOs experienced little change. During this period, option acceleration led to the single-largest drop in unvested equity incentives for CEOs.

Figure 3 quantifies the decrease in CEO incentive horizon due to option acceleration. Panel A plots the distribution of Unvested option duration prior to option acceleration, as well as the distribution of the duration of remaining unvested options following acceleration. Panel B plots the reduction in CEO incentive horizons. Option acceleration shortened the median CEO's Unvested option duration by more than 9 months, or 57%.

Taken together, the evidence implies that option acceleration substantially reduced CEOs' incentive horizons, as the previously unvested options were the primary holdings that CEOs could not unwind on short notice. Furthermore, we find no evidence that accelerating firms replenished CEOs' horizons after accelerating option vesting. Online Appendix Table II shows that the unvested option and equity holdings of accelerating and non-accelerating firms' CEOs followed a similar trend in the 2 years after FAS 123-R. Thus, option acceleration led to a direct shift from long- to short-term incentives that persisted over time, and this potentially allowed CEOs to profit from investment cuts in the short term while reducing exposure to the long-term consequences.

An interesting question is why boards approved option acceleration without taking any action to preserve CEOs' horizon incentives. We conjecture three explanations. First, because boards accelerated option vesting primarily to preserve accounting earnings, they may have paid only limited attention to non-accounting consequences. This interpretation is supported by Jochem, Ladika, and Sautner (2018), who show that accelerating firms only started to adjust compensation after experiencing negative retention consequences. Second, prior work shows that firms' pay policies correlate highly with those of benchmark peers (e.g., Bizjak, Lemmon, and Naveen, 2008; Albuquerque, De Franco, and Verdi, 2013; Denis, Jochem, and Rajamani, 2019). New equity grants following option acceleration may have been based largely on the median pay granted by peers, rather than on the deviation of the CEO's incentive horizon from a firm-specific optimum. Third, accelerating firms' boards may have been captured by the CEO. In untabulated tests, we find no relationship between option acceleration and proxies for board quality, but the acceleration decision itself may be a stronger indicator of poor governance.

5. Empirical Results: Main Results on Managerial Myopia

5.1 Option Acceleration and FAS 123-R Compliance: First-Stage Regressions

Option acceleration significantly reduced CEOs' unvested option incentives. We now document that the staggered compliance schedule of FAS 123-R allows us to use firms' fiscal year-ends as an instrument for the decision to accelerate option vesting in a specific calendar year.

Figure 4 provides initial evidence on the relation between staggered FAS 123-R compliance dates and option acceleration. We sort firm-fiscal year observations by the month in

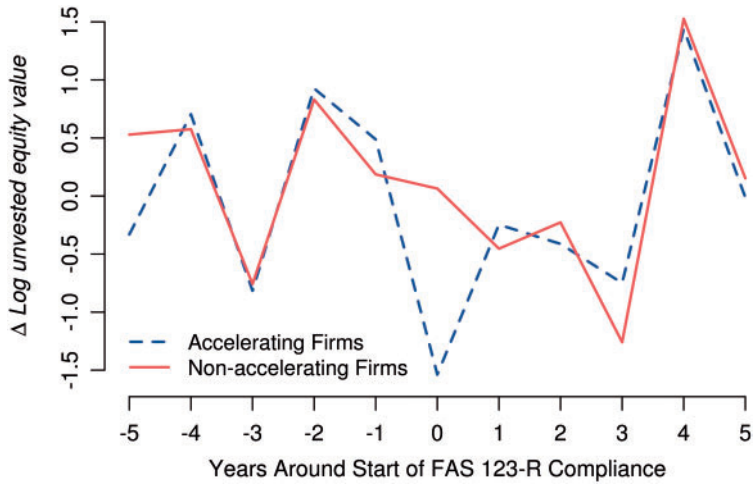

Figure 2. Unvested equity holdings at accelerating and non-accelerating firms over time. This figure plots the change in the logarithm of the value of unvested equity holdings (ΔLog unvested equity value) over a 5-year (two-sided) window around FAS 123-R compliance, separately for the average CEO at accelerating and non-accelerating firms. Unvested equity consists of unvested stock options and restricted stock.

which the fiscal year ends. Bars represent the percentage of firms with a fiscal year ending in a given month that accelerated options during that fiscal year. The acceleration rate was 5% among firms with fiscal years ending between January and May 2005, but rose to 18% for firms with a fiscal year ending in June 2005. This sharp increase is likely due to FAS 123-R, as these firms were the first to comply with the regulation. Acceleration rates remained high at 17% for firms with fiscal years ending later in 2005. Firms with fiscal years ending between January and May 2006 were also much more likely to accelerate options than a year earlier, when compliance with FAS 123-R was not yet imminent. Acceleration rates then dropped to almost zero for late fiscal-year-end firms that had already started to comply with FAS 123-R.

Table IV confirms a strong relation between FAS 123-R takes effect and option acceleration after controlling for firm characteristics. The table reports the first-stage estimates corresponding to our main 2SLS tests. Column (1) indicates that Frac. options accelerated increased by 0.028 in firm-fiscal years that immediately preceded compliance with FAS 123-R, compared with firm-fiscal years that did not precede compliance or took place afterward. This increase is twice as large as the fraction of options accelerated in the fiscal years ending between January and May 2005 (which is 0.014).[11] Column (2) shows that FAS 123-R compliance also led to a significant increase in the quantity of options accelerated, as measured by delta. The Kleibergen Paap (2006) *F*-statistics are 38 and 48 in the two first-stage regressions, indicating that the instrument is strong.

11 These estimates represent the average effect on upcoming FAS 123-R compliance on option acceleration across all sample firms, many of which did not accelerate. The effect is much larger among accelerating firms.

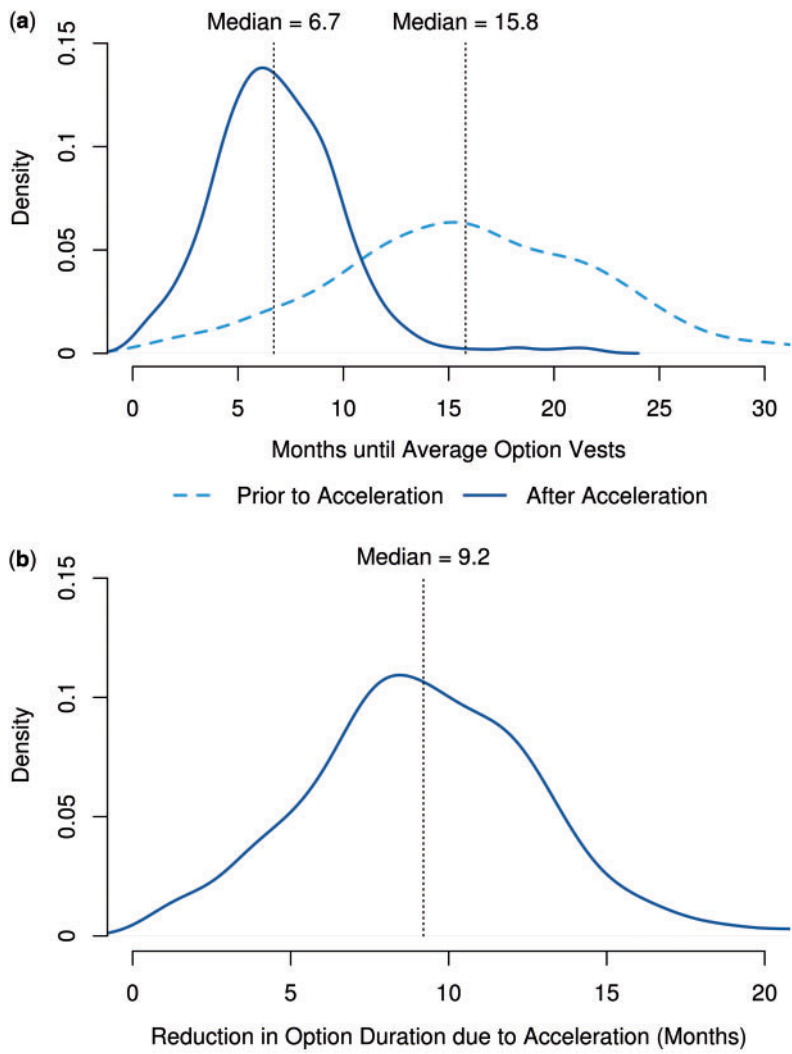

Figure 3. Impact of option acceleration on CEO incentive horizons. (**a**) Plots the distribution of Unvested option duration among all accelerating firms prior to option acceleration, as well as the distribution of the duration of remaining unvested options following option acceleration (in months). The remaining duration is estimated as the value-weighted average of the duration of accelerated options (which equals 0) and the duration of non-accelerated options, using the Black–Scholes value of options as weights. We estimate that firms accelerated 58% of a CEO's unvested options, using a subset of firms for which data on total unvested options outstanding is available. Because we do not have data on the precise grants that were accelerated, we assume firms proportionally accelerated 58% of each individual grant that was unvested at the time. For each firm, we then calculate the duration of remaining options as $0.58 \times 0 + (1–0.58) \times$ (Duration of unvested, non-accelerated options). (**b**) Plots the distribution of the difference between Unvested option duration and the duration of remaining unvested options (in months).

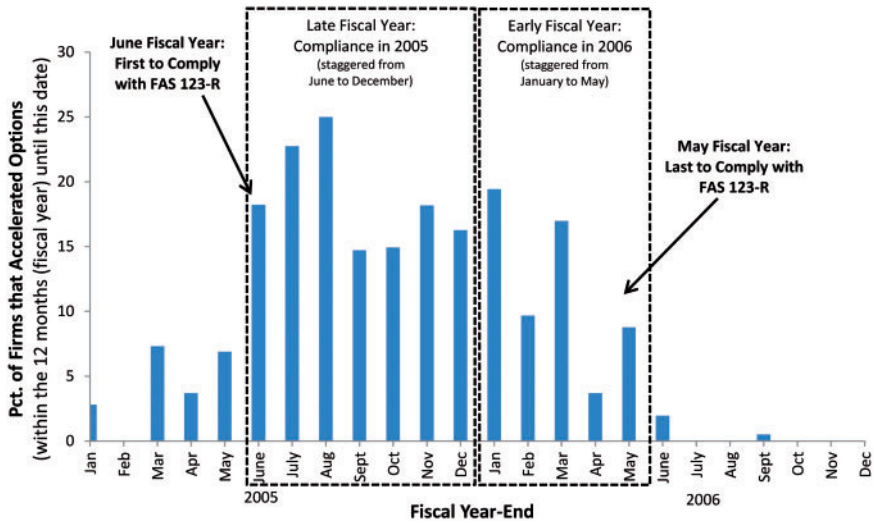

Figure 4. Effect of staggered FAS 123-R compliance on option acceleration. The sample contains all firm-fiscal year observations ending between January 2005 and December 2006. Bars represent the percentage of firms with a fiscal year ending in a given month that accelerated option vesting during that fiscal year. Firms had to accelerate option vesting before their FAS 123-R compliance date to avoid expenses.

5.2 Option Acceleration and Investment: Second-Stage Regressions

Table V reports second-stage regressions for the effect of option acceleration on investment. Below each regression we also report the coefficient, *t*-statistic, and Kleibergen–Paap (2006) *F*-statistic for the instrument FAS 123-R takes effect from the corresponding first-stage regression.

Column (1) shows that the OLS relation between Total investment and Frac. options accelerated is statistically indistinguishable from zero. Column (2) confirms the lack of a relationship between Total investment and Log accelerated options delta. However, these two estimates likely do not represent the causal effect of option acceleration, as unobservable variables that affect option acceleration and investment may bias the OLS estimates.

Columns (3)–(8) present 2SLS regressions that instrument option acceleration using FAS 123-R takes effect. These regressions show that acceleration led CEOs to cut investment. In Column (3), the –0.516 coefficient indicates that a one-standard deviation increase in Frac. options accelerated led to a 0.052 decrease in Total investment, equal to 24% of the variable's standard deviation. The estimate implies a $14m drop in investment for the median accelerating firm (assets of $277m). Such investment reductions are economically meaningful, yet managers could plausibly achieve them during the fiscal year of acceleration by delaying projects or cancelling them outright. Columns (4) and (5) show that option acceleration led CEOs to cut both R&D and Capex. R&D is more sensitive to option acceleration, as a one-standard deviation increase in Frac. options accelerated led to a decrease in R&D that equals 24% of the variable's standard deviation, while the corresponding decline in Capex was only 15%. Columns (6)–(8) confirm a negative relationship between Log

Table IV. Staggered FAS 123-R compliance and option acceleration: First-stage regressions

The regressions contain all firm-fiscal year observations ending between January 2005 and December 2006. Frac. options accelerated is the number of options accelerated during the fiscal year, divided by the number of options outstanding at the beginning of the fiscal year. Log accelerated options delta is the natural log of the delta of accelerated options. Delta represents the amount of incentives affected by option acceleration and is defined as the dollar change in the value of accelerated options for a 1% change in the stock price, measured at the start of the acceleration year. It is set to 0 for firms that did not accelerate option vesting. FAS 123-R takes effect equals 1 for firm-fiscal year observations ending between June 2005 and May 2006, and 0 for all other firm-fiscal year observations. The year-fixed effect equals 1 for firm-fiscal year observations ending in calendar year 2005, and 0 for firm-fiscal year observations ending in calendar year 2006. Industry-fixed effects are based on the Fama–French forty-eight industries. We also report the Kleibergen–Paap rk Wald *F*-statistic for the instrument FAS 123-R takes effect. *t*-statistics are based on robust standard errors that are clustered at the firm level. The regressions include only firm-year observations for which we can estimate second-stage regressions. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	Frac. options accelerated	Log accelerated options delta
Model	OLS	OLS
Sample	All firms	Thomson firms
Window of analysis	2005–06	2005–06
	(1)	(2)
FAS 123-R takes effect	0.028***	0.724***
	(6.17)	(6.96)
Log assets (*t*–1)	–0.001	0.049**
	(–0.91)	(2.57)
Market-to-book ratio (*t*–1)	–0.001**	–0.003
	(–2.26)	(–0.73)
Net leverage (*t*–1)	–0.003	–0.191
	(–0.57)	(–1.64)
Sales growth (*t*–1)	0.010*	0.213*
	(1.82)	(1.74)
Cash flow (*t*–1)	0.000	0.107
	(0.07)	(1.00)
Stock return (*t*–1)	–0.012***	–0.430***
	(–4.10)	(–5.97)
Stock return (*t*–2)	0.005	0.121*
	(1.53)	(1.81)
Log non-accelerated options delta		0.009
		(1.28)
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	4,111	3,741
Adjusted R^2	0.067	0.100
KP *F*-stat. (FAS 123-R takes effect)	38.08	48.49

Table V. Option acceleration and investment: Second-stage regressions

The regressions contain all firm-fiscal year observations ending between January 2005 and December 2006. Total investment is the sum of R&D expenditures and capital expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. R&D is the R&D expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. Capex is the capital expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. Frac. options accelerated is the number of options accelerated during the fiscal year, divided by the number of options outstanding at the beginning of the fiscal year. Log accelerated options delta is the natural log of the delta of accelerated options. Delta represents the amount of incentives affected by option acceleration and is defined as the dollar change in the value of accelerated options for a 1% change in the stock price, measured at the start of the acceleration year. It is set to 0 for firms that did not accelerate option vesting. The 2SLS regressions instrument the acceleration measures using FAS 123-R takes effect. This variable equals 1 for firm-fiscal year observations ending between June 2005 and May 2006, and 0 for all other firm-fiscal year observations. The year-fixed effect equals 1 for firm-fiscal year observations ending in calendar year 2005, and 0 for firm-fiscal year observations ending in calendar year 2006. Industry-fixed effects are based on the Fama–French forty-eight industries. *t*-statistics are based on robust standard errors that are clustered at the firm level. Below each regression, we report diagnostic information on the first-stage regression. We report the coefficient, *t*-statistic, and Kleibergen–Paap rk Wald *F*-statistic for the instrument FAS 123-R takes effect. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	Total investment	Total investment	Total investment	R&D	Capex	Total investment	R&D	Capex
Model	OLS	OLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Sample	All firms	Thomson firms	All firms	All firms	All firms	Thomson firms	Thomson firms	Thomson firms
Window of analysis	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Frac. options accelerated	–0.003		–0.516***	–0.275***	–0.248***			
	(–0.16)		(–3.70)	(–3.55)	(–2.58)			
Log accelerated options delta		–0.000				–0.017***	–0.010***	–0.009**
		(–0.20)				(–3.31)	(–3.11)	(–2.25)
Log assets (*t*–1)	–0.003*	–0.006***	–0.003**	–0.001*	–0.001	–0.005***	–0.003***	–0.002
	(–1.81)	(–3.54)	(–1.97)	(–1.91)	(–1.08)	(–2.91)	(–3.82)	(–1.14)
Market-to-book ratio (*t*–1)	0.004*	0.003	0.004*	0.002*	0.002	0.003	0.002	0.001
	(1.76)	(1.55)	(1.69)	(1.68)	(1.21)	(1.53)	(1.53)	(1.27)

(continued)

Table V. Continued

Dependent variable	Total investment	Total investment	Total investment	R&D	Capex	Total investment	R&D	Capex
Model	OLS	OLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Sample	All firms	Thomson firms	All firms	All firms	All firms	Thomson firms	Thomson firms	Thomson firms
Window of analysis	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net leverage (t–1)	–0.070***	–0.067***	–0.072***	–0.053***	–0.016**	–0.070***	–0.050***	–0.018**
	(–6.93)	(–6.50)	(–6.88)	(–9.39)	(–2.15)	(–6.81)	(–9.10)	(–2.29)
Sales growth (t–1)	0.054***	0.047***	0.059***	0.027***	0.032***	0.050***	0.024***	0.026**
	(4.64)	(3.79)	(4.93)	(4.35)	(3.30)	(4.06)	(4.18)	(2.52)
Cash flow (t–1)	0.055***	0.089***	0.055***	0.008	0.044***	0.091***	0.008	0.079***
	(2.81)	(3.15)	(2.85)	(1.09)	(3.08)	(3.22)	(0.93)	(3.38)
Stock return (t–1)	0.024***	0.021***	0.017**	–0.006*	0.022***	0.012	–0.008**	0.020***
	(3.15)	(2.59)	(2.07)	(–1.76)	(3.48)	(1.45)	(–2.39)	(2.84)
Stock return (t–2)	0.021***	0.020***	0.026***	0.007**	0.020***	0.025***	0.006**	0.019***
	(4.65)	(4.18)	(5.01)	(2.26)	(4.99)	(4.59)	(2.16)	(4.44)
Log non-accelerated options delta		0.002***				0.002***	0.002***	–0.000
		(3.11)				(3.28)	(7.44)	(–0.15)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage diagnostics								
Coeff. (FAS 123-R takes effect)	N/A	N/A	0.028***	0.028***	0.028***	0.724***	0.723***	0.724***
t-stat. (FAS 123-R takes effect)	N/A	N/A	(6.17)	(6.17)	(6.17)	(6.96)	(6.98)	(6.96)
KP F-stat. (FAS 123-R takes effect)	N/A	N/A	38.08	38.08	38.08	48.49	48.76	48.49
Observations	4,111	3,741	4,111	4,111	4,111	3,741	3,750	3,741
Adjusted R^2	0.307	0.309						

accelerated options delta and our investment measures, indicating that firms that accelerated a larger amount of option incentives also experienced larger investment cuts.

The 2SLS estimates in Columns (3) and (6) are much larger than the corresponding OLS coefficients in Columns (1) and (2). This raises the question of why, in our specific setting, the 2SLS estimation produces large and significant effects, while the OLS estimators fail to detect any effects of option acceleration. One possible explanation is that firms with higher investment opportunities generally also grant more option compensation. Online Appendix Figure 1 plots the average rate of Total investment in the years prior to FAS 123-R for each quintile of CEOs' unvested options delta, controlling for the effect of firm size on option holdings. Investment rises monotonically with unvested option delta—the investment rate is 0.122 on average for firms that grant CEOs the least options, compared with 0.182 for firms that grant the most options. Firms that relied more on option compensation also faced higher expenses under FAS 123-R, and thus benefitted more from option acceleration. Subsequent investment cuts therefore may have brought accelerating firms' total investment rates in line with those of non-accelerating firms, leading to small and statistically insignificant OLS coefficients on our acceleration measures.

Although the economic magnitude of the 2SLS estimate is reasonable, we cannot exclude the possibility that the difference between the OLS and 2SLS estimators is partly explained by a small violation of the exclusion restriction. As few variables are fully exogenous, our instrument FAS 123-R takes effect is reasonable as long as its direct effect on investment is small relative to its effect on the endogenous option-acceleration variable (Jiang, 2017). In our 2SLS model, this is equivalent to a small γ_Z/π_1 ratio, where γ_Z is the potential direct effect of FAS 123-R takes effect on investment and π_1 is the effect of FAS 123-R takes effect on option acceleration. When π_1 is small in magnitude, the 2SLS estimate can be inflated even if γ_Z is very small. Although all *F*-statistics on our instrument are above the threshold of 10 that indicates a strong instrument (Stock, Wright, and Yogo, 2002), we acknowledge that the partial R^2 of FAS 123-R takes effect in the first-stage regressions of Table IV is rather low (e.g., it is only 0.052 in Column (1)).

If longer incentive horizons encourage CEOs to engage in more investment, then those CEOs who experienced a larger reduction in horizon should cut investment by more. Indeed, Online Appendix Table III indicates that accelerating firms whose CEOs initially had longer vesting duration cut investment by a larger amount, relative to non-accelerating firms whose CEOs had the same duration but did not experience a horizon reduction. Shortening incentive horizon by 1 year leads to a 0.012 cut in investment, equal to 5% of its standard deviation.

Our finding of a decline in real investment is consistent with Cohen, Dey, and Lys (2008), who show that real earnings management increased significantly after the Sarbanes–Oxley Act in 2002, as it is harder to detect than accruals-based earnings management. Cutting investment also may be a more effective way to boost earnings for accelerating firms that had already been on the aggressive end of accruals management prior to FAS 123-R. Online Appendix Table IV supports this prediction by showing that option acceleration was more strongly associated with investment cuts among firms with above-median discretionary accruals in 2003–04.

5.3 Effects of Option Acceleration on Short-Term Earnings and Stock Returns

If investment cuts during the fiscal year of option acceleration reflect managerial myopia, then accelerating firms should have reported higher earnings at the end of the year.

Table VI tests this prediction in Column (1) by regressing net income scaled by sales on Frac. options accelerated. We continue to use 2SLS specifications to account for unobservable differences among firms. As predicted, option acceleration led firms to report higher earnings at the end of the fiscal year. A one-standard deviation increase in Frac. options accelerated led to a 0.12 increase in Net income, equal to 22% of the variable's standard deviation.

Next, Column (2) shows that option acceleration led to a higher frequency of reporting earnings that beat stock analysts' forecasts. Earnings surprise equals 1 when a firm's annual earnings per share (EPS) exceeds the most recent median consensus forecast by more than a quarter of a cent, and 0 when it does not beat forecasts.[12] A one-standard deviation increase in Frac. options accelerated led to a 23 percentage-point increase in the frequency of generating an earnings surprise.

If market participants did not fully realize the myopic nature of investment cuts, then higher earnings should have led them to revise valuations upward. This would have led to a short-term increase in accelerating firms' stock prices. Alternatively, investors may have understood managers' incentives following option acceleration and adjusted expectations prior to the fiscal year-end (Stein, 1989). In this case, higher earnings would not have impacted stock prices.

Column (3) examines the short-term market reaction to option acceleration. The dependent variable is the cumulative stock return over a period of 6 months before the firm's FAS 123-R compliance date to 12 months afterward. This window captures the potential payoffs from myopia, as firms may have begun to cut investment in the middle of the fiscal year of acceleration, and CEOs may have sold equity over the course of the following fiscal year. The results show that stock returns increased significantly following option acceleration. The effects are economically large, as a one-standard deviation increase in Frac. options accelerated implies short-term returns rose by 11%.

Columns (4)–(6) show similar results using Log accelerated options delta instead of Frac. options accelerated.

5.4 CEO Responses to Option Acceleration

Firms cut investment and reported higher earnings following option acceleration, and stock prices moved upward in response. Next, we study whether CEOs personally profited from these short-term effects by exercising options and selling shares. Table VII compares option exercises and equity sales by CEOs of accelerating and non-accelerating firms in the two fiscal years around firms' FAS 123-R compliance dates. We use a 2-year window as some CEOs may have waited more than a year after acceleration to exercise options. The dependent variable in Column (1) is the value of options exercised by the CEO during the fiscal year, divided by the value of the CEO's option holdings at the start of the fiscal year (Options exercised/option holdings). Similarly, in Column (2) it is the value of shares sold by the CEO following option exercise, divided by the value of the CEO's option holdings (Stock sold/option holdings).

12 We omit firm-fiscal year observations for which EPS exceeds the consensus forecast by less than $0.0025. This is consistent with findings in the accounting literature that consensus forecasts have rounding issues and are not always accurate at the sub-cent level (e.g., Payne and Thomas, 2005). Our results are robust to also considering these cases as earnings surprises.

Table VI. Option acceleration and short-term earnings, earnings surprises, and stock returns

The regressions contain all firm-fiscal year observations ending between January 2005 and December 2006. Net income is the annual net income scaled by sales, reported at the end of the fiscal year. Earnings surprise equals 1 if the reported annual EPS exceeds the latest median analyst consensus forecast prior to the earnings announcement by more than a quarter of a cent ($0.0025), and 0 if reported EPS does not exceed the consensus forecast. Short-term stock return is the cumulative unadjusted stock return, measured over the window of 6 months prior to the FAS 123-R compliance date to 12 months afterward. Frac. options accelerated is the number of options accelerated during the fiscal year, divided by the number of options outstanding at the beginning of the fiscal year. Log accelerated options delta is the natural log of the delta of accelerated options. Delta represents the amount of incentives affected by option acceleration and is defined as the dollar change in the value of accelerated options for a 1% change in the stock price, measured at the start of the acceleration year. It is set to 0 for firms that did not accelerate option vesting. The regressions instrument the acceleration measures using FAS 123-R takes effect. This variable equals 1 for firm-fiscal year observations ending between June 2005 and May 2006, and 0 for all other firm-fiscal year observations. The year-fixed effect equals 1 for firm-fiscal year observations ending in calendar year 2005, and 0 for firm-fiscal year observations ending in calendar year 2006. Industry-fixed effects are based on the Fama–French forty-eight industries. *t*-statistics are based on robust standard errors that are clustered at the firm level. Below each regression, we report diagnostic information on the first-stage regression. We report the coefficient, *t*-statistic, and Kleibergen–Paap rk Wald *F*-statistic for the instrument FAS 123-R takes effect. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	Net income	Earnings surprise	Short-term stock return	Net income	Earnings surprise	Short-term stock return
Model	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Sample	All firms	All firms	All firms	Thomson firms	Thomson firms	Thomson firms
Window of analysis	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06
	(1)	(2)	(3)	(4)	(5)	(6)
Frac. options accelerated	1.204***	2.336**	1.130**			
	(2.88)	(2.05)	(2.56)			
Log accelerated options delta				0.042**	0.080**	0.031*
				(2.22)	(2.21)	(1.77)
Log assets (*t*–1)	0.048***	0.062***	0.022***	0.054***	0.045***	0.022***
	(8.61)	(9.18)	(4.82)	(8.47)	(6.05)	(4.03)
Market-to-book ratio (*t*–1)	–0.012***	0.011**	–0.005***	–0.013***	0.006	–0.007***
	(–3.44)	(2.39)	(–2.77)	(–3.79)	(1.39)	(–2.59)

(continued)

Table VI. Continued

Dependent variable	Net income	Earnings surprise	Short-term stock return	Net income	Earnings surprise	Short-term stock return
Model	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Sample	All firms	All firms	All firms	Thomson firms	Thomson firms	Thomson firms
Window of analysis	2005–06	2005–06	2005–06	2005–06	2005–06	2005–06
	(1)	(2)	(3)	(4)	(5)	(6)
Net leverage (t–1)	0.196***	–0.192***	0.028	0.174***	–0.128**	0.021
	(4.64)	(–3.74)	(0.73)	(3.80)	(–2.41)	(0.53)
Sales growth (t–1)	–0.102***	–0.073*	–0.089***	–0.098**	–0.079**	–0.085***
	(–2.58)	(–1.85)	(–2.85)	(–2.35)	(–2.01)	(–2.68)
Cash flow (t–1)	0.473***	0.150***		0.484***	0.175***	
	(4.87)	(2.76)		(3.99)	(2.70)	
Stock return (t–1)	0.112***	0.055*		0.109***	0.074**	
	(5.70)	(1.95)		(5.13)	(2.42)	
Stock return (t–2)	0.010	–0.007		0.002	–0.018	
	(0.56)	(–0.31)		(0.12)	(–0.81)	
Log non-accelerated options delta				–0.006***	0.005**	–0.002
				(–3.22)	(2.27)	(–0.80)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
First-stage diagnostics						
Coeff. (FAS 123-R takes effect)	0.028***	0.026***	0.034***	0.722***	0.837***	0.880***
t-stat. (FAS 123-R takes effect)	(6.17)	(4.89)	(8.20)	(6.96)	(6.12)	(9.50)
KP F-stat. (FAS 123-R takes effect)	38.12	23.88	67.20	48.41	37.50	90.24
Observations	4,103	2,980	4,339	3,738	2,712	4,004

Table VII. CEO responses to option acceleration: Option exercises and equity sales

The regressions contain all firm-fiscal year observations ending between January 2004 and December 2007. The regressions contain only firms in ExecuComp. All columns are difference-in-differences regressions for the two fiscal years around each firm's FAS 123-R compliance date. Options exercised/option holdings is the value of options exercised by the CEO during the fiscal year divided by the value of the CEO's (vested and unvested) option holdings. Stock sold/option holdings is the value of shares sold by the CEO following option exercise, divided by the value of the CEO's (vested and unvested) option holdings. Accelerating firm equals 1 in all fiscal years for a firm that accelerated option vesting, and 0 otherwise. Post compliance equals 1 for fiscal years after FAS 123-R took effect, and 0 otherwise. The year-fixed effect equals 1 for firm-fiscal year observations ending in calendar year 2005, and 0 for firm-fiscal year observations ending in calendar year 2006. Industry-fixed effects are based on the Fama–French forty-eight industries. *t*-statistics are based on robust standard errors that are clustered at the firm level. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	Options exercised/option holdings	Stock sold/option holdings
Model	OLS	OLS
Sample	ExecuComp firms	
Window of analysis	2004–07	2004–07
	(1)	(2)
Accelerating firm×Post compliance	0.101***	0.236***
	(4.17)	(3.93)
Accelerating firm	–0.087***	–0.198***
	(–4.66)	(–5.07)
Post compliance	–0.036	–0.076
	(–1.19)	(–0.75)
Log assets (*t*–1)	0.004	0.001
	(0.93)	(0.05)
Market-to-book ratio (*t*–1)	–0.001	–0.001
	(–1.42)	(–0.70)
Net leverage (*t*–1)	–0.032	–0.121*
	(–1.23)	(–1.81)
Sales growth (*t*–1)	0.061**	0.116
	(2.37)	(1.42)
Cash flow (*t*–1)	0.098***	0.193**
	(2.77)	(2.15)
Stock return (*t*–1)	0.064***	0.077**
	(4.54)	(2.09)
Stock return (*t*–2)	0.079***	0.132***
	(5.27)	(3.28)
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3,463	3,463
Adjusted R^2	0.065	0.021

Column (1) indicates that CEOs of accelerating firms exercised substantially more options after FAS 123-R took effect than CEOs of non-accelerating firms. CEOs' option exercises rose by 78%, from 13% of the value of option holdings in the fiscal years prior to acceleration to 23.1% afterward. Column (2) shows that stock sales were also much larger among CEOs of accelerating firms after FAS 123-R took effect than CEOs of non-accelerating firms. As a result, CEOs' incentives to maximize long-term firm value decreased substantially, as did their exposure to the consequences of investment cuts. Our finding that CEOs unwound their equity incentives after vesting periods were eliminated is consistent with Ofek and Yermack (2002) and EFL, who document that CEOs sell stock after they receive new equity grants or prior grants vest.

6. Reduced-Form Regressions, Robustness Checks, and Placebo Tests

6.1 FAS 123-R Compliance and Investment: Reduced-Form Regressions

Table VIII reports reduced-form regressions to validate our 2SLS results. These regressions are useful for gauging whether our 2SLS results are consistent with our instrument's expected causal effect. A reduced-form coefficient of zero on FAS 123-R takes effect would indicate that the 2SLS estimates are driven mostly by omitted variables or regression misspecification (Angrist and Pischke, 2009). However, we obtain positive and significant coefficients in all regressions. Column (1) indicates that Total investment was 0.014 lower in the fiscal year just prior to compliance, equal to 6% of the variable's standard deviation. We also find significant effects for R&D and Capex in Columns (2) and (3). Online Appendix Table V shows that the reduced-form regressions are robust to using firm-fixed effects.

6.2 Robustness Checks

We perform several tests of the robustness of our main results. Online Appendix Table VI replicates Table V using firm-fixed effects. The estimates with firm-fixed effects use a wider sample period to more precisely estimate firms' baseline acceleration levels. The table confirms that both measures of option acceleration led to a within-firm drop in Total investment and Capex. Column (2) shows that Frac. options accelerated also has a negative and statistically significant effect on R&D, but the effect becomes insignificant when we use Log acceleated options delta in Column (5). One potential explanation for the weaker R&D effects with fixed effects is that firms that accelerated the largest amount of options had high levels of R&D, and their within-firm R&D cuts were large in absolute magnitude but proportionally small compared with their prior investment spending.

Jochem, Ladika, and Sautner (2018) show that CEO turnover increased following option acceleration. Online Appendix Table VII excludes firm-fiscal year observations in which a CEO turnover occurs, to account for the possibility that departing CEOs or their replacements reduced investment for reasons unrelated to myopia. Our results continue to hold, though the effect in Column (4) for Capex is smaller and marginally insignificant. One potential explanation is that part of the effect on Capex in Table V is driven by firms that delayed large projects after experiencing acceleration-induced turnover.

Online Appendix Table VIII reports alternative specifications for our main 2SLS tests. Column (1) shows that we obtain similar results using industry-by-year-fixed effects, which

Table VIII. Staggered FAS 123-R compliance and investment: Reduced-form regressions

The regressions contain all firm-fiscal year observations ending between January 2005 and December 2006. Total investment is the sum of R&D expenditures and capital expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. R&D is the R&D expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. Capex is the capital expenditures during the fiscal year, scaled by total capital at the start of the fiscal year. The year-fixed effect equals 1 for firm-fiscal year observations ending in calendar year 2005, and 0 for firm-fiscal year observations ending in calendar year 2006. Industry-fixed effects are based on the Fama–French forty-eight industries. *t*-statistics are based on robust standard errors that are clustered at the firm level. ***, **, and * indicate significance levels of 1%, 5%, and 10%, respectively. Variable definitions are in Appendix A.

Dependent variable	Total investment	R&D	Capex
Model	OLS	OLS	OLS
Sample		All firms	
Window of analysis	2005–06	2005–06	2005–06
	(1)	(2)	(3)
FAS 123-R takes effect	–0.014***	–0.008***	–0.007***
	(–4.68)	(–4.24)	(–2.98)
Log assets (*t*–1)	–0.003**	–0.001	–0.002
	(–2.28)	(–1.58)	(–1.63)
Market-to-book ratio (*t*–1)	0.004*	0.002*	0.002
	(1.90)	(1.86)	(1.43)
Net leverage (*t*–1)	–0.068***	–0.050***	–0.016**
	(–7.18)	(–9.69)	(–2.17)
Sales growth (*t*–1)	0.049***	0.023***	0.024***
	(4.36)	(4.24)	(2.63)
Cash flow (*t*–1)	0.066***	0.007	0.057***
	(3.11)	(1.05)	(3.05)
Stock return (*t*–1)	0.023***	–0.003	0.026***
	(3.10)	(–0.93)	(4.24)
Stock return (t–2)	0.025***	0.005**	0.020***
	(5.46)	(2.18)	(5.35)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes
Observations	4,331	4,340	4,331
Adjusted R^2	0.310	0.398	0.379

account for time-varying shocks at the industry level. Column (2) address the potential concern that treatment and control groups are differentially exposed to aggregate shocks because their firm-fiscal years do not completely overlap in calendar time.[13] The estimates in

13 For example, firm-fiscal years ending in January 2005 (control group) and June 2005 (treatment group) overlap by only 6 months. A related concern is that results may be driven by changes to investment during December firm-fiscal years, which constitute the majority of our sample.

the column show that results are robust to using a sample that only compares firms with March to May fiscal year-ends to those with June to October fiscal year-ends. These firm-fiscal years largely overlap in calendar time, yet only the CEOs of firms treated by FAS 123-R compliance experienced a reduction in incentive horizon. As a further robustness check, Column (3) uses only firms that accelerated options to exploit variation in the timing of acceleration. The results show that accelerating firms cut investment in the year of FAS 123-R compliance relative to non-compliance years. Column (4) shows that results are robust to including fixed effects for the month of each firm's fiscal year-end. They also hold when we use Accelerate in Column (5), and in Columns (6) and (7) when we exclude firms in wholesale and retail or healthcare (the industries for which fiscal year-ends were not evenly distributed).

6.3 Alternative Explanation: Changes in CEO Risk Taking

FAS 123-R required all firms to start expensing future option grants at fair value. This rule equalized the accounting treatment of stock options with other types of equity pay and led to a broad shift toward restricted stock. This shift may have decreased executives' risk-taking incentives (Hayes, Lemmon, and Qiu, 2012; Bakke *et al.*, 2016). Online Appendix Table IX, Panel A, confirms in Columns (1) and (2) that firms granted fewer new options relative to total new equity pay (New options/new equity pay) and less convex pay (Vega) after FAS 123-R.

Hayes, Lemmon, and Qiu (2012) find that firms responded to this shift with a small reduction in capital expenditures (R&D was unaffected), and Bakke *et al.* (2016) document an increase in hedging activity. These findings raise the question of whether our results could be driven by changes in risk-taking incentives. Because accelerating firms relied more heavily on options prior to FAS 123-R, their CEOs may have experienced a larger shift from options to new restricted stock grants afterward. This change may have caused CEOs to cut investment.

We address this concern in three ways. First, Online Appendix Table IX, Panel A, shows in Column (3) that accelerating firms did not engage in a larger shift from granting new options to restricted stock than non-accelerating firms after FAS 123-R. Column (4) shows that accelerating firms also did not reduce pay convexity by a larger amount. Second, Online Appendix Table IX, Panel B, shows in Columns (1)–(3) that our results hold among firms whose CEOs held deep in-the-money unvested options. These CEOs' option holdings had similar convexity as restricted stock prior to FAS 123-R, so their risk-taking incentives were less affected by the subsequent shift in equity grants. Third, Column (4) of Online Appendix Table IX, Panel B, shows that option acceleration did not affect firm risk, measured using stock price volatility.

6.4 Placebo Test

Another concern is that early and late fiscal-year-end firms differed based on unobservable characteristics that affected investment. Online Appendix Table X examines whether investment is related to option acceleration that occurred 2 years into the future. The dependent variable is Total investment in fiscal years 2003 or 2004, that is, 2 years prior to each firm's FAS 123-R compliance date. Frac. options acelerated in 2005/06 is defined as in Table V and instrumented using FAS 123-R takes effect. If unobserved heterogeneity across

fiscal year-ends caused some firms to invest less, then our instrument should be negatively correlated with investment prior to FAS 123-R's adoption. On the other hand, if option acceleration caused investment cuts only in 2005 and 2006, then no correlation should exist with investment in 2003 or 2004. The table shows that the coefficient on Frac. options accelerated is substantially smaller than in Table V, and statistically indistinguishable from zero. This indicates that late (early) fiscal-year-end firms cut investment only in 2005 (2006)—exactly when their CEOs' horizons decreased.

7. Conclusion

We investigate whether CEOs with more short-term horizons spend less on investment. Although executives are frequently criticized for acting myopically after receiving short-term incentives, little empirical evidence exists. This lack of evidence is due to the difficulty of constructing good proxies for changes in executive horizons, and to omitted variables that complicate the identification of the causal effect of incentive horizons on investment.

We overcome the first challenge by examining the sudden elimination of vesting periods of executive stock options as a result of an important accounting change. Hundreds of US firms accelerated vesting periods to avoid an accounting expense under FAS 123-R. Vesting periods determine executives' incentive horizons as they are a key explicit mechanism used by firms to prevent executives from unwinding their equity incentives in the short term. To overcome the second challenge, we exploit exogenous variation in the timing of FAS 123-R. Firms with a fiscal year ending in June or later complied with FAS 123-R in 2005, while firms with a fiscal year ending before June complied only in 2006. Option acceleration constituted a direct shift from incentives to increase long-term firm value toward incentives to induce short-term stock price increases.

Option acceleration had a strong negative effect on long-term investment. A one-standard deviation increase in option acceleration led firms to reduce investment rates by 0.052, equal to 24% of the variable's standard deviation. Option acceleration also led to higher short-term earnings and returns. In response, accelerating firms' CEOs increased option exercises and sold most of the resulting shares.

Our findings imply that executives' incentives depend not only on the amount of pay that is granted in equity, but also the length of time until incentives can be unwound. Future research could look at how internal firm governance, especially boards and compensation committees, react to incentive shocks such as the one resulting from option acceleration.

Supplementary Material

Supplementary data are available at *Review of Finance* online.

Appendix A: Variable definitions

Variable	Definition	Source
1. Option acceleration and FAS 123-R compliance variables		
Frac. options accelerated	Number of options accelerated during the fiscal year, divided by the total number of vested and unvested options outstanding at the beginning of the fiscal year. This variable is set to 0 for firm-fiscal years in which acceleration did not occur. The number of options accelerated is from the R.G. Associates Option Accelerated Vester Database. The database contains acceleration events between January 2005 and February 2006, and we manually extend this database through December 2006 using the same procedure as R.G. Associates. This variable is a proxy for CEOs' accelerated options, because most firms reported only the aggregate number of options accelerated across all employees. We assume that firms accelerated the same fraction of unvested options for CEOs as for other employees. The number of total options outstanding is Compustat item OPTOSBY.	R.G. Associates, Compustat
Log accelerated options delta	Natural logarithm of the delta of a CEO's unvested options that are accelerated. This variable represents the amount of incentives affected by option acceleration. Delta is defined as the dollar change (in thousands of $) in the value of accelerated options for a 1% change in the stock price, and is measured at the start of the fiscal year. It is set to 0 for firm-fiscal years in which acceleration did not occur. Only available for firms in the Thomson Reuters Insiders database. To construct this variable, we first collect data from Thomson Reuters Insiders on all new options granted to CEOs between 2000 and 2006. New option grants are those with Thomson Reuters Insiders item FORMTYPE equal to "4," item ACQDISP equal to "A," and item ROLECODE equal to "CEO" or "P." We retain only directly held grants (item OWNERSHIP equal to "D") with non-missing data on option parameters. Second, we calculate the delta of CEOs' unvested options. In each fiscal year *t* we identify currently unvested options at those grants with (i) a grant date (item TRANDATE) prior to fiscal year *t* and (ii) a vesting date (item XDATE) after fiscal year *t*. We calculate the delta of each grant as (Black–Scholes delta)×(Number of options)×(Stock price)/100. The Black–Scholes inputs are listed below. Number of options is Thomson Reuters Insiders NUM_DERIV adjusted for stock splits using Compustat item ADJEX_F. We sum up the delta across all unvested option grants held by the CEO at the start of fiscal year *t*.	R.G. Associates, Compustat, Thomson Reuters Insiders, CRSP, FED

(continued)

Continued

Variable	Definition	Source
	Third, we estimate the fraction of a CEO's unvested options from the start of the fiscal year that are accelerated during the year. This ratio equals the number of options accelerated during the fiscal year (from the R.G. Associates Option Accelerated Vester Database) divided by the total number of unvested options outstanding. We assume that firms accelerated the same fraction of unvested options for CEOs as for other employees. Data on total unvested options only become widely available in Compustat in the middle of our sample period. For firms with available data, we measure total unvested options as Compustat item OPTOSEY minus item OPTEX, both measured at the start of the fiscal year. We calculate the average ratio of unvested/total options in 2005–2006 as 0.34. For firms with missing data, we measure total unvested options as 0.34×total options outstanding (item OPTOSBY). Fourth, we multiply the delta of all unvested options by the fraction of unvested options that are accelerated, and then take the natural logarithm of one plus this value. To calculate the Black–Scholes delta, we use the following inputs: (1) the firm's stock price (Compustat item PRCC_F, measured at the start of the fiscal year and adjusted for stock splits using item ADJEX_F); (2) the option exercise price (Thomson Reuters Insiders item XPRICE_ADJ); (3) the option lifespan measured as the difference in years between the option expiration date (Thomson Reuters Insiders item TDATE) and the grant date (Thomson Reuters Insiders item TRANDATE); (4) the risk-free rate measured as the yield on a US government bond with maturity equal to the option's lifespan (data from the Federal Reserve); (5) volatility measured as the standard deviation of stock returns (CRSP data item RET) from the previous forty-eight months; and (6) dividend yield measured as the monthly dividend payment (CRSP item DIVAMT) divided by monthly stock price, summed over the previous 12 months.	
Accelerate	Dummy that equals 1 if a firm accelerated option vesting during the fiscal year, and 0 in all other fiscal years.	R.G. Associates
Accelerating firm	Dummy that equals 1 in all fiscal years for a firm that accelerated option vesting, and 0 otherwise.	R.G. Associates
Frac. options accelerated in 2005/06	Number of options accelerated during a fiscal year ending between January 2005 and December 2006, divided by the total number of options outstanding at the start of	R.G. Associates

(continued)

Continued

Variable	Definition	Source
	that fiscal year. This variable is defined as Frac. options accelerated, except measured 2 years into the future.	
FAS 123-R takes effect	Instrument that accounts for the staggered compliance of FAS 123-R across calendar years. It equals 1 for firm-fiscal year observations ending between June 2005 and May 2006, and 0 for all other firm-fiscal year observations.	Compustat
Post compliance	Dummy that equals to 1 for fiscal years after FAS 123-R took effect, and 0 otherwise.	Compustat
2. Investment variables		
Total investment	Sum of R&D expenditures (Compustat item XRD, missing values set to 0) and capital expenditures (item CAPX) during the fiscal year, scaled by total capital at the start of the fiscal year. Following Peters and Taylor (2017), total capital is the sum of physical and intangible capital. Physical capital is property, plant, and equipment (item PPENT). Intangible capital is item K_INT from the Peters and Taylor (2017) data set, and equals the sum of a firm's externally purchased intangibles and internally created intangibles (measured mostly by capitalizing past investment into intangible assets). Winsorized at the 1% level.	Compustat, Peters and Taylor (2017)
R&D	R&D expenditures during the fiscal year (Compustat item XRD, missing values set to 0) scaled by total capital at the start of the fiscal year. Total capital is defined in the same way as for Total investment. Winsorized at the 1% level.	Compustat, Peters and Taylor (2017)
Capex	Capital expenditures during the fiscal year (Compustat item CAPX) scaled by total capital at the start of the fiscal year. Total capital is defined in the same way as for Total investment. Winsorized at the 1% level.	Compustat, Peters and Taylor (2017)
Total investment growth	Fiscal-year-on-fiscal year fractional growth rate in Total investment. Winsorized at the 5% level.	Compustat, Peters and Taylor (2017)
R&D growth	Fiscal-year-on-fiscal year fractional growth rate in R&D. Winsorized at the 5% level.	Compustat, Peters and Taylor (2017)
Capex growth	Fiscal-year-on-fiscal year fractional growth rate in Capex. Winsorized at the 5% level.	Compustat, Peters and Taylor (2017)
3. Executive compensation variables		
Unvested option duration	Weighted-average number of months until a CEO's unvested option grants are scheduled to vest (in the absence of acceleration). To calculate this variable, first we	Compustat, Thomson Reuters Insiders

(continued)

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Variable	Definition	Source
	collect data from Thomson Reuters Insiders on all unvested options held by CEOs, using the same procedure as for Log accelerated options delta. Second, for each unvested option grant, we measure the remaining unvested option duration (in months) as the vesting date (Thomson Reuters Insiders item XDATE) minus the end date of the current fiscal year. Third, we calculate average duration across all unvested option grants, weighting by the Black–Scholes value of options in each grant. The Black–Scholes value is calculated using the same inputs as for Log accelerated options delta. Winsorized at the 1% level.	
Unvested option moneyness	Weighted-average moneyness of a CEO's unvested option grants. Moneyness is the option's strike price (Thomson Reuters Insiders item XPRICE_ADJ) divided by the firm's stock price (Compustat items PRCC_F/ADJEX_F), and is measured at the end of the fiscal year. We compile unvested option holdings and calculate average moneyness across individual grants using the same procedure as for Unvested option duration. Winsorized at the 1% level.	Compustat, Thomson Reuters Insiders
All options vest	Dummy that equals 1 if a CEO's number of unvested options (ExecuComp data item OPT_UNEX_UNEXER_NUM) is positive at the start of the fiscal year and zero at the end of the fiscal year, and 0 otherwise. Only available for firms in the ExecuComp database.	ExecuComp
ΔLog unvested option delta	Fiscal-year-on-fiscal year change in the natural logarithm of the delta of a CEO's unvested stock options. Delta is defined as the dollar change (in thousands of $) in the value of unvested options for a 1% change in the stock price, and is measured at the end of the fiscal year. Only available for firms in the ExecuComp database. To construct this variable, we first calculate the average Black–Scholes delta of unvested options using the Core and Guay (2002) procedure. This procedure estimates the Black–Scholes delta separately for two sets of options: (i) new grants awarded in the fiscal year (ExecuComp item NUMSECUR); and (ii) total unvested options (ExecuComp item OPT_UNEX_UNEXER_NUM) net of newly granted options. It estimates the average exercise price and expiration date for each set of unvested options. Other Black–Scholes formula inputs are the same as for Log accelerated options delta. Second, for each set we multiply (average Black–Scholes delta)×(number of unvested options)×(firm's stock price), all divided by 100.	ExecuComp, Compustat, CRSP, FED

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Variable	Definition	Source
	Third, we add these values for the two sets, take the natural logarithm, and calculate the fiscal-year-on-fiscal year change. Winsorized at the 1% level.	
ΔLog unvested option value	Fiscal-year-on-fiscal year change in the natural logarithm of the value of a CEO's unvested stock options (in thousands of $). The value of unvested options is calculated using the same procedure as for ΔLog unvested option delta, except that we calculate the Black–Scholes value of each set of unvested options and add these together. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp, Compustat, CRSP, FED
ΔLog unvested equity delta	Fiscal-year-on-fiscal year change in the natural logarithm of the delta of a CEO's unvested option and restricted stock holdings. The delta of unvested options is calculated as for ΔLog unvested option delta. The delta of restricted stock is ExecuComp item STOCK_UNVEST_VAL divided by 100. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp, Compustat, CRSP, FED
ΔLog unvested equity value	Fiscal-year-on-fiscal year change in the natural logarithm of the value of a CEO's unvested option and restricted stock holdings. The value of unvested options is calculated as for ΔLog unvested option value. The value of restricted stock is ExecuComp item STOCK_UNVEST_VAL. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp, Compustat, CRSP, FED
Log non-accelerated options delta	Natural logarithm of the delta of a CEO's unvested options that are not accelerated. This variable represents the amount of unvested incentives remaining after option acceleration. Delta is defined as the dollar change (in thousands of $) in the value of non-accelerated options for a 1% change in the stock price, and is measured at the start of the fiscal year. Only available for firms in the Thomson Insiders database. To construct this variable, first we use data from Thomson Insiders to calculate the delta of all unvested options held by CEOs, using the same procedure as for Log accelerated options delta. Second, we calculate (Delta of all unvested options outstanding at the start of the fiscal year)×(1 – fraction of a CEO's unvested options that are accelerated). The fraction of unvested options that are accelerated is measured as for Log accelerated options delta. Third, we take the natural logarithm of one plus this value. We set this value equal to 0 for non-accelerating firms that are in the Thomson Reuters Insiders database but whose CEOs do not have any unvested options.	R.G. Associates, Compustat, Thomson Reuters Insiders, CRSP, FED

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Variable	Definition	Source
Options exercised/option holdings	Value of options exercised by the CEO during the fiscal year divided by the value of the CEO's (vested and unvested) option holdings. On each date that options are exercised, the value of options is calculated as the difference between the stock price on that date (CRSP data item PRC) and the option exercise price (Thomson data item XPRICE), multiplied by the number of options exercised (Thomson data item NUM_DERIV). The value is than summed up over all exercise dates during the fiscal year. This variable is set to 0 in firm-fiscal years when a CEO is in the Thomson Insiders database but does not report any option exercises. We omit exercises of grants that are indirectly owned or have missing data on strike prices, vesting dates, or expiration dates. The value of CEO's unvested option holdings is ExecuComp data item OPT_UNEX_UNEXER_EST_VAL, and the value of vested option holdings is data item OPT_UNEX_EXER_EST_VAL. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp, CRSP, Thomson Reuters Insiders
Shares sold/option holdings	Value of shares sold by the CEO following option exercise, divided by the value of the CEO's (vested and unvested) option holdings. On each date that stock is sold, the value of stock sales is measured as Thomson data item SHARES multiplied by data item TPRICE. This value is the summed up over all sales dates during the fiscal year. We stop the summation once the number of shares sold during the fiscal year exceeds the number of options exercised, to ensure results are unaffected by equity sales unrelated to contemporaneous option exercises. This variable includes sales that are sold to pay the option exercise price (denoted by value "F" of Thomson data item TRANCODE). This variable is set to 0 in firm-fiscal years when a CEO is in the Thomson Reuters Insiders database but does not report any stock sales. Option exercises and option holdings are measured in the same way as for Options exercised/option holdings. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp, Thomson Reuters Insiders
ΔNew options/new equity pay	Fiscal-year-on-fiscal-year change in the value of a CEO's new stock option grants divided by the value of new option and restricted stock grants. The value of new option grants is ExecuComp data item OPTION_AWARDS_BLK_VALUE prior to 2006 and OPTION_AWARDS_FV afterward. The value of new restricted stock grants is ExecuComp data item RSTKGRNT prior to 2006, and STOCK_AWARDS_FV	ExecuComp

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Variable	Definition	Source
	afterward. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	
ΔVega	Fiscal-year-on-fiscal-year change in the Black–Scholes vega of a CEO's new equity grants. For CEOs with multiple new option grants, vega is calculated as the value-weighted average of each individual grant's vega, measured on the date of the grant. Following Core and Guay (2002), the Black–Scholes vega is multiplied by the number of new options granted (ExecuComp data item NUM_SECUR) to measure the change in the value of option grants for a 1% increase in stock volatility. The vega of restricted stock is set to zero. Only available for firms in the ExecuComp database. Winsorized at the 1% level.	ExecuComp
4. Other variables		
Log assets	Natural logarithm of total assets (Compustat item AT) at the end of the fiscal year (in millions $). Winsorized at the 1% level.	Compustat
Market-to-book ratio	Equity market value (Compustat items PRCC_F × CSHO) plus book value of total liabilities (item LT), divided by book value of equity (item CEQ) and total liabilities. Winsorized at the 1% level.	Compustat
Net leverage	Book value of debt (Compustat items DLTT+DLC) minus cash holdings and short-term investments (item CHE), divided by the book value of debt plus the equity market value (item PRCC_F × CSHO). Winsorized at the 1% level.	Compustat
Sales growth	Fiscal-year-on-fiscal-year fractional growth rate in sales (Compustat item SALE). Winsorized at the 5% level.	Compustat
Cash flow	Cash inflows during the fiscal year prior to investment and depreciation, but after interest payments and taxes. This variable is measured as net income (Compustat item NI) plus depreciation (item DP) and investment into R&D (item XRD, missing values set to 0), all scaled by total capital. Total capital is defined as for Total investment. Winsorized at the 1% level.	Compustat
Stock return	Fractional stock return during the fiscal year, measured as the stock price at the end of the fiscal year (Compustat item PRCC_F) plus dividends paid during the year (item DVPSX_F), divided by the stock price at the end of the previous fiscal year, minus 1. Prices and dividends are adjusted for stock splits by scaling by item ADJEX_F. Winsorized at the 5% level.	Compustat

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Variable	Definition	Source
Net income	Net income (Compustat item NI) scaled by sales (item SALE). Winsorized at the 5% level.	Compustat
Net income growth	Fiscal-year-on-fiscal-year fractional growth rate in Net income. Winsorized at the 5% level.	Compustat
Earnings surprise	Dummy that equals 1 if the annual EPS exceeds the most recent median consensus EPS forecast of stock analysts by more than a quarter of a cent ($0.0025), and 0 if EPS does not exceed the consensus forecast. Annual reported and forecast EPS are IBES items ACTUAL and MEDEST, respectively, when filtering item MEASURE to "EPS" and FISCALP to "ANN." Both are measured on the final estimate date in IBES just prior to the announcement of annual financials.	IBES
Earnings surprise growth	Fiscal-year-on-fiscal-year fractional growth rate in the difference between a firm's annual EPS and the median consensus EPS forecast of stock analysts, divided by the absolute value of the median consensus forecast. Annual reported and forecast EPS are measured as for Earnings surprise. Winsorized at the 5% level.	IBES
Short-term stock return	Cumulative unadjusted stock return (CRSP item RET, measured at monthly level) over the window from 6 months prior to the firm's FAS 123-R compliance date to 12 months afterward. Winsorized at the 5% level.	CRSP
Volatility	Standard deviation of fractional stock returns (CRSP item RET, measured at daily level) during the 365 calendar days preceding the end of the fiscal year. This variable is set to missing for firm-fiscal year observations with fewer than 60 trading days. Winsorized at the 1% level.	CRSP

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