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CEO incentives and earnings management ☆

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Abtract

We provide evidence that the use of discretionary accruals to manipulate reported earnings is more pronounced at firms where the CEO's potential total compensation is more closely tied to the value of stock and option holdings. In addition, during years of high accruals, CEOs exercise unusually large numbers of options and CEOs and other insiders sell large quantities of shares.

JEL classification: G14; G34, M41

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1. Introduction

The past 15 years have seen an enormous increase in stock-based and option-based executive compensation. The median exposure of CEO wealth to firm stock prices tripled between 1980 and 1994, and doubled again between 1994 and 2000

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Fig. 1. Average accurual ratios, size weighted.

(Hall and Liebman, 1998). Firms responsible for this change often described the increase in CEO exposure to stock prices as a way to align upper management incentives with the interests of shareholders. This strategy may, however, have had mixed results. In particular, it has recently been suggested that large option packages increase the incentives for managers to manipulate their firms' reported earnings.[1]

The use of accruals to temporarily boost or reduce reported income is one mechanism for earnings management. Accruals are components of earnings that are not reflected in current cash flows, and a great deal of managerial discretion goes into their construction. As Fig. 1 shows, accruals (normalized by firm assets) have increased significantly over the past 20 years. This increase has been especially rapid since 1995. We examine cross-sectional data from the 1990s to assess whether the increasing use of accruals is related to the increase in stock-based CEO compensation.

Xerox is an example of a company whose executives appear to have manipulated reported income during the 1990s. During this period, the firm's CEO was exercising large numbers of stock options and selling large numbers of shares. In April 2002, the SEC sued Xerox for manipulating reported earnings and revenues, and as part of the settlement with the SEC Xerox was forced to restate reported revenues for the period 1997–2001. This restatement reduced reported revenues by $2.1 billion and reduced reported net income by $1.4 billion. The SEC's lawsuit accused Xerox of

[1]See, for example, the 9 January, 2004 *New York Times* article by Gretchen Morgenson: "Options packages encourage executives to fiddle books."

using a variety of methods to inflate net income, including inappropriately allocating the revenue stream on their equipment leases. Xerox's accounting choices were inconsistent with GAAP and significantly inflated the company's reported earnings.[2] During this period, the value of options exercised by the Xerox CEO was over $20 million, almost three times the value of options exercised over the prior five years. Xerox is not the only company where inflated earnings coincided with significant option exercises and share sales; other examples include Waste Management, Tyco, and Enron.

Using data from the Compustat and and Compustat Executive Compensation datasets, this paper finds evidence that companies with more "incentivized" CEOs—those whose overall compensation is more sensitive to company share prices—have higher levels of earnings management. These CEOs appear to more aggressively use discretionary components of earnings to affect their firms' reported performance. In addition, CEOs exercise unusually large amounts of options and sell unusually large quantities of their firms' shares during years in which accruals make up a large part of their firms' reported earnings. These findings relate to work on the accruals anomaly documented by Sloan (1996) and Collins and Hribar (2000), and also extend work by Beneish and Vargus (2002) on insider trading, accruals, and returns.

The paper proceeds in four sections. The next section provides a description of the changing structure of executive compensation during the 1980s and 1990s, and discusses existing evidence on earnings management. Section 3 introduces the data used in the paper, and discusses the empirical approach. Section 4 presents empirical results. A final section concludes and discusses directions for future research.

2. Background on executive pay and earnings management

The central tension in the corporate governance literature is the conflict of interest between firms' dispersed owner-investors and the managers hired to determine firms' investment projects and payout decisions. Jensen and Murphy (1990) show that on average, CEOs saw only a $3 increase in the value of their stock and option portfolios for every $1,000 increase in shareholder wealth over the period 1974–1986, suggesting that CEOs had little incentive to maximize shareholder value.[3] Jensen (1993) further presents evidence that excessive R&D and capital investment during

[2]See the GAO's 2002 publication: "Report to the Chairman, Committee on Banking, Housing, and Urban Affairs: Financial Statement Restatements", available at http://www.gao.gov/new.items/d03138.pdf; see also the SEC's news release regarding the Xerox settlement, available at http://www.sec.gov/news/headlines/xeroxsettles.htm.

[3]An implication of their finding was that a CEO might choose to undertake a project that would cost shareholders $1.00 but bring $0.004 in private benefits. Certainly managers look beyond the narrow impact of share price changes on the value of their existing portfolios; career concerns, potential future salary increases, and the social norms and institutional environment of firms all help to motivate behavior consistent with the aims of investors. Jensen and Murphy's line of research, however, helped crystallize a sense that managers' financial insulation from the stock prices of their companies led to value-destroying behavior. Stories from this period described managers so heedless of shareholder interests that they built 'empires' and engaged in other wasteful projects.

the 1980s destroyed at least $10 billion at companies such as General Motors, Ford, British Petroleum, Chevron, and DuPont. On the other hand, there is some evidence that increasing managers' equity-based incentives creates value: Mehran (1995) finds that firm performance is positively related to the share of equity held by managers and the share of manager compensation that is equity-based. Of course, Mehran takes executive exposure to stock price as exogenous. Palia (2001) takes CEO incentives as endogenous and suggests that the cross-sectional relation between Tobin's Q and managerial incentives reflects underlying firm characteristics.

Direct CEO wealth exposure to the stock prices of their companies increased dramatically during the 1990s. Hall and Liebman (1998) show that the median exposure of CEO wealth to firm value tripled between 1980 and 1994. This change came in response to the belief that managers were under-incentivized, as well as to changes in the tax code that increased the attractiveness of performance-based compensation such as grants of stock and options.[4] These changes may have discouraged certain types of wasteful "empire-building," such as those documented by Jensen (1993). This paper presents evidence, however, that highly incentivized CEOs engage in higher levels of earnings manipulation.

The opportunity to "manage" earnings arises in part because reported income includes cash flows as well as changes in firm value that are not reflected in current cash flows. While cash flows are relatively easy to measure, computing the change in firm value that is not reflected in current cash flows often involves a great deal of discretion. The accruals components of income capture the wedge between firms' cash flows and reported income.

For instance, consider a firm that pays cash for a finite-lived goose, laying golden eggs. Accrual accounting attempts to match the initial cash outflow against the future inflows from the investment. The cost of the goose is thus spread over current and future periods. In any particular period, the firm sells the eggs, and (assuming for the moment that customers pay in cash) the cash flows of the firm are the payments for these golden eggs. But the firm has also used up a finite-lived resource, a fact not reflected in current cash flows. A true picture of the firm's income requires an adjustment for the use of the goose, and thus the difference between cash flows and earnings reflects the depreciation of the firm's asset during the period. Conditional on cash flow, the firm can reduce or increase its reported earnings by assuming a higher or lower rate of depreciation. Another method of manipulating earnings is to take expenses that are not reasonably expected to generate future cash flows and label them as investment expenditures. WorldCom, which capitalized

[4]The relevant tax law change was the introduction of Section 162 (m) of the Internal Revenue Code, legislated in 1993. This section placed a $1 million cap on the deductibility of executive compensation from corporate income taxes, and significantly raised the effective tax rate on executive salary in excess of $1 million for any corporation facing positive marginal tax rates. Compensation that is substantially "performance based", such as bonuses or grants of stock and stock options, was exempted from this non-deductibility provision. See Rose and Wolfram (2002) for a discussion of the relation between these tax code changes and executive compensation. See Goldman and Slezak (2004) for a recent theoretical model in which optimal CEO stock ownership is chosen in order to balance the incentive to supply effort and the incentive to misreport performance.

operating expenses, is a striking example of the misapplication of accrual accounting.

To continue with this example, suppose the firm's customers buy golden eggs on credit extended by the firm. Selling goods on credit, the firm has no cash inflow during the period. The firm now possesses promises from customers to pay later; and while these promises are valuable, deciding their value requires judgment. In particular, with credit sales, constructing income requires making assumptions about the speed with which customers will pay and the proportion of customers that will eventually default. These decisions influence the firm's current reported income, and managerial discretion creates the potential for the manipulation of reported earnings.[5]

Researchers in the accounting literature have often focused on earnings management by executives seeking to hit explicit bonus-linked targets for reported income. Healy (1985) presents evidence that the accruals policies of managers are related to the nonlinear incentives inherent in their bonus contracts. Gaver et al. (1995) find evidence of earnings management consistent with income smoothing, as do Burgstahler and Dichev (1997). Such behavior would make sense for managers whose bonus-linked incentives are focused on meeting explicit targets for earnings. Burgstahler and Dichev, in particular, show that firms avoid negative earnings; they present nonparametric evidence that the distribution of earnings is "bunched" just above zero. Degeorge et al. (1999) show that the distribution of earnings bunches at a number of points: above zero earnings, above the level of earnings necessary to have stable or growing earnings, and above analysts' forecasts.

While Healy's (1985) original contribution was to document that managers manipulate earnings to "game" bonus schemes, later work by Sloan (1996) and Collins and Hribar (2000) provides evidence that managers may be able to game the capital markets as well. These authors document an apparent accruals anomaly in financial markets. The market appears to have consistently overestimated the persistence of the accruals components of earnings, and therefore overpriced them. Collins and Hribar suggest that a hedge portfolio strategy exploiting the overvaluation of accruals earned abnormal two-quarter holding period returns of approximately 6 percent over the period 1988–1997. This implies that managers were potentially able, during this period, to use accruals to manipulate the market valuation of their firms. In particular, CEOs were possibly able to sell some of their positions in company stock before the anomalous returns to accruals disappeared.[6]

[5]Though not part of accruals, managers also enjoy discretion in reporting the cost of sponsoring defined benefit pension plans. In particular, firms decide at the beginning of the year what rate of return to assume on the assets that back its pension plan. Regardless of the actual realized rate of return on these assets, the firm can continue to use this assumed rate in computing income. Differences between assumed and actual returns on pension assets can be amortized over long periods of time. See Bergstresser et al. (2004) for more information on earnings management in defined benefit pension plans.

[6]Xie (2001) suggests that this result comes largely from the discretionary part of accruals. Yablon and Hill (2001) observe that the channels available for managers to manipulate earnings are generally 'either legal or effectively insulated from legal regress.'

There is also evidence that managers manipulate earnings during periods when they or their companies are selling shares to capital markets. Beneish and Vargus (2002) analyze accruals, insider sales, and subsequent earnings. They find that periods of very high accruals are associated with sales of shares by insiders, and that low earnings and stock returns follow periods of high accruals that are accompanied by insider sales. Bergstresser et al. (2004) show that firms with defined benefit pension plans make particularly aggressive assumptions about these plans' returns during periods where their executives are exercising stock options. Teoh et al. (1998a, b) show that initial and secondary public offerings of shares by firms that appear to have manipulated earnings around the offering year see substantially worse performance than other offerings. Finally, Burns and Kedia (2003) find that earnings restatements are more common at firms where CEOs have larger options portfolios.

Our paper presents evidence that accruals-based measures of earnings management are higher at firms with higher levels of stock-based incentives. This result complements the existing literature, in particular the papers by Burns and Kedia and Beneish and Vargus. Burns and Kedia focus on earnings restatements; our paper complements theirs by focusing on accruals-based measures of earnings management. In addition, the finding that periods of high accruals coincide with high levels of CEO option exercises and higher levels of CEO and insider share sales extends and complements Beneish and Vargus (2002). Our paper extends one part of their results by focusing on a variety of measures of insider option exercises and share sales, and by presenting an analysis of insider sales that controls explicitly for firm characteristics.

3. Methods and data

This section documents the construction of our main variables: accruals, CEO incentives, and CEO option exercises and share sales. The accrual measures are based on the Compustat dataset, which samples publicly held corporations and contains financial information based on public filings. In addition to accruals, we construct firm-year level measures of earnings, cash flows, firm age, and firm industrial classification. Measures of CEO incentives and measures of CEO option exercises are based on the Executive Compensation database. Finally, data on purchases and sales of shares by executives come from SEC insider filings, available through Thomson Financial. Table 1 presents summary statistics for the samples used in our analysis.

3.1. Accruals

We use data from firms' reported income statements to compute accrual measures. Our methods closely follow those of Dechow et al. (1995). Specifically, we calculate total accruals as the difference between earnings and cash flows from operations:

$$TA_{i,t} = (\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t} - Dep_{i,t})/A_{i,t-1}, \quad (1)$$

Table 1
Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Firms with lagged assets below $1 billion in 1996 dollars (sample for Table 2a)					
Absolute accruals over lagged assets (1)	4,671	0.089	0.271	0	12.443
(1) Using discretionary accruals	4,671	0.081	0.268	0	12.311
(1) Using accruals from statement of cash flows	4,671	0.106	0.641	0	41.151
INCENTIVE_RATIO	4,671	0.263	0.239	0	1
INCENTIVE_RATIO using Core-Guay measure	4,640	0.216	0.248	0	1
Lagged assets	4,671	5.762	0.795	1.593	6.907
Age	4,671	17.251	12.279	1	50
Governance index	1,182	8.551	2.661	2	17
Volatility of sales	4,671	0.099	0.104	0	1.223
Book leverage	4,671	0.447	0.235	0.016	2.628
Tobin's Q	4,662	2.342	2.56	0.298	78.565
Firms with lagged assets above 1 billion of 1996 dollars (sample for Table 2b)					
Absolute accruals over lagged assets (1)	4,199	0.062	0.054	0	0.871
(1) Using discretionary accruals	4,199	0.041	0.051	0	0.83
(1) Using accruals from stat. of cash flows	4,199	0.044	0.052	0	0.72
INCENTIVE_RATIO	4,199	0.244	0.228	0	1
INCENTIVE_RATIO using Core-Guay measure	4,185	0.165	0.251	0	1
Lagged assets	4,199	8.22	0.97	6.908	11.994
Age	4,199	32.146	15.041	1	50
Index of governance from Gompers et al.	1,398	9.78	2.611	2	17
Volatility of sales	4,199	0.075	0.068	0	0.961
Book leverage	4,199	0.579	0.174	0.032	2.062
Tobin's Q	4,194	1.879	1.486	0.435	23.077

Note. $INCENTIVE\_RATIO_{i,t} = ONEPCT_{i,t}/(ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t})$. *ONEPCT* is the dollar change in the value of CEO stock and option holdings coming from a one percent increase in the firm's stock price. *INCENTIVE_RATIO* assumes delta = 1 for options. Incentive ratio calculated using Core-Guay measure uses a measure of the option delta constructed using the technique described in Core and Guay (2002). Governance index is the Investor Responsibility Research Center measure described in Gompers et al. (2003).

$TA_{i,t}$ represents the total accruals of firm i at time t, and the Δ operator represents a one-year change in a variable. The components of accruals include: $\Delta CA_{i,t}$, the change in the current assets of firm i at time t (Compustat data item 4); $\Delta CL_{i,t}$, the change in current liabilities (Compustat data item 5); $\Delta Cash_{i,t}$, the change in cash holdings (Compustat data item 1); and $\Delta STD_{i,t}$, the change in long-term debt in current liabilities (Compustat data item 34). Including $\Delta STD_{i,t}$ removes the portion of $\Delta CL_{i,t}$ that comes from the maturation of the firm's existing long-term debt. $Dep_{i,t}$ is the depreciation and amortization expense of the firm (Compustat data item 14), and $A_{i,t-1}$ is the lagged size (in assets) of firm i at time $t-1$ (Compustat data item 6).

We primarily use $TA_{i,t}$ and $|TA_{i,t}|$ as measures of earnings manipulation. Since earnings management involves the transfer of earnings from one period to another, the $|TA_{i,t}|$ measure of accruals measures the total amount of earnings transfer

without being sensitive to the precise timing of when earnings are increased or decreased.

Following Dechow et al. (1995), we also remove components of accruals that are "nondiscretionary", or beyond the control of the CEO. We use a version of the Jones (1991) model of accruals, which estimates nondiscretionary accruals as the fitted value from a regression of total accruals on lagged firm size, the change in firm sales, and gross property plant and equipment scaled by total firm assets. We estimate the following model:

$$TA_{i,t} = \alpha_0 + \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t}) + \alpha_3 \times (PPE_{i,t}) + \varepsilon_{i,t}. \quad (2)$$

The estimated coefficients are then used to construct nondiscretionary accruals according to the following equation:

$$\overbrace{NDA^2_{i,t}}^{\text{est}} = \overbrace{\alpha_0}^{\text{est}} + \overbrace{\alpha_1}^{\text{est}} \times (1/A_{i,t-1}) + \overbrace{\alpha_2}^{\text{est}} \times (\Delta REV_{i,t}) + \overbrace{\alpha_3}^{\text{est}} \times (PPE_{i,t}). \quad (3)$$

The variable $\Delta REV_{i,t}$ is the change in sales (normalized by lagged assets) for firm i at time t, and $PPE_{i,t}$ is gross property plant, and equipment, again normalized by firm assets. Estimating Eq. (2) on the entire Compustat sample back to 1976, using $TA_{i,t}$ as the dependent variable, yields coefficients that can be applied to current observations to construct a measure of nondiscretionary accruals. This measure of nondiscretionary accruals implies a level of discretionary accruals, as in Eq. (4) below.[7]

$$\overbrace{DA^2_{i,t}}^{\text{est}} = TA_{i,t} - \overbrace{NDA^2_{i,t}}^{\text{est}}. \quad (4)$$

[7]We have also applied versions of this model that are modified to allow more flexibility with respect to time period and industry. First, we run models allowing for dummy variables by year:

$$\text{(2a)}\quad TA_{i,t} = \alpha_0 + \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t}) + \alpha_3 \times (PPE_{i,t}) + \left(\sum_{year=y} \gamma_y\right) + \varepsilon_{i,t}.$$

We apply as well a version of Eq. (2a) that interacts coefficients with year dummy variables:

$$\text{(2b)}\quad TA_{i,t} = \left(\sum_{year=y} \alpha_{0,y} + \alpha_{1,y} \times (1/A_{i,y-1}) + \alpha_{2,y} \times (\Delta REV_{i,y}) + \alpha_{3,y} \times (PPE_{i,y})\right) + \varepsilon_{i,t}.$$

We also run a version of Eq. (2a) which allows for different coefficients by industrial classification, using a 12-classification industry breakdown:

$$\text{(2c)}\quad TA_{i,t} = \left(\sum_{ind=j} \alpha_{0,j} + \alpha_{1,j} \times (1/A_{i,t-1}) + \alpha_{2,j} \times (\Delta REV_{i,t}) + \alpha_{3,j} \times (PPE_{i,t})\right) + \left(\sum_{year=y} \gamma_y\right) + \varepsilon_{i,t}.$$

As noted in the next section, the results from models based on Eqs. (2a)–(2c) are similar enough to results based on (2) that they have been suppressed for the sake of brevity. These results are available from the authors by request.

We also explore using a version of the "Modified Jones" model, substituting the change in sales less the change in receivables ($\Delta REV_{i,t} - \Delta REC_{i,t}$) for the change in sales in Eq. (2):

$$\overbrace{NDA^3_{i,t}}^{\text{est}} = \beta_0 + \beta_1 \times (1/A_{i,t-1}) + \beta_2 \times (\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_3 \times (PPE_{i,t}) + \varepsilon_{i,t}, \quad (5)$$

$$\overbrace{DA^3_{i,t}}^{\text{est}} = TA_{i,t} - \overbrace{NDA^3_{i,t}}^{\text{est}}. \quad (6)$$

The results using discretionary accruals based on the Modified Jones model are similar to the results using the Jones model and omitted for brevity.

The approaches outlined above estimate accruals using changes between successive years in firms' balance sheet items. However, Hribar and Collins (2002) point out that using successive-year balance sheet variables to measure earnings management creates potential problems around "non-articulation" dates, such as mergers and acquisitions. They propose two measures of earnings management that are immune to the non-articulation problem. Both measures are based on information reported in firms' cash flow statements. The first measure is reported earnings before extraordinary items and discontinued operations (Compustat data item 123) less operating cash flows from continuing operations (Compustat item 308—Compustat item 124):

$$TA^{CF}_{i,t} = (EBXI_{i,t} - CFO_{i,t})/A_{i,t-1}. \quad (7)$$

We use this measure, which we call TA^{CF}, because it is based on data from the statement of cash flows. This measure is conceptually similar to the balance-sheet accruals measure introduced earlier in that it captures the difference between earnings and cash flows, but it is computed based on data from the income statement and the statement of cash flows and is therefore not subject to the non-articulation problem. Phillips et al. (2003) propose using deferred tax expense as a signal of earnings management. We explore this measure as well, and the results are available from the authors by request.

3.2. Executive incentives

This paper assesses the relation between earnings manipulation and the power of CEO equity-based incentives, as measured by the dollar change in the value of a CEO's stock and options holdings that would come from a one percentage point increase in the company stock price. We construct this measure, $ONEPCT_{i,t}$, using the Compustat Executive Compensation data on CEO stock and option holdings:

$$ONEPCT_{i,t} = 0.01 * PRICE_{i,t} \times (SHARES_{i,t} + OPTIONS_{i,t}), \quad (8)$$

where *PRICE* is the company share price, *SHARES* is the number of shares held by the *CEO*, and *OPTIONS* is the number of options held by the CEO. We then use

$ONEPCT_{i,t}$ to calculate the variable $INCENTIVE\_RATIO_{i,t}$. This measure of incentives is normalized in a way that captures the share of a hypothetical CEO's total compensation that would come from a one percentage point increase in the value of the equity of his or her company, as shown below:

$$INCENTIVE\_RATIO_{i,t} = ONEPCT_{i,t}/(ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t}). \quad (9)$$

The measures above are based on the implicit assumption that the "delta" of the options in the CEO's portfolio is one, i.e. a dollar increase in the price of a firm's shares translates one-for-one to the value of an option. While this is approximately true for options that are deep in the money, it is a less accurate assumption for options that are out of the money. To more closely match the delta of out-of-the-money options, we follow the Core and Guay (2002) approach and estimate the delta of the option portfolio by dividing the CEO's options into three groups: those awarded in the current year, those awarded in previous years but not yet exercisable, and those that are currently exercisable. For each group, measures of the exercise price and other variables in the Black-Scholes option formula are taken or constructed from the Execucomp dataset. We denote the '*ONEPCT*' measure based on the Core-Guay technique $ONEPCT^{CG}$. We use this measure to construct the incentive ratio as well:

$$INCENTIVE\_RATIO^{CG}_{i,t} = ONEPCT^{CG}_{i,t}/(ONEPCT^{CG}_{i,t} + SALARY_{i,t} + BONUS_{i,t}). \quad (10)$$

In addition to assessing the relation between CEO equity-based incentives and earnings manipulation, this paper also looks at the relation between high-accrual periods and executive option exercises and share sales. The primary measure of CEO selling activity is the value of CEO option exercise, normalized by firm value. We test whether selling activity, captured by this CEO exercise variable, is particularly pronounced during periods of high accruals. Our maintained assumption is that executives sell the shares arising from option exercises. Ofek and Yermack (2000), looking at US executives, document that nearly all executive stock option exercises are followed by share sales. This result may not generalize internationally, however; Kyriacou and Mase (2004) find that executives in the UK sell, on average, only half of the shares from the options exercised.

We also use measures of share sales taken from the Thomson Financial data on firm insider transactions. Insider trade data from Thomson are available as far back as the 1980s, but we start the sample at 1993 because executives' positions within the company are not reliably identified until relatively recently. The reliability with which insiders' positions are identified within the company increases over time; the results in this paper are not highly sensitive to the choice of start date. We create four measures of CEO and insider sales: the gross number of shares sold by the CEO normalized by the number of shares outstanding; net sales of shares by the CEO as a proportion of outstanding shares; and gross and net sales of shares normalized by outstanding shares for executives identified as holding one of five senior positions

(CEO, COO, CFO, President, and Chairman) in each year. Because the coverage of the Thomson dataset extends to firms smaller than the Executive Compensation dataset, using the Thomson data expands the analysis to a broader sample of corporations.

4. Results

The results in this section are divided into two subsections. Section 4.1 evaluates the relation between CEO financial incentives and earnings management across companies during the 1990s. We find that accruals are more actively used at firms where CEO compensation is more closely linked to the value of the stock.

Section 4.2 uses a variety of measures of insider option exercises and share sales to document that periods when accruals are high (our proxy for periods when earnings management is being used to boost current reported income) are periods when CEOs and other insiders are selling shares and exercising options.

Taken together, these results suggest a dark side to the increasing use of equity-based incentives in executive compensation. Highly incentivized executives appear more likely to manipulate reported measures of corporate performance, and appear to be cashing in their equity when reported earnings are artificially high.

4.1. CEO incentives and earnings management

Because earnings manipulation involves both positive and negative values of accruals, the results in this section fit regressions of the absolute value of total accruals ($|TA|$) on measures of CEO incentives:

$$\left|TA_{i,t}\right| = \alpha + \beta \times INCENTIVE\_RATIO_{i,t-1} + X'_{i,t}\Gamma + \varepsilon_{i,t}. \quad (11)$$

Table 2a presents the results for firms with assets below $1 billion (in 1996 dollars), and Table 2b for firms with assets above $1 billion. This cutoff is not the same as the one used to construct Fig. 1, because Fig. 1 uses all firms for which Compustat data are available, while Table 2 uses only firms with data on executive compensation, which tend to be larger. We run separate regressions for small and large firms because, even though the results are qualitatively similar, the data reject the equality of coefficients between these two groups. Unless otherwise noted, the variables are winsorized at the 1st and 99th percentiles (calculated annually) in all equations. This approach reduces the influence of outlier observations.

Column 1 of Table 2a presents results based on Eq. (11) estimated without control variables. The coefficient on the *INCENTIVE_RATIO* variable suggests that a one percentage point increase in this ratio is associated with an 11 basis point increase in the absolute value of firm financial accruals. A movement from the 25th percentile of *INCENTIVE_RATIO* (8.3%) to the 75th percentile (34.5%) would be associated with a 300 basis point increase in the absolute value of accruals over assets.

Adding control variables reduces the coefficient but does not affect the statistical significance of the result. We control for firm size, firm corporate governance, firm

Table 2a
Small firms (lagged assets below $1 billion in 1996 dollars)

Dependent variable	Total accruals over lagged assets; accruals constructed using balance sheet data		Total accruals over lagged assets; accruals constructed using balance sheet data		Discretionary accruals over lagged assets; accruals constructed using balance sheet data		Discretionary accruals over lagged assets; accruals constructed using cash flow data		Discretionary accruals over lagged assets; accruals constructed using balance sheet data	
	1		2		3		4		5	
Independent variables	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
$RATIO_{I,t-1}$	0.1164	0.0398	0.0768	0.0287	0.0743	0.028	0.1038	0.0657		
$RATIO_{i,t-1}$ using Core-Guay delta									0.075	0.032
$\ln(Assets_{i,t-1})$			−0.0109	0.0042	−0.0126	0.0039	−0.024	0.0071	−0.0119	0.004
Governance variables (*omitted is missing*)										
$G <= 6$ (democracy)			−0.0354	0.011	−0.0385	0.011	−0.0494	0.0214	−0.0354	0.011
$7 <= G <= 9$			−0.0265	0.0081	−0.0311	0.0079	−0.0478	0.0143	−0.0265	0.0081
$10 <= G <= 12$			−0.0221	0.0083	−0.0296	0.0083	−0.0405	0.0146	−0.0221	0.0083
$13 <= G$ (dictatorship)			−0.0165	0.0088	−0.02	0.009	−0.0234	0.0148	−0.0165	0.0088
Firm age variables										
5–19 years listed in Compustat			−0.0654	0.0287	−0.0672	0.0281	−0.1293	0.0700	−0.0674	0.0280
20+ years			−0.0471	0.0167	−0.0466	0.0162	−0.0860	0.0329	−0.0477	0.0162
Other variables										
Volatility of sales growth			0.5097	0.2343	0.5147	0.2315	1.0556	0.6513	0.5217	0.2336
Book leverage (one year lag)			0.0179	0.0132	0.0112	0.0128	0.0189	0.0190	0.0118	0.0132
10 deciles of Market to Book	No		Yes		Yes		Yes		Yes	
Year dummies	No		Yes		Yes		Yes		Yes	
Exchange dummies	No		Yes		Yes		Yes		Yes	
48 Industry dummies	No		Yes		Yes		Yes		Yes	
Constant	0.058	0.007	0.122	0.025	0.120	0.023	0.201	0.036	0.069	0.010
R^2	0.015		0.077		0.082		0.050		0.083	
N	4,671		4,671		4,671		4,671		4,640	

OLS regressions of accruals over assets on CEO incentives. Columns 1 and 2 fit total accruals over lagged assets: $|TA_{i,t}/A_{i,t-1}| = a + b * RATIO_{i,t-1} + X'_{i,t}G + e_{i,t}$. Total accruals constructed based on firms' reported balance sheet information. $RATIO_{i,t-1}$ constructed as : $RATIO_{i,t} = ONEPCT_{i,t}/(ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t})$. *ONEPCT* is the dollar change in the value of CEO stock and option holdings coming from a one percent increase in the firm's stock price. Columns 3, 4, and 5 fit discretionary accruals, where discretionary accruals are constructed according to the modified version of the Jones model discussed in the text. Column 3 uses an accruals measure constructed using firms' reported cash flows; columns 4 and 5 use accruals measures constructed using firms' reported balance sheet information. Column 5 substitutes for *ONEPCT* a measure based on the an estimated delta, constructed according to the Core-Guay technique, for the executive's portfolio of options. Standard errors are corrected for firm-level clustering. 1994–2000.

Table 2b
Large firms (lagged assets over $1 billion in 1996 dollars)

Dependent variable	Total accruals over lagged assets; accruals constructed using balance sheet data		Total accruals over lagged assets; accruals constructed using balance sheet data		Discretionary accruals over lagged assets; accruals constructed using balance sheet data		Discretionary accruals over lagged assets; accruals constructed using cash flow data		Discretionary accruals over lagged assets; accruals constructed using balance sheet data	
	1		2		3		4		5	
Independent variables	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
$RATIO_{i,t-1}$	0.0297	0.0068	0.0161	0.0076	0.0174	0.0071	0.0219	0.0065		
$RATIO_{i,t-1}$ using Core-Guay delta									0.0163	0.0058
$\ln(ASSETS_{i,t-1})$			−0.0036	0.0011	−0.0065	0.0010	−0.0064	0.0009	−0.0061	0.0009
Governance variables (*omitted is missing*)										
$G <= 6$ (democracy)			−0.0017	0.0073	0.0035	0.0063	0.0001	0.0079	0.0027	0.0064
$7 <= G <= 9$			−0.0024	0.0050	−0.0001	0.0048	−0.0087	0.0044	−0.0007	0.0049
$10 <= G <= 12$			−0.0067	0.0037	−0.0064	0.0035	−0.0071	0.0035	−0.0069	0.0035
$13 <= G$ (dictatorship)			−0.0002	0.0050	0.0011	0.0049	−0.0091	0.0048	0.0007	0.0050
Firm age variables										
5–19 years listed in Compustat			0.0014	0.0067	0.0033	0.0059	−0.0009	0.0069	0.0027	0.0059
20+ years			−0.0076	0.0062	−0.0065	0.0055	−0.0122	0.0062	−0.0073	0.0055
Other variables										
Volatility of sales growth			0.0913	0.0204	0.1239	0.0199	0.1135	0.0251	0.1256	0.0202
Book leverage (one year lag)			0.0095	0.0086	0.0149	0.0077	0.0099	0.0075	0.0155	0.0077
10 deciles of market to book	No		Yes		Yes		Yes		Yes	
Year dummies	No		Yes		Yes		Yes		Yes	
Exchange dummies	No		Yes		Yes		Yes		Yes	
48 Industry dummies	No		Yes		Yes		Yes		Yes	
Constant	0.054	0.002	0.069	0.012	0.066	0.010	0.080	0.010	0.069	0.010
R^2	0.016		0.098		0.131		0.131		0.132	
N	4,199		4,199		4,199		4,199		4,185	

OLS regressions of accruals over assets on CEO incentives. Columns 1 and 2 fit total accruals over lagged assets: $|TA_{i,t}/A_{i,t-1}| = a + b * RATIO_{i,t-1} + X'_{i,t}G + e_{i,t}$. Total accruals constructed based on firms' reported balance sheet information. $RATIO_{i,t-1}$ constructed as : $RATIO_{i,t} = ONEPCT_{i,t}/(ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t})$. *ONEPCT* is the dollar change in the value of CEO stock and option holdings coming from a one percent increase in the firm's stock price. Columns 3, 4, and 5 fit discretionary accruals, where discretionary accruals are constructed according to the modified version of the Jones model discussed in the text. Column 3 uses an accruals measure constructed using firms' reported cash flows; columns 4 and 5 use accruals measures constructed using firms' reported balance sheet information. Column 5 substitutes for *ONEPCT* a measure based on the an estimated delta, constructed according to the Core-Guay technique, for the executive's portfolio of options. Standard errors are corrected for firm-level clustering. 1994–2000.

age, lagged leverage, lagged volatility of sales, year and industry dummies, 10 deciles of market-to-book, and dummy variables for the stock exchange on which the firm's shares trade. The estimated coefficient remains statistically significant, and suggests that a movement from the 25th to the 75th percentile of *INCENTIVE_RATIO* would be associated with a 200 basis point increase in the absolute value of accruals over assets.

In particular, controlling for size, age, volatility, and market-to-book suggests that our results are not driven by the more volatile operating environments of firms that use a lot of stock-based compensation. We control for firms' market-to-book ratios in an effort to exclude a potential alternative explanation for our findings. Smith and Watts (1992), looking at data aggregated to the level of industries, show that there is a positive relation between firms' growth opportunities and their pay-performance sensitivity. Given that growth options are not directly observable, it is not possible to entirely rule out the possibility of some remaining omitted variable bias. We do, however, find some corroborating evidence in Burns and Kedia (2004), who show that CEOs with more stock options are more likely to have to restate their company's earnings. Their restatement-based measure of earnings management is less likely to be contaminated by the presence of growth options.

The remaining columns of Table 2a fit regressions similar to Eq. (11) above, but using different measures of accruals and CEO incentives, as described in Section 3. The dependent variable in the third regression of Table 2a is the absolute value of discretionary accruals $|DA|$ computed using the Jones Model. The fourth regression uses a measure of accruals that is not subject to the problems around firm non-articulation dates. This measure of accruals is based on data from statements of cash flows rather than balance sheets, as proposed by Hribar and Collins (2002). The fifth regression returns to the earlier measures of accruals, but focuses on a measure of CEO incentives that explicitly models the "delta" on the executives' portfolios of options, following the techniques outlined by Core and Guay (2002). All these robustness checks confirm our main result: CEOs with higher exposure to their firms' equity lead firms where earnings management is more pronounced.

Table 2b repeats the same steps using firms with more than $1 billion in lagged assets. In these large firms, the sample mean of accruals over lagged assets is lower, and the estimated coefficients are smaller than in Table 2a. However, because the data for large firms are less noisy, the results are at least as significant as in Table 2a.

The evidence in Tables 2a and b suggests a direct link between earnings management and the financial incentives given to CEOs. Together with Fig. 1, this gives us a consistent picture in the time series and in the cross-section. In the next subsection, we investigate how CEOs exercise their options and trade their companies' stock around years of high accruals.

4.2. Insider sales around high-accrual periods

This section evaluates CEO option exercises and insider sales in periods of large and positive accruals. Our results confirm and extend the findings of Beneish and Vargus (2002), who show that during periods when accruals are high, insiders sell

unusually large numbers of shares, and that the periods of high accruals that accompany large insider sales are followed by particularly low reported earnings and stock returns. Our contribution is to use a broader set of measures of insider trading, as well as data on option exercises. Data on option exercise come from the Compustat Executive Compensation database for the period 1993–2000. The first measure of insider sales is the value realized from CEO option exercise as a proportion of firm equity market value. The second measure is gross CEO share sales as a proportion of firm equity market value; these data are based on the Thomson database. The third measure is CEO share sales net of purchases, and the fourth and fifth measures are top-five insider gross and net share sales, again normalized by firm equity market value.

The first two columns of Table 3 show coefficients and standard errors, respectively, from the regression of CEO option exercises (normalized by firm market value) on a dummy variable capturing whether the firms' total accruals were in the top 10% of firms in our sample in that year. This decile-based approach follows Beneish and Vargus (2002). Results based on analyzing the top 10%, 5%, and 1% of accruals, as well as results based on linear specifications, are robust to the particular specification choice. Eq. (12) captures the regression specification for the first columns of Table 3:

$$(VALUE\_OPTION\_EXERCISE_{i,t}/FIRM\_VALUE_{i,t}) = \alpha + \beta \times (DUMMY\ for\ TA_{i,t}\ in\ top\ 10\%) + X'_{i,t}\Gamma + \varepsilon_{i,t}. \quad (12)$$

The first rows present coefficients from a regression with no additional controls. These results suggest that the value of CEO option exercises, as a proportion of firm equity market value, is 3.82 basis points higher in periods when the firms they manage have levels of accruals that are in the top 10% of firms in that year. The second set of rows presents the coefficients on the high-accruals dummy based on specifications that also include additional controls: firm size, year dummy variables and dummies capturing the firm's age, governance environment, the exchange on which the firm's shares trade, and the industry in which the firm competes. Adding these controls, the result is still economically and statistically significant: the value of option exercise as a share of firm value is 2.2 basis points higher in the high-accrual periods.

The third set of rows present coefficients from a specification that includes, in addition to the variables mentioned above, a variable capturing the firm's leverage and ten dummy variables capturing the firm's market-to-book ratio. When we add these variables, the result is no longer statistically significant, with a point estimate of 1.74 and a standard error on that point estimate of 1.05.

The reported specifications use option exercises and share sales normalized by firm value. This measure captures the intensity of executive selling activity in a given period. We also explore measures of option exercise normalized by the number of options held by the CEO at the beginning of the year. This measure controls for cross-firm heterogeneity in the intensity of option-based compensation. The results are very similar to the ones presented in Table 3. We further explore whether the

Table 3
Option exercises and share sales of CEOs and insiders around high-accrual periods

Dependent variable	CEO option exercise as a share of firm equity market value		CEO gross share sales as share of firm equity market value		CEO net share sales as share of firm equity market value		Total insiders gross share sales as share of firm equity market value		Total insiders net share sales as share of firm equity market value	
Regression number	1		2		3		4		5	
Sample	Compustat execucomp		Thomson financial		Thomson financial		Thomson financial		Thomson financial	
Specification 1: *No control variables*										
Independent variable	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
Constant	5.256	0.258	11.58	0.717	3.474	0.947	29.476	1.081	9.583	1.533
Dummy variable = 1 if accruals in top 10% of year	3.8210	1.0090	19.0970	3.8960	12.7760	4.8080	43.9080	5.2700	29.5290	8.1940
Specification 2: *Control variables include log firm size, governance dummy variables, firm age dummy variables, exchange dummy variables, 48 industry dummy variables, and year dummy variables*										
Dummy variable = 1 if accruals in top 10% of year	2.2080	1.0330	16.0540	3.9300	12.9490	4.9020	36.2330	5.2960	31.0530	8.2240
Specification 3: *Control variables include log firm size, governance dummy variables, firm age dummy variables, exchange dummy variables, 48 industry dummy variables, year dummy variables, leverage, and 10 book/market dummy variables*										
Dummy variable = 1 if accruals in top 10% of year	1.7390	1.0470	14.6900	3.8560	10.5320	4.8380	33.0540	5.1910	25.0860	8.1260
N	15,654		40,517		40,517		40,517		40,517	

Regressions fit CEO option exercise or share sales, on a dummy variable set equal to 1 if a firm's accruals are in the top 10% of firms in our sample in that year. Specification 1 includes no additional control variables. Specifications 2 and 3 include the control variables listed. Standard errors are corrected for firm-level clustering. Sample period 1993–2000 for Compustat sample, 1996–2001 for Thomson sample.

tendency to exercise options during high-accrual periods is more pronounced for CEOs who have more equity-based compensation. While the point estimate on the relation between accruals and option exercise is higher for CEOs with more equity-based compensation, the difference in the coefficient between the high-equity compensation and low-equity compensation samples is not statistically significant at standard confidence levels.

The second column shows the results of three regressions using the larger Thomson sample and using gross CEO share sales, normalized by firm equity market value, as the dependent variable. Again, the first row shows the coefficient on the high-accrual dummy in a specification with no additional controls, while the second and third columns add increasingly generous sets of control variables. The first row suggests that periods of high accruals see CEO share sales that are 19 basis points higher than other periods; controlling for year effects, industry effects, exchange effects, firm size, firm age, governance, leverage, and market-to-book ratio reduces the estimated effect to 14.7 basis points.

The third column uses the same sample as the second column but a different dependent variable: net CEO share sales as a proportion of firm value. Netting out purchases captures the true change in the CEO's exposure to the firm's performance. Regardless of the control structure employed, the results suggest that high-accrual periods coincide with net sales of shares by firms' CEOs. Finally, the fourth and fifth columns repeat this exercise for a broader sample of executives, focusing on the holders of the top five positions within each firm: CEO, COO, CFO, President, and Chairman. Column 4 focuses on gross share sales, and Column 5 on net share sales. Again, the results are highly significant. Periods in which earnings are increased by accruals see substantially higher insider sales. This result is consistent with the analysis of Beneish and Vargus (2002), although they use a different sample and a different approach. They focus on the top five executives and create a measure of the net shares purchased (as a proportion of outstanding) for these managers. They then create an "abnormal selling" dummy variable, which is equal to one if two conditions are met: the net amount of shares purchased for the firm in that year is negative, and the net amount of shares purchased is lower than the median of all firms that are in the same CRSP size decile and htat have negative net shares purchased. The proportion of "abnormal sale" firm-year observations is increasing in accruals after controlling for firm size, though not for other potential explanatory variables.

5. Conclusion

The scale of the modern corporation makes the separation of ownership and control common, especially at the largest firms. Dispersed investor-owners rely on professional managers, who rarely own more than a tiny fraction of the companies they manage, to make investment and payout decisions. A manager whose personal financial stake is unaffected by the value of the company he or she manages may act in ways that, while privately beneficial, reduce the value of the investors' claims. This

separation of ownership and control has long been recognized as a root of corporate governance problems (Berle and Means, 1932; Smith, 1776).

Partly because of concerns that managers' insulation from their companies' performance leads to value-destroying executive behavior, the 1990s saw executives become much more directly exposed to changes in their companies' share prices through substantial grants of options and stock. By the end of the decade, managers' potential incentives to affect the share prices of their companies had increased dramatically. Although these changes were motivated by a desire to align managers' incentives with those of shareholders, our results suggest that they brought a new set of problems. Tying management incentives to the stock price may have had the perverse effect of encouraging managers to exploit their discretion in reporting earnings, with an eye to manipulating the stock prices of their companies.

We find evidence that more "incentivized" CEOs—those whose overall compensation is more sensitive to company share prices—lead companies with higher levels of earnings management. We go on to document that periods of high accruals coincide with unusually significant option exercises by CEOs and unloading of shares by CEOs and other top executives.

If the insulated CEO, undertaking socially wasteful but personally beneficial projects, was an archetype of the 1970s and 1980s, then a highly incentivized CEO, manipulating reported earnings, may have become an archetype of the late 1990s. This does not mean that financial incentives destroy value on average, but it does mean that making the most efficient use of high-powered incentives requires careful consideration of their possible good and ill effects. In particular, high-powered incentives based on stock price performance seem likely to work best when coupled with a careful consideration of managers' opportunities to exploit these incentives through the discretion that they enjoy in reporting their firms' performance.

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