Comments welcome

CEO incentives and earnings management

Daniel Bergstresser[a]*, Thomas Philippon[b]

[a]*Harvard Business School, Boston MA 02163 USA*
[b]*NYU Stern School of Business, New York, NY 10012-1126 USA*

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Abstract

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 amounts of options and CEOs and other insiders sell large quantities of shares.

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*Corresponding author. Tel.: 617 495 6169; fax: 617 496 5271; e-mail dbergstresser@hbs.edu

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 price tripled between 1980 and 1994, and doubled again between 1994 and 2000[1]. The 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 increased the incentives for managers to manipulate their firms' reported earnings.[2]

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 Figure 1 shows, accruals (normalized by firm assets) have increased significantly over the past 20 years. This increase has been especially rapid since 1995. This paper uses cross-sectional data from the 1990s to assess whether the increasing use of accruals was related to the increase in stock-based CEO compensation.

Xerox is an example of a company where executives appear to have manipulated reported income during the 1990s. During this period, the firm's CEO was exercising large amounts 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 between 1997 and 2001. This restatement reduced reported revenue by $2.1 billion and reducing reported net income by $1.4 billion. The SEC's lawsuit accused Xerox of using a variety of tricks 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

[1] See Hall and Liebman (1998).
[2] See, for example, the 9 January 2004 *New York Times* article by Gretchen Morgenson: 'Options packages encourage executives to fiddle books.'

earnings.[3] 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.

This paper uses data from the Compustat and and Compustat Executive Compensation datasets to 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. 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 where 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.

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

1. 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) showed that on average, CEOs enjoyed a $3 increase in the value of their stock and option portfolios for every $1000 increase in

[3] 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.

shareholder wealth, suggesting that CEOs had little incentive to maximize shareholder value.[4] Indeed, Jensen (1993) presents evidence that excessive R&D and capital investment during the 1980s destroyed at least $10 billion each at companies including 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.[5]

Direct CEO 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.[6] 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 also engaged in higher levels of earnings manipulation.

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[4] 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.

[5] A key weakness of Mehran's empirical approach is that he takes executive exposure to the stock price as exogenous. See Palia (2001) for an approach that takes CEO incentives as endogenous. His analysis suggests that the cross-sectional relationship between Q and managerial incentives reflects underlying firm characteristics, and does not imply that firms, in equilibrium, could increase their value by increasing the power of their executives' incentives.

[6] 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 relationship between these tax code changes and executive compensation.

The opportunity to 'manage' earnings arises in part because reported income includes both cash flows and 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 income.

For instance, consider a firm that owns a finite-lived goose, laying golden eggs. While cash may have been used for the initial purchase of the goose, accrual accounting attempts to match this initial outflow against the future inflows from this 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. And conditional on cash flow, the firm can reduce or increase its reported earnings by assuming a higher or lower rate of deprecation.[7]

Continuing 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; 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 share of customers that will eventually default. These decisions influence the firm's current reported

[7] Another method of manipulating earnings is to take expenses that are not reasonably expected to generate future cash inflows and label them as investment. Worldcom, which capitalized operating expenses, is a striking example of the misapplication of accrual accounting.

income, and the discretion that managers enjoy creates a potential setting for the manipulation of reported earnings.[8]

Researchers in the accounting literature have often focused on earnings management by managers 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, Gaver, and Austin (1996) 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.[9]

While Healy (1985)'s 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[10]. 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 to overprice 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 between 1988 and 1997. This implies that managers may potentially have been able, during this period, to use accruals to manipulate the markets' valuation of their firms.

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[8] 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, Desai, and Rauh (2004) for more information on earnings management in defined benefit pension plans.

[9] See also Degeorge, Patel, and Zeckhauser (1999), who 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.

[10] Potential market-based incentives for this type of behavior are discussed in Barth et al (1995). They show that firms with a consistent pattern of earnings increases appear to trade at a premium.

In particular, CEOs may have been able to sell some of their positions in company stock before the anomalous returns to accruals disappeared.[11]

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 they find that low earnings and stock returns follow the periods of high accruals that are accompanied by insider sales. Bergstresser, Desai, and Rauh (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. A set of papers from Teoh, Welch, and Wong (1998a,1998b), 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.

This 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 exercise and higher levels of CEO and insider share sale extends and complements Beneish and Vargus (2001). This paper extends one part of their results by focusing on a variety of measures of insider option exercise and share sales, and by presenting an analysis of insider sales that controls explicitly for firm characteristics.

[11] See Xie (2001), who suggests that this result comes largely from the discretionary part of accruals. See also Yablon and Hill (2001) for a discussion of how the channels available for managers to manipulate earnings are generally 'either legal or effectively insulated from legal regress.'

2. Methods and data

This section documents data construction of our main variables: accruals, CEO incentives, and CEO option exercise and share sales. The accruals 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 exercise 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.

2.1. Accruals.

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

$$(3.1)\quad TA_{i,t} = (\Delta CA_{i,t} - \Delta CL_{i,t} - \Delta Cash_{i,t} + \Delta STD_{i,t} - Dep_{i,t}) / A_{i,t-1}$$

TA 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_{it} 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 (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, Sloan, and Sweeney (1995), this paper 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:

$$(3.2)\quad TA_{i,t} = \alpha_0 + \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t}) + \alpha_3 \times (PPE_{i,t}) + \varepsilon_{i,t}$$

The estimated coefficients are then used to construct nondiscretionary accruals according to equation (3.3):

$$(3.3)\quad \overbrace{NDA_{i,t}^{2}}^{est} = \overbrace{\alpha_0}^{est} + \overbrace{\alpha_1}^{est} \times (1/A_{i,t-1}) + \overbrace{\alpha_2}^{est} \times (\Delta REV_{i,t}) + \overbrace{\alpha_3}^{est} \times (PPE_{i,t})$$

The variable $\Delta REV_{i,t}$ is the change in sales (normalized by lagged assets) at firm i at time t, and PPE is gross property plant, and equipment, again normalized by firm assets. Estimating the model (3.2) on the entire Compustat sample back to 1976, using TA as the dependent variable, yields coefficients that can be applied to current observations to construct a measure of non-discretionary accruals. This measure of non-discretionary accruals implies a level of discretionary accruals, as in equation (3.4) below.[12]

[12] 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:

$$(3.2')\quad TA_{i,t} = \alpha_0 + \alpha_1 \times (1/A_{i,t-1}) + \alpha_2 \times (\Delta REV_{i,t}) + \alpha_3 \times (PPE_{i,t}) + \left(\sum_{year=y} \gamma_y \right) + \varepsilon_{i,t}$$

We apply as well a version of equation (3.2') that interacts coefficients with year dummy variables:

$$(3.2'')\quad TA_{i,t} = \left(\sum_{year=y} \alpha_{0,y} + \alpha_{1,y} \times (1/A_{i,y-1}) + \alpha_{2,y} \times (\Delta REV_{i,y}) + \alpha_{3,y} \times (PPE_{i,y}) \right) + \varepsilon_{i,t}$$

We also run a version of equation (3.2') which allows for different coefficients by industrial classification, using a 12-classification industry breakdown:

$$(3.2''')\quad TA_{i,t} = \left(\sum_{ind=j} \alpha_{0,j} + \alpha_{1,j} \times (1/A_{i,t-1}) + \alpha_{2,j} \times (\Delta REV_{i,t}) + \alpha_{3,j} \times (PPE_{i,t}) \right) + \left(\sum_{year=y} \gamma_y \right) + \varepsilon_{i,t}$$

$$(3.4)\quad \overbrace{DA_{i,t}^{2}}^{est} = TA_{i,t} - \overbrace{NDA_{i,t}^{2}}^{est}$$

We also explored 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 equation (3.2):

$$(3.5)\quad \overbrace{NDA_{i,t}^{3}}^{est} = \beta_0 + \beta_1 \times (1/A_{i,t-1}) + \beta_2 \times (\Delta REV_{i,t} - \Delta REC_{i,t}) + \beta_3 \times (PPE_{i,t}) + \varepsilon_{i,t}$$

$$(3.6)\quad \overbrace{DA_{i,t}^{3}}^{est} = TA_{i,t} - \overbrace{NDA_{i,t}^{3}}^{est}$$

The results using discretionary accruals based on the Modified Jones model were 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, problems can arise when using balance sheet information to construct measures of accruals. Hribar and Collins (2001) 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 the difference between reported earnings before extraordinary items and discontinued operations (Compustat data item 123) and operating cash flows from continuing operations (Compustat item 308 – Compustat item 124):

$$(3.7)\quad TA_{i,t}^{CF} = (EBXI_{i,t} - CFO_{i,t}) / A_{i,t-1}$$

As noted in the next section, the results from models based on (3.2')-(3.2''') are similar enough to results based on (3.2) that they have been suppressed for the sake of brevity. These results are available from the authors by request.

This paper uses 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. The important difference is that 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.[13]

2.2. Executive incentives

This paper assesses relationship between earnings manipulation and the power of CEO equity-based incentives. Our measure of the power of CEO incentives is based on a measure of the dollar change in the value of a CEO's stock and options holdings that would come from a one percentage point increase in company stock price. We construct this measure using the Compustat Executive Compensation data on CEO stock holdings and option holdings. Our measure ONEPCT is constructed as in (3.8) below:

$$(3.8)\quad ONEPCT_{i,t} = 0.01 * PRICE_{i,t} \times (SHARES_{i,t} + OPTIONS_{i,t})$$

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 to calculate the variable INCENTIVE_RATIO. 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 company. This incentivization measure is below:

$$(3.9)\quad INCENTIVE\_RATIO_{i,t} = ONEPCT_{i,t} / (ONEPCT_{i,t} + SALARY_{i,t} + BONUS_{i,t})$$

[13] Phillips, Pincus, and Rego (2003) propose using deferred tax expense as a signal of earnings management. Deferred tax expenses arise when book earnings are accelerated relative to tax earnings, which can be consistent with earnings management. We explored this measure as well; results using deferred tax expense and a second Hribar and Collins measure were similar to results using TA^{CF} and are available from this authors upon request.

The measures above are based on the implicit assumption that the 'delta' of the options in the CEO's portfolio is one. In other words, these measures assume that 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 also use a measure of the 'delta' of the CEO's option portfolio that follows the Core and Guay (2002) approach. This approach estimates 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 which 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 use the Core-Guay measure of option delta as well, and we denote the 'ONEPCT' measure based on the Core-Guay technique $ONEPCT^{CG}$. We use this measure to construct the incentive ratio, as well:

$$(3.11)\quad INCENTIVE\_RATIO^{CG}{}_{i,t} = ONEPCT^{CG}{}_{i,t} / (ONEPCT^{CG}{}_{i,t} + SALARY_{i,t} + BONUS_{i,t})$$

In addition to assessing the relationship between CEO equity-based incentives and earnings manipulation, this paper also looks at the relationship 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, supported by Ofek and Yermack (2000), is that executives sell the shares arising from option exercises.[14]

[14] 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.[15] 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 share 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.

3. Results

The results in this section are divided into two subsections. Subsection 3.1 evaluates the relationship between CEO financial incentives and earnings management across companies during the 1990s. We find that accruals are more actively used at firms where the compensation of the CEO is more closely linked to the value of the stock.

Subsection 3.2. uses a variety of measures of insider option exercise 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 equity of equity-based incentives in executive compensation. Highly incentivized executives appear more likely to manipulate reported measures of corporate performance, and appear to be liquidating stakes in their companies when their reported earnings are artificially high.

3.1. CEO Incentives and earnings management

[15] 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 when to start the sample.

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:

$$(4.3)\quad \left|TA_{i,t}\right| = \alpha + \beta \times INCENTIVE\_RATIO_{i,t-1} + X'_{i,t}\,\Gamma + \varepsilon_{i,t}$$

Table 2a presents the results for firms with assets below $1 billion, and table 2b for firms with assets above $1 billion[16]. 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. Table 1a and 1b present summary statistics for the samples used in our analysis.

Column 1 of Table 2a presents results based on equation (4.3) estimated without control variables. Without controls, the coefficient on the INCENTIVE_RATIO variable suggests that a 1 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 percent) to the 75th percentile (34.5 percent) 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 governance, firm 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

[16] We use a cutoff of 1 billions of 1996 dollars for assets. This cutoff is not the same that we used to construct figure 1, because the samples are different: Figure 1 uses all firms for which Compustat data are available, while Table 2 uses only firms that have data on executive compensation. Firms with executive compensation data are larger, on average, than firms for which these data are unavailable.

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' book-to-market 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 relationship 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 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 equation (4.3) above, but using different measures of accruals and CEO incentives, as described in section 2. 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 whose exposure to their firms' equity is higher lead firms where earnings management is more pronounced.

Table 2b repeats the same steps using firm 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 2b suggests a direct link between earnings management and the financial incentives given to CEOs. Together with figure 1, this gives us a consistent picture in the time series and in the cross-section. In the next section, we investigate how CEOs exercise their options and trade their companies' stocks around years of high accruals.

3.2. 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 part of Beneish and Vargus (2001), who show that during periods when accruals are high, insiders sell unusually large amounts of shares, and that 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 exercise. Data on option exercise come from the Compustat Executive Compensation database, and are used for the period between 1993 and 2000. The first measure of insider sales is the value realized from CEO option exercise as a share of firm equity market value. The second measure is gross CEO share sales, as a share 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 exercise (normalized by firm market value) on a dummy variable capturing whether the firms' total accruals were in the top 10 percent of firms in our

sample in that year. Equation 3.2.1 captures the regression specification for the first columns of Table 3[17]:

$$(3.2.1)\quad (VALUE\_OPTION\_EXERCISE_{i,t} / FIRM\_VALUE_{i,t}) = \alpha + \beta \times (DUMMY \quad for \quad TA_{i,t} \quad in \quad top \quad 10\%) + X'_{i,t}\,\Gamma + \varepsilon_{i,t}$$

The first rows present coefficients from a regression 3.2.1 with no additional controls. These results suggest that CEO option exercise, as a share of firm equity market value, is 3.82 basis points higher in periods where the firms they manage have levels of accruals that are in the top 10% of firms in that year. The second set of rows present the coefficients on the high-accruals dummy based on specifications that also include additional controls: firm size, year dummy variables, 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 at 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 10 dummy variables capturing the firm's book/market ratio. Adding dummy variables capturing the firm's book/market ratio, 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 the option exercise and share sales normalized by firm value. This measure captures the intensity of executive selling activity in a given period. We also explored 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

[17] This decile-based approach follows Beneish and Vargus (2002). Earlier versions of this paper presented results based on analyzing the top 10%, 5% and 1% of accruals, as well as results based on linear specifications. The results are robust to the particular specification choice.

also explored whether the tendency to exercise options during high-accrual periods was more pronounced for CEOs who were more highly incentivized with equity-based compensation. While the point estimate on the relationship between accruals and option exercise was higher for CEOs with more equity-based compensation, the difference in the coefficient between the high-incentive and low-incentive samples was 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 book/market ratio reduces the estimated effect to 14.7 basis points.

The third column uses the same sample as the second and a different dependent variable: net CEO share sales, as a share 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 where 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 different approach.[18]

[18] Beneish and Vargus focus on the top five executives. They create a measure of the net shares purchased (as a share 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

4. 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 she manages may act in ways that, while privately beneficial, reduce the value of her investors' claims. This separation of ownership and control has long been recognized as a root of corporate governance problems[19].

Partly because of concerns that managers' insulation from their companies' performance led to value-destroying executive behavior, during the 1990s executives became much more directly exposed to changes in their companies' share prices. This increase in exposure came 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. These changes were motivated by a desire to align managers' incentives with those of shareholders, but our results suggest that they may have 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 large option exercise by CEOs and significant unloading of shares by CEOs and other top executives.

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same CRSP size decile and that have negative net shares purchased. They find that the proportion of 'abnormal sale' firm-year observations is increasing in accruals. This approach controls for firm size, though not for other potential explanatory variables.

[19] See Berle and Means (1932). Also Adam Smith 1776: "The directors of [joint stock] companies, however, being the managers of other peoples' money rather than their own, it cannot well be expected, that they should watch over it with the same anxious vigilance [as owners].

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 the 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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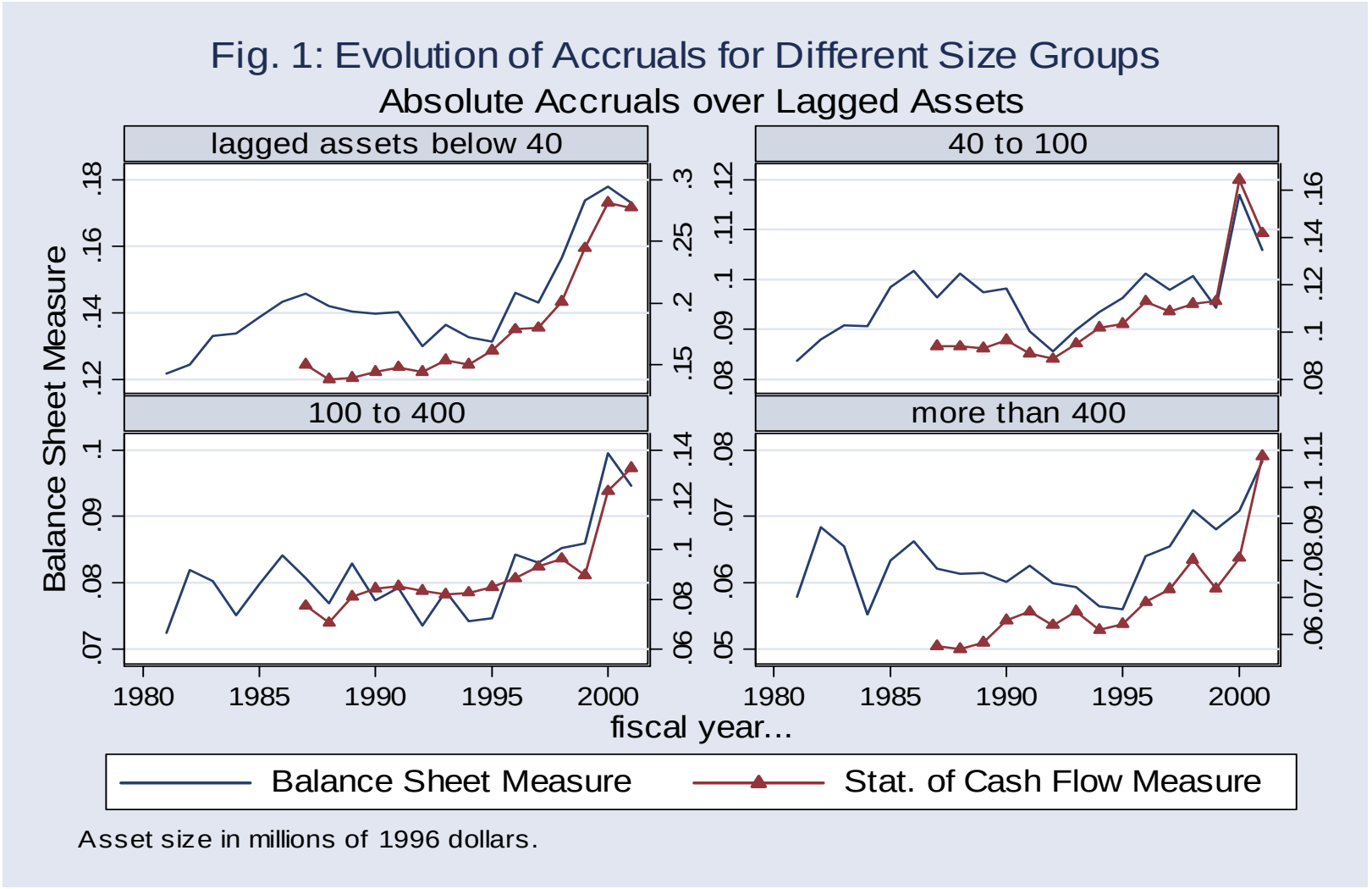

Note. The left scale is for the balance sheet measure of accruals, and the right scale is for the measure using the statement of cash flows. The measure using the statement of cash flows is robust to non-articulation events (such as M&As), but is not available before 1987. The construction of both measures of accruals is presented in details in section 2.

Table 1a: Summary Statistics

Firms with lagged assets below 1 billion of 1996 dollars (sample for Table 2a)					
Variable	Obs	Mean	Std. Dev.	Min	Max
absolute accruals over lagged assets (1)	4671	0.089	0.271	0.000	12.443
(1) using discretionary accruals	4671	0.081	0.268	0.000	12.311
(1) using accruals from stat. of cash flows	4671	0.106	0.641	0.000	41.151
INCENTIVE_RATIO	4671	0.263	0.239	0.000	1.000
INCENTIVE_RATIO using Core-Guay measure	4640	0.216	0.248	0.000	1.000
lagged assets	4671	5.762	0.795	1.593	6.907
age	4671	17.251	12.279	1.000	50.000
index of governance from Gompers et al.	1182	8.551	2.661	2.000	17.000
volatility of sales	4671	0.099	0.104	0.000	1.223
book leverage	4671	0.447	0.235	0.016	2.628
Tobin's Q	4662	2.342	2.560	0.298	78.565

Firms with lagged assets above 1 billion of 1996 dollars (sample for Table 2b)					
Variable	Obs	Mean	Std. Dev.	Min	Max
absolute accruals over lagged assets (1)	4199	0.062	0.054	0.000	0.871
(1) using discretionary accruals	4199	0.041	0.051	0.000	0.830
(1) using accruals from stat. of cash flows	4199	0.044	0.052	0.000	0.720
INCENTIVE_RATIO	4199	0.244	0.228	0.000	1.000
INCENTIVE_RATIO using Core-Guay measure	4185	0.165	0.251	0.000	1.000
lagged assets	4199	8.220	0.970	6.908	11.994
age	4199	32.146	15.041	1.000	50.000
index of governance from Gompers et al.	1398	9.780	2.611	2.000	17.000
volatility of sales	4199	0.075	0.068	0.000	0.961
book leverage	4199	0.579	0.174	0.032	2.062
Tobin's Q	4194	1.879	1.486	0.435	23.077

Note. INCENTIVE_RATIO = ONEPCTit/(ONEPCTit + Salaryit + Bonusit). 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. Core-Guay measure adjusts the delta of options.

Table 2a: Small firms (lagged assets below 1 billion of 1996 dollars) Regressions of **absolute value of accruals over assets** on **CEO incentives**. OLS regressions: $|TAi,t| = a + b * Ratio_{i,t-1} + X_{it}'G + eit$. Independent variable Ratio constructed as : $Ratio_{it} = Onepct_{it}/(Onepct_{it} + Salary_{it} + Bonus_{it})$. 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.

Dependent Variable	Total Accruals over Lagged Assets				Discretionary Accruals using Jones Model		Discretionary Accruals using Cash Flow Data		Discretionary Accruals using Jones Model	
Regression number	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	0.0280	0.1038	0.0657		
Ratioi,t-1 using Core Guay delta									0.0750	0.0320
Lagged log assets			-0.0109	0.0042	-0.0126	0.0039	-0.0240	0.0071	-0.0119	0.0040
Governance Variables (omitted is missing)										
G <=6 (democracy)			-0.0354	0.0110	-0.0385	0.0110	-0.0494	0.0214	-0.0398	0.0113
7 <= G <= 9			-0.0265	0.0081	-0.0311	0.0079	-0.0478	0.0143	-0.0320	0.0081
10 <= G <= 12			-0.0221	0.0083	-0.0296	0.0083	-0.0405	0.0146	-0.0305	0.0084
13 <= G (dictatorship)			-0.0165	0.0088	-0.0200	0.0090	-0.0234	0.0148	-0.0186	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			yes		yes		yes		yes	
Year Dummies			yes		yes		yes		yes	
Exchange Dummies			yes		yes		yes		yes	
48 Industry Dummies			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	4671		4671		4671		4671		4640	

Note. Standard errors are robust and corrected for firm-level clustering. Sample period: 1994-2000. Compustat Executive Compensation Database.

Table 2b: Large firms (lagged assets above 1 billion of 1996 dollars) Regressions of **absolute value of accruals over assets** on **CEO incentives**. OLS regressions: $|TAi,t| = a + b * Ratio_{i,t-1} + X_{it}'G + eit$. Independent variable Ratio constructed as : $Ratio_{it} = Onepct_{it}/(Onepct_{it} + Salary_{it} + Bonus_{it})$. 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.

Dependent Variable	Total Accruals over Lagged Assets				Discretionary Accruals using Jones Model		Discretionary Accruals using Cash Flow Data		Discretionary Accruals using Jones Model	
Regression number	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		
Ratioi,t-1 using Core Guay delta									0.0163	0.0058
Lagged log assets			-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			yes		yes		yes		yes	
Year Dummies			yes		yes		yes		yes	
Exchange Dummies			yes		yes		yes		yes	
48 Industry Dummies			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	4199		4199		4199		4199		4185	

Note. Standard errors are robust and corrected for firm-level clustering. Sample period: 1994-2000. Compustat Executive Compensation Database.

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

Dependent variable	CEO option exercise as a share of firm equity market		CEO gross share sales as share of firm equity		CEO net share sales as share of firm equity		Total insiders gross share sales as share of firm		Total insiders net share sales as share of firm	
Regression number	1		2		3		4		5	
Sample	Compustat Execucomp		Thomson Financial		Thomson Financial		Thomson Financial		Thomson Financial	
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
Additional controls	*no*		*no*		*no*		*no*		*no*	
Independent variable	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
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
Additional controls	*Constant, log firm size, governance dummies, firm age dummies, exchange dummies, 48 industry dummies, year dummies*									
Independent variable	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err	Coeff	Std Err
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
Additional controls	*Constant, log firm size, governance dummies, firm age dummies, exchange dummies, 48 industry dummies, year dummies, leverage, 10 book/market dummy variables*									
N	15654		40517		40517		40517		40517	

Note. Standard errors are robust and corrected for firm-level clustering. Sample period: 1993-2000 for Compustat sample, 1996-2001 for Thomson sample.