Stock returns, earnings management, and insider selling during the 1990s stock market bubble

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Abstract: Consistent with allegations that lofty stock-based compensation levels in the 1990s led managers to boost the stock price by manipulating earnings before selling stock, we find that: managers tended to inflate earnings before selling stock; during the market bubble's last years, firms managing earnings the most experienced returns 21% higher than firms managing earnings the least; and stocks of firms where insiders sold the most stock rose 59% higher than stocks where insiders sold the least. Furthermore, stock corrections after the bubble burst are strongly negatively associated with estimated levels of earnings management and insider selling during the bubble.

Keywords: equity incentives, insider trading, financial reporting, smoothing

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Data availability: Data used in this study are available from public sources identified in the study.

I. Introduction

The latter years of the 1990s saw a tremendous increase in stock-based compensation.[1] Prominent commentators have argued that stock-based compensation and managerial stock ownership increased managers' incentives to inflate earnings and, consequently, stock prices, which contributed to the 1990s stock market bubble. Our enquiry is motivated by the provocative assertions made by Coffee (2003), Fuller and Jensen (2002), and Greenspan (2002) that high-levels of stock-based compensation created incentives to inflate stock prices.[2] The link between stock-based compensation and managerial stock ownership, on one hand, and earnings management and overpricing, on the other, may be that stock-based compensation leads to more stock sales by managers, which, in turn, creates the incentive to boost stock prices shortly before stock sales occur. Earnings manipulation is a principal

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[1] Hall and Murphy (2002), for instance, report that the grant-date value of stock options accounted for 47 percent of total compensation granted to chief operating officers (CEOs) of Standard & Poor's (S&P) 500 index companies in 1999, up from 21 percent of total compensation in 1992. Hall and Murphy (2003) also estimate that, in 2000, firms in the S&P 500 granted their employees options valued at $119 billion, compared with only $11 billion in 1992.

[2] Coffee (2003) asserts that the increase in stock-based executive compensation created an environment where managers became sensitive to short-term stock performance. He argues that the increased sensitivity to short-term performance is due to the increased stock selling undertaken by managers, which, in turn, is caused by their increased equity ownership. Greater stock ownership implies managers will sell more stock. Larger pending stock sales imply managers have more incentive to boost their companies' stock prices before they sell. Greenspan (2002) opines that "the highly desirable spread of shareholding and options among business managers perversely created incentives to artificially inflate earnings to keep stock prices high and rising." Fuller and Jensen (2002, p. 42) also state that "[a]s stock options became an increasing part of executive compensation, and managers who made great fortunes on options became the stuff of legends, the preservation or enhancement of short-term stock prices became a personal (and damaging) priority for many a CEO and CFO. High share prices and earnings multiples stoked already amply endowed managerial egos, and management teams proved reluctant to undermine their own stature by surrendering hard won records of quarter-over-quarter earnings growth."

mechanism that managers could use to inflate stock price. We analyze whether earnings inflation is more pronounced in the quarterly earnings announced immediately before managers sell stock and whether insider selling and earnings management activities are associated with a stock's price movements during and after the bubble.

Whether and how market prices respond to earnings manipulation is an important question on which theoretical predictions are divided. Stein (1989) presents a signal-jamming model in which managers undertake wasteful actions to increase current earnings but the capital market correctly anticipates this earnings inflation, reconstructs the unmanaged earnings series, and always prices the firm at fundamental value. On the other hand, Fischer and Verrecchia (2000) show that when there is uncertainty about managers' incentives to bias earnings, the capital market is unable to reconstruct the unmanaged earnings series. Furthermore, at firms where managers' incentives to increase stock price are stronger than expected, earnings are distorted upwards by a large amount and the stock price exceeds fundamental value. Also, at firms where managers' incentive to increase stock price are weaker than expected (e.g., because they seek to lower the exercise price of soon-to-be-granted equity compensation), earnings are distorted downwards—or are distorted upwards to a less-than-expected extent—and the stock price falls below fundamental value. Thus, whether earnings management leads to distorted prices in models where all agents have rational expectations depends on what investors know about managers' incentives to distort earnings.[3]

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[3] Coles, Hertzel, and Kalpathy (2006) present evidence that discretionary accruals are low after firms announce out-of-the-money options will be cancelled and before replacement options are issued, but stock price is unaffected by these apparent manipulations. They

The possibility that some stock traders are not fully rational further complicates the relationship between earnings management and market prices. For instance, de Long, Shleifer, Summers, and Waldman (1990) propose a model where some traders are fully rational and the rest are subject to a psychological bias that leads them to chase trends. They show that if the disclosure of good news (e.g., an announcement of high earnings) induces prices to rise, then prices could also rise in the future because the trend-chasing traders would be buying the stock. Moreover, rational traders would accentuate, rather than counteract, the price rise in the short term by buying in order to increase their eventual trading profits from selling at a later date. Consistent with this view, Brunnermeier and Nagel (2004) present evidence that hedge fund portfolios were tilted towards technology stocks until September 1999 and that hedge funds reduced their holdings in individual stocks before the prices of these stocks fell significantly. Furthermore, laboratory experiments by Andreaseen and Kraus (1990) confirm that subjects in a simulated stock market exhibit trend-chasing behavior: they are more likely to buy in response to a history of strongly rising prices (and sell in response to a history of falling prices). It is reasonable to conjecture that investors also attend to earnings and that trend-chasing investors may buy stock after high earnings have been announced. Hence, an interesting environment in which to examine whether and how earnings management affects prices is over the course of a bubble.

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conclude that investors are not misled because management's incentives in such a setting are obvious. They also observe that earlier studies by Teoh et al. (1998a and 1998b) of earnings management around equity offerings suggest that in these cases earnings manipulation leads to long-lasting departures of price from fundamental value, perhaps because management's incentives are less apparent to investors. We note that Coles, Hertzel, and Kalpathy's empirical finding is broadly consistent with Stein (1989) while the findings of Teoh et al. (1998a and 1998b) are broadly consistent with Fischer and Verrecchia (2000).

Increased stock sales by managers may heighten managers' incentives to mislead investors. However, investors are unlikely to be fooled forever even if managerial incentives to mislead them remain high. One reason for this is that a price increase, attained, e.g., through an earnings report inflated by a distortion of the firm's accruals, implies earnings in subsequent periods must be lower by an equal amount. That is, earnings manipulations must reverse over time. Further, Jensen (2004, p. 562) argues that if the firm's stock price is inflated, "the market *will* find out that you are overvalued. That is predetermined. It is not a matter of whether: it is a matter of when, because by definition if your stock is overvalued you will not be able to generate the financial performance the market requires to justify that value." Thus, it is also interesting to examine how stock price movements during a correction are related to management's preceding stock sales and earnings manipulations.

To conduct our analysis, we need to measure the extent to which a stock is overpriced during the bubble. Conceptually, overpricing is the deviation of market prices from fundamentals. As Rosser (2000, p. 107) recognizes, however, "determining what is 'fundamental'" is a very challenging task. In this study, we assess mispricing in two ways. The first measure of mispricing is derived from cross-sectional variation in stocks' returns during the period of the bubble, which we define as the three years before the peak of 1,527.46 reached by the S&P 500 index on March 24, 2000. The value of the index at the beginning of this period, March 25, 1997, was 789.07. The second measure is derived from cross-sectional variation in stocks' returns during the period of the correction, which we define as March 25, 2000 until October 9, 2002, when the S&P 500 index reached a bottom of 776.76. Measuring the bubble component of a stock's price by the severity of the correction the stock subsequently experiences is consistent with Greenspan's (1999) argument that

"bubbles generally are perceptible only after the fact." Using the market peak as the reference point for all stocks is consistent with Kindleberger (1978, p. 16) who defines a bubble as "an upward price movement over an extended range that then explodes." While unambiguous and precise dating of the start and end of the bubble may not be possible, the results we report are insensitive to reasonable changes in these dates.

We do not assume that increased managerial stock ownership or stock trading is either a necessary or a sufficient condition for the bubble. Neither do we attempt to explain what triggered the bubble to burst. We assume that a bubble existed and burst in 2000, although the existence of a bubble is disputed by some. For instance, Pastor and Veronesi (2004) argue that uncertainty about average future profitability (or average future growth rates) was sufficiently high in the late 1990s to explain the high market valuations and high stock return volatilities of Nasdaq firms in March 2000. That is, their model can be calibrated so that Nasdaq firms were priced at fundamental value conditional on the available information at that date. In their view, the subsequent correction was due to a downward revision in the market's expectations of firms' expected excess profitabilities due to lower reported profits in 2000 and 2001. Their analysis provides a rational basis for price trends in the bubble and correction, but does not address the causes of cross-sectional variation in the financial reporting strategies of firms or the consequences of these reporting strategies on stock returns in the bubble and correction. In this paper, we examine empirically the link between reporting strategies and price movements and relate these to managers' personal financial incentives.

Our results indicate that managerial trading and earnings management activities explain cross-firm variations in the stock price run-up during the bubble and the subsequent

correction. Specifically, we find that reported earnings are significantly inflated (relative to a widely-used empirical estimate of unmanaged earnings) when insider selling in the next three months is high. The difference in the abnormal accruals of low and high insider selling firms is, on average, 0.451% of total assets per quarter or 1.802% on an annual basis. These findings are consistent with the interpretation that stock-based compensation contributes to earnings inflation because managers who are granted stock-based compensation (including stock, restricted stock, and stock options) must sell stock in order to consume and/or diversify their portfolios and manipulate earnings to effect these sales at high prices.

Further, we find strong evidence that stock returns during the last years of the bubble and during the correction period are strongly associated with earnings management and insider selling during the bubble. After controlling for size and book-to-market, we find:

- an average daily difference in the returns of high and low earnings management firms of 0.028% during the last years of the bubble (or 21% when cumulated over the 758 trading days from March 25, 1997 to March 24, 2000);
- an average daily difference in the returns of low and high earnings management firms of 0.061% during the correction period (or 39% when compounded over the 637 trading days from March 25, 2000 to October 9, 2002);
- an average daily difference in the abnormal returns of high and low insider selling firms of 0.078% during the last years of the bubble (or 59% when cumulated over the 758 trading days from March 25, 1997 to March 24, 2000); and
- an average daily difference in the abnormal returns of low and high insider selling firms of 0.037% during the correction period (or 24% when cumulated over the 637 trading days from March 27, 2000 to October 9, 2002).

These differences in returns are economically large. The overall relationship between price movements and earnings manipulation is consistent with the interpretation that managers who engaged in the most earnings management temporarily increased their firm's stock price by the largest amount during the bubble, then experienced the most severe stock price drop during the correction. Also, higher insider selling during the bubble is associated with a larger stock price run-up during the bubble and a larger price drop during the correction.[4]

The remainder of the study is organized as follows. Section II relates our analysis to the literature. Section III describes the association between earnings inflation and managerial selling. Section IV analyzes the association between earnings management and stock performance during and after the stock market bubble. Section V examines the association between insider selling and stock performance during and after the stock market bubble. Section VI presents evidence that the associations documented in this paper, while peculiar to the bubble period, are robust to other specifications of the main tests. Section VII concludes.

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[4] The 59% spread in returns between firms with high and low insider selling during the bubble is larger than the 21% spread in returns between high and low earnings management firms. Conversely, the 39% spread in returns between high and low insider-selling firms during the correction is smaller than the 24% spread in returns between high and low earnings management firms. Note that insider selling is one among several reasons why managers manipulate earnings and earnings manipulation is one of many mechanism managers may use to temporarily increase stock price. Besides manipulating earnings, managers may make other disclosures (e.g., forecasts of future operating results, new product announcements, announcements of significant new sales, etc.) that may affect the stock price but are not part of our analysis. Coffee (2003), for instance, posits that managers' incentive to inflate earnings and hype stock prices is related to concerns about employment security. Consistent with Coffee (2003), in a survey of Chief Financial Officers (CFOs), Graham, Harvey, and Rajgopal (2005, p. 6) find that executives manage earnings "primarily to influence stock prices and their own welfare *via career concerns and external reputation*" (emphasis added).

II. Prior research

Managers have an incentive to increase stock price, even if only temporarily, before they sell stock. Managers allegedly increase their firms' stock prices through earnings inflation. Hence, we expect earnings inflation to be positively associated with subsequent managerial selling. Earnings can be manipulated because the computation of earnings requires subjective—and therefore difficult to verify—estimates from management. For example, estimates of uncollectible receivables affect bad debt expense, estimates of ending inventory values affect cost of goods sold, and estimates of future compensation rates, interest rates, life expectancy, turnover, and rates of return on pension plan assets affect defined benefit pension plan and health care expense. Reported earnings, which are revenues net of expenses, therefore depend on each of these estimates. Since the estimates are inherently unverifiable, managers can distort earnings to further their interests. In addition, accounting rules often provide managers with discretion regarding how to account for a class of transactions. For example, managers have discretion to choose revenue recognition, inventory accounting, and depreciation policies; they may use that discretion to distort adjust earnings.

The case of Qwest Communications International Inc. (ticker NYS: Q) is emblematic. An SEC complaint alleges a fraud that began in April 1999 and describes an obsession with meeting earnings, revenue, and growth targets that was imposed by top executives and permeated the firm. Top executives, including CEO Joseph P. Nacchio,

> set required internal revenue targets based on the numbers necessary for Qwest to meet the public growth predictions rather than on revenues that a particular business unit could reasonably expect to achieve. … Nacchio then exerted extreme pressure on subordinate executives who managed business units to achieve the targets. In turn, the business unit executives exerted extraordinary …pressure on their managers and employees to meet or exceed the revenue targets at all costs. For example:

> a) Qwest insured that company and business unit targets were met by paying bonuses to management and employees for periods when they achieved the targeted revenue and threatening consequences if targets were not met.
>
> b) Nacchio had an explosive temper. One senior executive, in describing Nacchio's interaction with subordinates, explained that "people [were] just afraid of the man."
>
> c) Another executive … stated that Qwest management "had a culture of fear." (Securities and Exchange Commission, Civil Action No. 05-MK-480, pp. 16–17)

Jensen (2004, p. 551) explains the link between accrual management and outright fraud as follows: "The pressure to [commit fraud] can be great because choices to move revenue from the future to the present or expenses from the present to the future cumulate over time and make it tougher to meet goals in future periods. Little by little managers are led to make ever more aggressive choices to keep up with the game and eventually what started out with legitimate choices can turn into fraud." In Qwest's case, the SEC complaint alleges that "Qwest relied so heavily on the immediate revenue recognition from one-time IRU [an irrevocable right to use a specific amount of telecommunications fiber for a specified time period] and equipment sales transactions to meet the aggressive revenue and growth targets that Qwest management and employees referred to the practice as a 'drug,' an 'addiction,' 'heroin,' and 'cocaine on steroids'" (Securities and Exchange Commission, Civil Action No. 05-MK-480, p. 2). The complaint further alleges that Qwest accelerated revenue by advancing the publication dates of several telephone directories (increasing EBITDA by $18 million in 2000) and lowered liabilities related to employee vacations (increasing EBITDA by $71.3 million in 2001) to artificially increase Qwest's earnings. Notice that these manipulations do not alter the cash flows a firm receives. Instead, they affect the accrual element of earnings. In 1999, Qwest stock traded between about $23 and $43 per share. In 2000, it reached a high of $64 per share. In 2002 it reached a low of $1.10 per share. Over

the period in which fraud is alleged, the SEC also claims Nacchio made profits of $176.5 million from stock sales.

The notion that equity incentives lead to earnings management has been investigated in several prior studies. In a sample of firms that are the subject of Accounting and Auditing Enforcement Releases (AAERs) issued by the Securities and Exchange Commission in 1993 and earlier, Beneish (1999) finds that in the period when earnings are overstated, managers are more likely to sell stock than managers at control firms and that these sales take place at inflated prices. Financial reporting choices that lead to charges of fraud or AAERs are rare and exceptional. Reporting choices that distort earnings but that do not lead to regulatory actions may be more pervasive and therefore more significant. Cheng and Warfield (2005) find that managers with high equity incentives in the years 1993 to 2000 sell more shares in future periods, are more likely to report earnings that meet or just beat analysts' forecasts and less likely to report large positive earnings surprises. In a similar vein, McVay, Nagar, and Tang (2006) examine whether insider stock selling is more intense in firm-quarters where earnings met or just exceeded analysts' expectations as compared with firm-quarters where earnings fell just short of expectations. Neither of these papers, however, examines how earnings management induced by equity incentives affects stock returns.

One paper that does examine the association between equity transactions by managers and firm stock returns is Bartov and Mohanram (2004). They identify 1,322 firm-years drawn from 1992 to 2001 in which executive option exercises are abnormally large. They find that the firm's stock return in the year preceding such years is abnormally positive, while the return is abnormally negative in the following year. They also present evidence that discretionary accruals, and hence earnings, are high in the year of exercise and lower in the

two ensuing years. Our research question in similar in that we seek to understand the link between executive incentives to manage earnings and stock price movements. Different from Bartov and Monhanram (2004), our analysis is based on the public record of insider trades, and so is broadly representative of US public companies with available data on Compustat and CRSP, while Bartov and Monhanram's study is drawn from the ExecuComp universe, which excludes smaller firms. Furthermore, while incentives to manipulate earnings may be provided by option exercises, they may also be provided by pending stock sales, including sales of stock that was not acquired as the result of exercising options. Finally, we focus our analysis on a period characterized as a price bubble (when some theories suggest price may stray far above fundamental value) and the ensuing correction. We seek to identify differences in the price paths of (i) stocks exhibiting high and low amounts of insider selling and (ii) stocks exhibiting high and low estimated amounts of earnings inflation over the course of the bubble and correction while Bartov and Mohanram characterize stock returns before and after options are exercised. We expect earnings inflation to be positively associated with subsequent managerial selling during the last years of the 1990s market bubble.

III. The association between earnings inflation and managerial selling

In this section, we describe how we estimate earnings inflation and test whether pending stock sales are associated with inflated earnings. Following Teoh, Welch, and Wong (1998a and 1998b) and Louis (2004), we proxy for the level of earnings inflation by the unexpected accruals a firm reports, using a modified version of the Jones (1991) model. We measure earnings inflation on a quarterly basis by estimating the following regression for each calendar quarter and for each (two-digit SIC code) industry using all firms that have the

necessary data on Compustat from the last calendar quarter of 1985 through the last calendar quarter of 1999:

$$TA_i = \lambda_0 + \lambda_1(\Delta SALES_i - \Delta AR_i) + \lambda_2 PPE_i + \lambda_3 ASSET_i + \varepsilon_i, \quad (1)$$

where *TA* is the total quarterly accrual; $\Delta SALES$ is the quarterly change in sales; ΔAR is the quarterly change in accounts receivable; *PPE* is property, plant, and equipment; *ASSET* is total assets at the beginning of the quarter; and ε is the regression residual. Total quarterly accrual is defined as change in non-cash current assets (change in Compustat quarterly data item 40 minus change in Compustat data item 36) minus change in current liabilities (change in Compustat quarterly data item 49) plus change in debt in current liabilities (change in Compustat quarterly data item 45) minus depreciation (Compustat quarterly data item 5).[5] All the variables, including the intercept, are scaled by assets at the beginning of the quarter. To mitigate the effects of outliers and errors in the data, we delete observations for which the deflated values of *TA*, $\Delta SALES_i - \Delta AR$, or *PPE* fall either below the 1st percentile or above the 99th percentile of their respective distributions. Since we scale all variables by total assets, the explanatory variable *ASSET* is transformed into a column of ones, which allows us to estimate the model with a standard intercept.

Because the unexpected accruals constructed above are likely to be correlated with performance, we adjust them for performance as suggested by Kothari, Leone, and Wasley (2005). For each calendar quarter and for each two-digit SIC code industry, we create five

[5] Cash flow statement data are not available for all years. We replicate the results for the period 1996-1999. We obtain qualitatively the same results whether we estimate accruals using balance sheet data or cash flow statement data.

portfolios of at least four firms each by sorting the data into quintiles of ROA measured four quarters before the quarter of the portfolio formation. The discretionary accrual for a given firm is the respective residual from the discretionary accrual model for that firm minus the average (excluding the sample firm) residual of the matched portfolio. We label the performance-adjusted unexpected accruals "earnings inflation," since positive values of this variable indicate that a firm's earnings are high relative to a peer group of firms taking account of the average relationship between each firm's earnings and other elements of its financial statements. The corresponding variable is denoted *EI*.

We also require a measure of insider stock selling intensity. We obtain insider-trading data from Thomson Insider Filing Feed database. Corresponding to each quarterly earnings announcement for each firm, we measure insider selling, *ISELLING*, as the shares sold (expressed as a percentage of shares outstanding on the date of sale) less shares bought (similarly expressed) by insiders cumulated over the 91 days following the earnings announcement dates. The earnings announcement dates correspond to the 60 fiscal quarters ending over the period from March 1985 to September 1999. Because insiders who are not officers or directors are unlikely to be involved in or privy to the earnings management activities of the firm, we exclude trades by affiliated persons, affiliates of investment advisors, beneficial owners of the company's securities, beneficial owners as custodians, beneficial owners as trustees, investment advisors, shareholders, indirect shareholders, or chairman emeritus who are not also either an officer or director. However, including trades by these insiders in our computation of net insider selling does not qualitatively change the results of the study.

[TABLE 1]

Panel A of Table 1 presents descriptive statistics on estimated earnings inflation and net insider selling by firm-quarter. (The control and instrumental variables in Panel B are discussed as they are introduced in the analysis.) Earnings inflation, *EI*, has a mean that, by construction, is nearly zero and exhibits substantial variation: for 25% of firm-quarters, the estimation process suggests earnings have been manipulated upwards by an amount greater than 2.169% of total assets and for 25% of firm-quarters, the estimation process suggests earnings have been manipulated downwards by an amount more than 2.252% of total assets. Turning next to insider selling, observe that in many quarters, insiders do not trade firm stock. Less frequently, insiders are net buyers of firm stock. Overall, insiders are net sellers of stock because we do not count as purchases stock granted to the insider or acquired by insiders as a result of exercising stock options. Accordingly, *ISELLING* is negative, zero, and positive for 23.91%, 38.20%, and 37.89% of observations. Also, the distribution is negatively skewed and leptokurtic. On average, insiders sell 0.101% of shares outstanding each firm-quarter.

[TABLE 2]

We then compare the levels of earnings inflation by low (bottom quintile) and high (top quintile) insider selling firms over the 60 fiscal quarters in the years 1985–1999.[6] Within each of these quarters, we rank firms according to the value of *ISELLING* and then compare the earnings inflation of the low and high insider selling firm-quarters. The results are reported in Table 2, Panel A. There are 18,102 and 18,637 firm-quarters in the low and high insider selling groups, respectively. Consistent with the conjecture that short-term managerial

[6] Qualitatively similar and strongly significant results obtain when we consider the 1997–1999 period alone.

selling creates managerial incentives to inflate earnings, the high insider selling firms report significantly higher abnormal accruals than the low insider selling firms in the quarterly earnings announcement immediately preceding the 91-day period over which insider selling is measured. The one-tail *p*-values for the tests of mean and median differences are below the 0.001 level. Relative to low insider selling firms, high insider selling firms, on average, inflate earnings by 0.451% of total assets per quarter or 1.802% on an annual basis.

To address the possibility that cross-sectional correlation of the residuals may lead to overstated significance levels, we follow a procedure similar to the Fama-McBeth approach. Each quarter, we compute the cross-sectional average earnings inflation for the low and the high insider selling groups. This gives us a time series of 60 average quarterly earnings inflations for each of the two groups over the period 1985–1999. We then use the time series of 60 average quarterly earnings inflations to make inferences. The estimates in Table 2, Panel B are quite similar to those reported in Panel A and, although there are only 60 data points, the significance levels remain very strong. Earnings inflation by high insider selling firms is higher than earning inflation by low insider selling firms at better than the 0.001 significance level over the 15-year period preceding the market peak.

We also control for firm attributes that may be correlated with earnings management. Book-to-market may be correlated with firms' incentives to manage earnings. Because low book-to-market ratio firms are more sensitive to earnings fluctuations, they stand to benefit more from earnings management and, hence, have stronger incentives to manage earnings (cf. Skinner and Sloan 2002). Prior studies also suggest that political costs (size) and leverage are related to earnings management (see, e.g., Watts and Zimmerman, 1978 and 1990; and Klein,

2002). Lastly, Teoh et al. (1998a) report that managers inflate earnings before seasoned equity offerings.

Panel B of Table 1 reveals that the median observation has a market value of common equity at the beginning of the fiscal year of $116 million while the mean market value is more than 10 times greater. Because market value is highly skewed, we report results using the logarithm of market value as a regressor. The mean and median values of the book-to-market ratio over firm-quarters are 0.644 and 0.542, respectively. The mean and median values of leverage are 38.7% and 14.9%. Finally, 5.9% of firm-quarters are followed by significant stock issuances.

We estimate the association between earnings inflation and managerial selling using the following regression model for the period 1985–1999:

$$EI_{i,t} = \alpha_0 + \alpha_1 ISELLING_{i,t} + \alpha_2 LOGSIZE_{i,t} + \alpha_3 BM_{i,t} + \alpha_4 LEVERAGE_{i,t} + \alpha_5 STK\_ISSUANCE_{i,t} + \varepsilon_i, \quad (2)$$

where, for firm *i* and quarter *t*, variables are defined as follows:

EI is earnings inflation, proxied by the abnormal accruals.

ISELLING is net insider selling is the percentage of shares outstanding sold minus percentage of shares outstanding bought measured over the three months (91 days) following the quarterly earnings announcement date.

LOGSIZE is the log of total market capitalization of common stock at the beginning of the quarter.

BM is the ratio of common book equity to total market capitalization at the beginning of the quarter.

LEVERAGE is the ratio of long-term debt to market capitalization at the beginning of the quarter.

STK_ISSUANCE is a binary variable taking the value one if the value of stock issued by the firm (quarterly Compustat data #84) in the fiscal quarter immediately after the calendar

quarter of the earnings announcement scaled by beginning market value exceeds 0.05, and zero otherwise.

[TABLE 3]

Because of potential cross-correlation problems, we estimate eqn. (2) both as a pooled regression and year-by-year using the Fama-McBeth (1973) approach to make inferences. The results of these analyses are reported in Table 3, Panel A. Consistent with the suggestion that short-term managerial selling creates managerial incentives to inflate earnings, we find that earnings inflation is significantly higher in the quarter that immediately precedes high insider selling activities in both specifications.[7] The abnormal accruals are positively associated with subsequent insider selling activities, with *p*-values close to 0.001 for both the pooled regression and the Fama-McBeth approach. While the association is statistically significant, it must also be noted that the model variables explain little of the variation in earnings inflation.

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[7] As Beneish, Press, and Vargus (2004, pp. 1–2) point out, research "findings are inconclusive on the timing of insider selling relative to the earnings management and silent on the mechanism by which insider trading creates incentives for income-increasing earnings management." Insiders might have incentive to manage earnings upwards before selling so as to inflate the price of the stock at the time of the sale. Alternatively, managers might inflate earnings after selling stock to delay the reporting bad news and thereby support the stock price after selling. Such a strategy may reduce the jeopardy insiders would otherwise face if a stock price drop followed too closely their stock sales. To allow for the possibility that earnings inflation may precede, follow, or be contemporaneous with insider selling, we include both a lead and a lag value of the insider selling variable, *ISELLING*, in an alternative specification (not reported). In that specification, we find no association between earnings inflation and insider selling in the other surrounding quarters (quarters *t-1* and *t+1*). Parenthetically, we observe that the significantly positive coefficient estimate on $ISELLING_t$ and the insignificant coefficient estimates on both $ISELLING_{t-1}$ and $ISELLING_{t+1}$ confirm that insider selling closely follows announcement of inflated earnings, consistent with the interpretation that managers inflate earnings when they anticipate that they will shortly sell stock.

We argue that the positive coefficient estimate on *ISELLING* in eqn. (2) reflects incremental earnings inflation in response to pending insider stock sales. However, because earnings are announced before the period in which insiders' stock sales occur, it is possible that the positive coefficient on *ISELLING* is partly a response to the preceding earnings inflation, i.e., both insider selling and earnings inflation may be endogenous. In this case, the coefficient estimate on *ISELLING* in eqn. (2) may be biased and inconsistent. To address this concern, we use an instrumental variable approach.

The instruments we use are the lag of insider trading, *LISELLING*; the abnormal stock return over the year before the beginning of the calendar quarter of the fiscal quarter-end date, *ABR1_12M*; an indicator variable that takes the value one for technology firms—SIC codes: 2833–2836 (drugs), 3570–3577 (computer and office equipment), 3600–3674 (electronic and other electrical equipment and components, except computer equipment), 3812–3845 (measuring, analyzing, and controlling instruments), 7371–7379 (computer programming and data processing), and 8731–8734 (research, development, and testing services)—and zero otherwise, *HIGH_TEC*; an indicator variable that takes the value one if the proportion of the outstanding shares traded by institutional investors during the calendar quarter after the calendar quarter of the fiscal quarter-end date is above the median, and zero otherwise, *IO*; the logarithm of the firm's size, *LOGSIZE*; and the firm's book-to-market ratio, *BM*. More specifically, we use the following model:

$$ISELLING_{i,t} = \alpha_0 + \alpha_1 EI_{i,t} + \alpha_2 LISELLING_{i,t} + \alpha_3 ABR1\_12M_{i,t} + \alpha_4 HIGHTEC_{i,t} + \alpha_5 IO_{i,t} + \alpha_6 LOGSIZE_{i,t} + \alpha_7 BM_{i,t} + \varepsilon_i \quad (3)$$

Panel B of Table 1 provides descriptive statistics on the additional variables. The mean abnormal return over the year before the beginning of fiscal firm-quarter has a positive mean and a negative median. By construction, *IO* is 1 for half of the firm-quarters. Firm-quarters drawn from firms in high tech industries comprise 27.8% of the sample.

We model *ISELLING* as a function of *LISELLING* because insider trading is likely to be serially correlated. We include *ABR1_12M* in the model because prior studies suggests that insiders are contrarian traders (Lakonishok and Lee 2001). We therefore expect *ISELLING* to be positively associated with *ABR1_12M*. We include *HIGH_TEC* because technology firms tend to use equity-based options more heavily. Therefore, insider selling is likely higher for high-tech firms. Insiders may trade because they have relevant private information that is not fully impounded into price. It is generally assumed that institutional investors have superior information due partly to their access to corporate management (cf. Wermers 1999; Nofsinger and Sias 1999; and Wermers 2000). If the institutions have privileged access to management and managers trade on their private information, then *IO* will be associated with insider private information. Therefore, we expect a positive association between *IO* and *ISELLING*. Market value is included as a control because Seyhun (1986) reports that insider trading varies cross-sectionally with firm size. The book-to-market ratio controls for the effect documented by Rozeff and Zaman (1998) that insider buying climbs as stocks change from growth to value categories.

Using either the pooled 2SLS or 3SLS regression approach, we find the coefficient estimates for *ISELLING* are larger than those in the Fama-MacBeth or pooled OLS specifications and are highly significant. The coefficient estimates on the other variables have the same signs and similar significance levels across all specifications. Hence, our inference

about the relation between earnings management and insider selling continues to hold using these approaches.

IV. The association between earnings management and stock returns

Tables 2 and 3 suggest that earnings inflation is high when insiders have stock sales pending. We now consider how the extent of earnings management at a firm relates to the firms' stock price movements during the bubble and the correction. Taking the view that earnings management, as measured by abnormal accruals, is a choice made by a firm's managers, in this section we examine the association between the individual firms' overpricing and the level of earnings management during the market bubble.

The bubble corresponds to a period of high managerial stock sales. The amount of stock sold by insiders increased markedly in the last part of the sample period. Net insider stock sales in a firm-year, measured as a fraction of shares outstanding averaged 0.567% in the period 1995–1999, which is more than three and half times the average value of 0.157% in the period 1985–1989. If the relationships between insider selling and earnings inflation documented in Tables 2 and 3 also lead to stock price inflation, then these effects should be strongest in the latest part of the sample period, which coincides with the bubble.

We measure overpricing by the stock returns (i) during the bubble, which we define to be the three-year period ending on March 24, 2000 and (ii) the correction occurring after the peak reached by the S&P 500 index on March 24, 2000 and until the bottom reached on October 9, 2002. Note that our study differs from Sloan (1996), who compares low and high accruals portfolios. We assume that, at any given point, firms that engage in earnings inflation the most during the bubble are likely to have abnormal accruals in either extreme of the abnormal accrual distribution because earnings inflation using discretionary accruals

cumulates overtime and has to reverse eventually. Managers, however, might avoid some of the potential stock price decline that would be associated with the reversal of earnings inflation by hiding the nature of the reversal to investors through "big baths" or some reorganization or restructuring charges.

As we explain above, because the component of earnings inflation that is due to manipulation of accruals has to reverse, we assume that, at any given point, firms that engage in earnings manipulation (e.g., upwards and downwards distortions of earnings) the most during the bubble are likely to have both the most positive and the most negative abnormal accruals, as measured by the procedure described above. Therefore, we proxy for earnings management by the average of the unsigned abnormal accruals obtained from model (1).[8] We average the absolute abnormal accruals over the fiscal quarters from October 1, 1996 to September 30, 1999. Note that the average signed abnormal accrual may be a poor proxy for earnings inflation over a twelve-quarter period because the positive accruals will tend to reverse and so cancel out over a long horizon.

We group sample firms according to the average absolute value of abnormal accruals. Earnings management is deemed low if this value is below the 20th percentile (i.e., the bottom quintile) of the distribution and high if it is above the 80th percentile (i.e., the top quintile). We compute the post-bubble abnormal return for the low and high groups using the approach suggested by Fama (1998). Each day, we compute the abnormal return for each firm.[9] The daily abnormal return for a firm is its raw return for the day minus the average return of a

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[8] Aboody, Hughes, and Liu (2005) label similar constructs "earnings quality measures".
[9] In the post-bubble period, we set missing delisting returns to –1; however, the results are not sensitive to this choice. By construction, firms that were delisted during the bubble are not included in the sample.

portfolio matched on size and book-to-market. The control portfolio is formed at the beginning of the fiscal quarter that ends in the same calendar quarter as the return measurement day. We sort the sample firms into size-quintiles and each size quintile into book-to-market quintiles to form 25 portfolios. Each firm is matched with its corresponding size/book-to-market portfolio. Then, every day, we compute the cross-sectional average abnormal returns. We then use the mean and standard deviation of the time series of the average daily abnormal returns to make statistical inferences. This approach controls for cross-correlations in long-term returns (see Brav, Geczy, and Gompers 2000; Fama and McBeth 1973; and Fama 1998). This is particularly important in our setting because the burst of the bubble has some common effects on all firms.

[TABLE 4]

The results are reported in Table 4. Consistent with the conjecture that earnings management is associated with the bubble, we find a strong association between the level of earnings management and stock returns in both the bubble and the correction. During the last years of the bubble, high earnings management firms experience significantly positive abnormal returns whereas they experience significantly negative abnormal returns during the correction period. Conversely, low earnings management firms experience significantly negative abnormal returns during the bubble and positive abnormal returns during the correction period. Both the mean and median differences in the abnormal returns of low and high earnings management firms in both periods are significantly different from zero at the 1 percent level. From Panel A, the mean of the difference in the average daily returns during the latest years of the bubble is 0.028%. Cumulated over the 758 trading days (from March

25, 1997 to March 24, 2000), the average difference in the abnormal returns of high and low earnings management firms is approximately 21%. Correspondingly, in Panel B, the mean of the difference in the average daily returns during the correction is 0.061 percent. Cumulated over the 637 trading days (from March 25, 2000 to October 9, 2002), the average difference in the abnormal returns of low and high earnings management firms is approximately 39%.[10]

Because the component of earnings inflation that is due to manipulation of accruals within GAAP has to reverse, we assume that, at any given point over a twelve quarter period, firms that engage in the most earnings inflation are likely to have the most extreme (i.e., the most positive and the most negative) abnormal accruals. Thus, we rank firms' earnings management by the total of unsigned abnormal accruals in quarterly earnings averaged over the fiscal quarters from October 1, 1996 to September 30, 1999. However, our measure of earnings management may proxy for earnings smoothing activities instead of earnings inflation (and related big baths). The evidence that firms inflate earnings before insiders' stock sales in Tables 2 and 3 suggests that the association between the average unsigned abnormal accruals and abnormal return in Table 4 is likely related to the effects of earnings inflation. Nevertheless, we attempt to disentangle the effect of earnings inflation (and big baths) from the potential effect of earnings smoothing by conditioning our analysis on the likelihood that a firm is engaging in earnings smoothing. If the association between earnings

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[10] The market reached a trough on October 9, 2002. However, because of the shock caused to the economy by the September 11, 2001 event and since such an event was hardly predictable by investors, the drop in stock prices subsequent to the September 11, 2001 event is not necessarily associated with the stock market bubble. We therefore condition our analysis on the September 11, 2001 event by analyzing the association between earnings management and stock return before and after September 11, 2001. The results are qualitatively unaffected because we find that the stock price reversal associated with the prior earnings management activities largely occurred before September 11, 2001.

management and abnormal stock returns that we report in Table 4 is due solely to earnings smoothing (and not at all to earnings inflation) then the association in Table 4 should be driven by firms that were engaging in earnings smoothing. On the other hand, if the association in Table 4 is due to earnings inflation (notwithstanding big baths), then the association should be present for all firms.

To examine this issue, we partition firms according to the extent to which they appear to smooth earnings and contrast low and high earnings management firms (as measured by total absolute abnormal accruals) within the high and low smoothing groups. Next, we describe how and why we identify firms that are likely engaged in extensive earnings smoothing. For firms using discretionary accruals to smooth earnings, the managed and the unmanaged components of earnings should be negatively correlated. That is, a firm will report negative (positive) discretionary accruals when unmanaged earnings are high (low). Therefore, the probability that a firm is engaging in earnings smoothing is deemed high (low) when the correlation between the presumably managed component of earnings and the unmanaged component is below (above) the median correlation for the sample. If the documented association between earnings management and abnormal stock returns is due to earnings smoothing, the association should be stronger when the correlation between managed and unmanaged earnings is most negative.

[TABLE 5]

The results are reported in Table 5. During the last three years of the bubble, the mean difference in the average daily returns of high and low earnings management firms is 0.026% for the firms that were most likely to be engaging earnings smoothing. Correspondingly, the

mean difference in the average daily returns of high and low earnings management firms is 0.044% for the firms that were less likely to be engaging earnings smoothing. Because the effect of extensive earnings management activity (as measured by firms' total absolute abnormal accruals) on the stock price run-up during the bubble is lower for firms that appear to have smoothed earnings the most, we find no evidence that the results are driven by the firms most likely to have engaged in earnings smoothing.

Similarly, during the correction, the mean difference in the average daily returns of high and low earnings management firms is 0.060% for the firms that are most likely to have engaged in earnings smoothing. Correspondingly, the mean difference in the average daily returns of high and low earnings management firms is 0.080% for the firms that are least likely to have engaged in earnings smoothing. Again, because the effect of extensive earnings management activity (as measured by firms' average absolute abnormal accruals) on the stock price run up during the bubble is lower for firms that appear to have smoothed earnings the most, we find no evidence that the results are driven by the firms that were most likely to be engaging earnings smoothing.

V. The association between managers' stock sales and stock returns

If earnings manipulation is prompted by the incentive managers face to increase the stock price before they sell stock, it is also useful to ask whether managers' stock sales are associated with firm stock returns during the bubble and the correction. We measure net insider selling by the net total amount of common shares sold by a firm's insiders from January 1, 1997 to December 31, 1999. The number of shares traded by an insider on a given day is scaled by the number of common shares outstanding on the day of the transaction.

Insider selling is deemed low if it is in the bottom quintile of the net insider selling distribution and high if it is in the top quintile for the period.

Analogous to the analysis of earnings manipulation in the previous section, we measure stock returns during both the bubble and the correction. Each day, we compute the abnormal return for each firm. The daily abnormal return for a firm is its raw return for the day minus the average return of a portfolio matched on size and book-to-market. The control portfolio is formed at the beginning of the fiscal quarter that ends in the same calendar quarter as the return measurement day. We sort the sample firms into size-quintiles and each size quintile into book-to-market quintiles to form 25 portfolios. Each firm is matched with its corresponding size/book-to-market portfolio. We use the distribution of the daily time-series of abnormal returns to make inferences.

[TABLE 6]

The results are reported in Table 6. There is a significant association between insider selling and stock returns during the bubble. There is also a significant association between insider selling during the bubble and the stock price reversal following the stock market bubble. High insider selling firms experience significantly positive abnormal returns whereas low insider selling firms experience significantly negative abnormal returns during the bubble period. The mean of the difference in the average daily abnormal returns of low and high insider selling firms is 0.078%. Compounded over the 758 trading days (from March 25, 1997 to March 24, 2000), the average difference in the abnormal returns of high and low insider selling firms is approximately 59%. Low insider selling firms experience significantly positive abnormal returns whereas high insider selling firms experience significantly negative

abnormal returns during the correction period. The mean of the difference in the average daily abnormal returns of low and high insider selling firms is 0.037%. Compounded over the 637 trading days (from March 27, 2000 to October 9, 2002), the average difference in the abnormal returns of low and high insider selling firms is approximately 24%.

All else equal, the fraction of insiders' wealth invested in firm stock increases with stock price increases. Hence, a stock price run-up could lead to stock sales by insiders for portfolio rebalancing or profit-taking reasons. Since insider selling intensity and stock returns are measured contemporaneously in Panel A, the significant difference in returns between high and low insider selling firms may arise simply because high returns prompt insider selling. This line of reasoning, however, does not explain the low stock returns during the correction for firms with high insider selling during the bubble. A more plausible explanation for the difference in returns documented in Panel B is that stocks with prices inflated by insiders seeking to sell at high prices in one period later experienced a correction.

VI. Robustness

In this section, we discuss how the results reported in Tables 3, 4, and 6 are affected when potentially contaminated observations are excluded and when the tests are re-performed on data drawn from an earlier time period.

Effect of mergers, discontinued operations and restatements

The accounting data used in this study are from Compustat. In some cases, when a company reports for a new quarter and at the same time reports different data than originally reported for prior periods, Compustat revises the data for the prior periods. These revisions can be due to restatements (i.e., prior period adjustments), mergers, acquisitions, discontinued

operations, and accounting changes. In such cases, Compustat's revisions effectively erase and rewrite the history of reported earnings. Since the stock price responds to the earnings that were actually announced, not the numbers arrived at after giving effect to subsequent revisions, our inferences may be affected by the inclusion in our sample of firms for which the record of reported financial results has been revised.

This is a concern for at least two reasons. First, mergers and restatements give rise to violations of tidiness: in the revised data, inflation of reported earnings in one period need not result in offsetting reductions in earnings in future periods. Our rationale for using absolute abnormal accruals as a measure of earnings management relies on earnings being tidy. Untidy data undermines this logic behind our measure. Second, under the assumption that some restatements undo earnings manipulation, the revised data mischaracterize (and probably understate) the abnormal accruals originally reported. Since the results reported in Tables 3 and 4 are based on accounting data that has in some cases been revised, inferences may be affected. Additionally, Hribar and Collins (2002) observe that mergers and acquisitions impart a positive bias to the to accruals estimated using the balance sheet, discontinued operations impart a negative bias, and foreign currency translation gains and losses also introduce a negative bias that is smaller in magnitude.[11]

To our knowledge, the accounting data as originally reported are not available in machine-readable form. Hand collection appears prohibitively costly. Since we cannot reconstruct the original series of accounting reports, we instead re-perform our tests after excluding observations potentially contaminated by revisions.

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[11] Note, however, that using the cash flow statement to estimate accruals does not solve the problems related to the revision of prior-period data.

We define observations potentially contaminated by data revisions due to mergers and discontinued operations to be firm-quarters that have absolute value of cash flows related to acquisitions (quarterly Compustat data item 94) scaled by total assets or absolute value of income from discontinued operations (quarterly Compustat data item 33) scaled by total assets greater than 0.005.

Identifying restatements that could affect inference is difficult because there is no authoritative list of accounting restatements; however, the General Accounting Office (GAO 2003) assembled and published a comprehensive list of public company restatements occurring from January 1, 1997 through June 30, 2002 that appear related to some accounting irregularity—defined to include "so-called 'aggressive' accounting practices, intentional and unintentional misuse of facts applied to financial statements, oversight or misinterpretation of accounting rules, and fraud" and exclude "restatements resulting from mergers and acquisitions, discontinued operations, stock splits, issuance of stock dividends, currency-related issues (for example, converting from Canadian dollars to U.S. dollars), changes in business segment definitions, changes due to transfers of management, changes made for presentation purposes, general accounting changes under generally accepted accounting principles (GAAP), litigation settlements, and arithmetic and general bookkeeping errors" (GAO 2002, 76). We define observations potentially contaminated by data revisions due to accounting regularities resulting in restatements to be firm-quarters within 48 months before and 12 months after the month of a restatement announcement reported by the GAO.[12]

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[12] In a set of restatements that overlaps with the GAO set, Moore and Pfeiffer Jr. (2004, Table 1) indicate that the mean number of quarters restated in their sample ranges between 4 and 6 per year over the years 1997–2000.

Inferences in Tables 4 and 5 are qualitatively unaffected by the exclusion of either or both sets of potentially contaminated observations.

Application to an earlier period

It is also interesting to examine whether the associations documented above, in the context of an apparent bubble, are evident in a different time period. In Table 7, we report the results of performing the analyses in Tables 4 and 6 on data from 5 years earlier. In place of the last 3 years of the bubble (March 25, 1997 to March 24, 2000), we consider the period from March 25, 1992 to March 25, 1995. In place of the correction (March 25, 2000 to October 9, 2002), we consider the period from March 25, 1995 to October 9, 1997. The S&P 500 index was 407.52 on March 25, 1992, 500.97 on March 24, 1995, and 970.62 October 9, 1997. Thus, the earlier periods are characterized by generally rising prices and there is no systematic correction.

[TABLE 7]

Columns (1) and (2) in Panel A of Table 7 present the mean and median daily returns of stocks where earnings management is estimated to be high and low in the period March 25, 1992 to March 24, 1995. Columns (1) and (2) in Panel B present the mean and median daily returns of these same stocks for the period March 25, 1995 to October 9, 1997. In contrast to the results in Table 4, there is no evidence that the daily stock returns of these two groups of firms differ in either period. In particular, high earnings management implies neither contemporaneous superior returns relative to low earnings management nor a subsequent downwards correction.

Columns (3) and (4) in Panel A of Table 7 present the mean and median daily returns of stocks where insider selling is high and low in the period March 25, 1992 to March 24, 1995. Columns (3) and (4) in Panel B present the mean and median daily returns of these same stocks for the period March 25, 1995 to October 9, 1997. Consistent with Table 6, stock returns are significantly higher when contemporaneous insider selling is high, although the estimated daily difference between low and high insider selling portfolios' abnormal returns is only half as large. In contrast to Table 6, there is no evidence of a difference in the subsequent returns of firms with high and low levels insider selling in the earlier period.

The changes in the relationships between (i) earnings management and stock returns and (ii) insider selling and stock returns between the alleged bubble and the earlier period suggests that the effects of earnings management on stock price depend on market conditions that vary over time. The evidence from 1992–1997 is consistent with the interpretation that insiders sell stock after the stock price has increased and that the market is not fooled into pricing stock above fundamental value when earnings management is intense, as Stein (1989) argues. The evidence from 1997–2002, however, suggests that more intense earnings manipulation resulted in larger stock prices increases that ultimately proved transitory. The root cause of these time-dependent findings is not apparent, but the higher level of equity compensation; greater uncertainty about managers' reporting objectives, as described in Fischer and Verrecchia (2000); and the trend-chasing or positive feedback behavior described in de Long et al. (1990) all may play a role in the 1997–2002 period.

VII. Conclusion

By paying managers with stock and hence obliging them to sell large amounts of stock, the compensation practices of the 1990s allegedly created an environment where

managers became very sensitive to short-term stock performance, contributing to the recent stock market bubble (cf. Coffee 2003; Fuller and Jensen 2002; and Greenspan 2002). Consistent with these allegations, we find that managers inflate earnings more in quarters that precede high insider selling activities. We further find strong evidence that stock price run-ups of particular firms during the bubble period are strongly positively associated with both earnings management and insider trading activities during the bubble. Moreover, there is strong evidence that the stock price declines of particular firms during the ensuing correction period also are strongly positively associated with both earnings management and insider trading activities during the bubble.

Additional tests indicate that the price run-up during the alleged bubble cannot be attributed solely to earnings smoothing. Strikingly, the results we document for the bubble period of 1997–2002 do not obtain when identical tests are applied to data from the period 1992–1997. This indicates that something about the bubble period, perhaps the higher level of equity compensation, greater uncertainty about managers' reporting objectives, or certain positive feedback trading behaviors distinguish it from the earlier period.

Overall, our results are remarkably consistent with the assertions made by Coffee (2003), Fuller and Jensen (2002), and Greenspan (2002). Because the evidence is only circumstantial, we do not claim to have established a causal relation among the bubble, executive compensation, insider selling, and earnings management. Nevertheless, the results suggest that, at least during 1997–1999, high levels of stock-based compensation led managers to inflate stock prices through earnings management. Thus, this compensation practice appears to have amplified the stock price run-up and correction at particular firms during the 1990s market bubble.

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Table 1
Descriptive statistics (N = 93,258): 1985–1999

	Mean	Std. dev.	25th percentile	Median	75th percentile
Panel A: Test variables					
EI	-0.053	4.695	-2.252	-0.029	2.169
ISELLING	0.101	0.585	0.000	0.000	0.044
Panel B: Instrumental and control variables					
SIZE	1227.282	6449.582	30.321	115.622	530.810
BM	0.644	0.479	0.323	0.542	0.832
LEVERAGE	0.387	0.649	0.014	0.149	0.477
STK_ISSUANCE	0.059	0.236	0.000	0.000	0.000
ABR1_12M	0.023	0.515	-0.282	-0.054	0.204
IO	0.515	0.500	0.000	1.000	1.000
HIGHTEC	0.276	0.447	0.000	0.000	1.000

Notes to Table 1:

EI, earnings inflation as a percentage of total assets, is proxied by the residual of a modified Jones model adjusted for performance according to the procedure suggested by Kothari, Leone, and Wasley (2005).

ISELLING, net insider selling, is shares sold minus shares bought over the three months (91 days) following the quarterly earnings announcement date. It is expressed as a percentage of shares outstanding.

SIZE is total market capitalization of common stock in millions of dollars at the beginning of quarter *t*.

BM is the ratio of common book equity to total market capitalization at the beginning of quarter *t*.

LEVERAGE is the ratio of long-term debt to market capitalization at the beginning of quarter *t*.

STK_ISSUANCE is a binary variable taking the value one if the value of stock issued by the firm (quarterly Compustat data #84) in the fiscal quarter immediately after the calendar quarter of the earnings announcement scaled by beginning market value is 0.05, and zero otherwise.

ABR1_12M is the abnormal return over the year before the beginning of the calendar quarter of the fiscal quarter-end date.

IO is a dummy variable taking the value one if the proportion of the outstanding shares traded by institutional investors during the calendar quarter after the calendar quarter of the fiscal quarter-end date is above the median, and zero otherwise.

HIGHTEC is a binary variable that takes the value one for technology firms—SIC codes: 2833–2836 (drugs), 3570–3577 (computer and office equipment), 3600–3674 (electronic and other electrical equipment and components, except computer equipment), 3812–3845 (measuring, analyzing, and controlling instruments), 7371–7379 (computer programming and data processing), and 8731–8734 (research, development, and testing services)—and zero otherwise.

We winsorize the top and bottom one-percentiles of all the continuous variables.

Table 2
Unconditional association of earnings inflation and subsequent insider trading: High versus low net insider selling (1985–1999)

Panel A: Pooled sample

	Low Net Insider Selling (N = 18,102)	High Net Insider Selling (N = 18,637)	Difference
Mean earnings inflation	-0.227 [0.000]	0.224 [0.000]	0.451 [0.000]
Median earnings inflation	-0.122 [0.000]	0.148 [0.000]	0.270 [0.000]

Panel B: Fama-McBeth procedure

	Low Net Insider Selling (N = 60)	High Net Insider Selling (N = 60)	Difference
Mean earnings inflation	-0.224 [0.000]	0.225 [0.000]	0.449 [0.000]
Median earnings inflation	-0.254 [0.000]	0.251 [0.000]	0.505 [0.000]

Notes to Table 2:

Earnings inflation, expressed as a percentage of total assets, is proxied by the residual of a modified Jones (1991) model adjusted for performance according to the procedure suggested by Kothari, Leone, and Wasley (2005).

Net insider selling is the shares sold minus shares bought by corporate officers and directors over the three months (91 days) following the quarterly earnings announcement date as a percentage of shares outstanding. The earnings announcement dates correspond to the fiscal quarters ending in the period from October 1984 to September 1999. Net insider selling is deemed high if it is in the top quintile of the net insider selling distribution and low if it is in the bottom quintile.

Panel A presents results for the pooled sample. Because a firm may be included in the sample up to 12 times, there is a high probability that our inferences are affected by cross-sectional correlation. To control for such an eventuality, we follow a procedure similar to the Fama-McBeth approach. Each quarter, we compute the cross-sectional average earnings inflation for the low and the high insider selling groups. This gives us a time series of 12 average quarterly earnings inflations for each of the two groups over the period from October 1984 to September

1999. We then use the time series of 12 average quarterly earnings inflations to make inferences. The results are reported in Panel B.

In Panel A, *N* is the number of firm-quarters and, in Panel B, it is the number of quarters. One-tail *p*-values presented in brackets beneath the coefficient estimates are for a *t*-test of differences for the mean difference (assuming unequal variances) and a Wilcoxon two-sample test for the median difference.

Table 3
Association between earnings inflation and subsequent insider selling conditioned on firm attributes (1985–1999)

$$EI_{i,t} = \alpha_0 + \alpha_1 ISELLING_{i,t} + \alpha_2 LOGSIZE_{i,t} + \alpha_3 BM_{i,t} + \alpha_4 LEVERAGE_{i,t} + \alpha_5 STK\_ISSUANCE_{i,t} + \varepsilon_i \quad \text{(model 1)}$$

$$ISELLING_{i,t} = \alpha_0 + \alpha_1 EI_{i,t} + \alpha_2 LISELLING_{i,t} + \alpha_3 LOGSIZE_{i,t} + \alpha_4 BM_{i,t} + \alpha_5 ABR1\_12M_{i,t} + \alpha_6 IO_{i,t} + \alpha_7 HIGHTEC_{i,t} + \varepsilon_i \quad \text{(model 2)}$$

Panel A – Dependent variable: *EI* (model 1)

	Fama-MacBeth (OLS) (N = 60)	Pooled OLS (N = 93,258)	Pooled 2SLS (N = 93,258)	Pooled 3SLS (N = 93,258)
INTERCEPT	0.560***	0.502***	0.290***	0.319***
	[8.55]	[8.78]	[4.82]	[5.31]
ISELLING	**0.200^{+++}**	**0.172^{+++}**	**1.387^{+++}**	**1.370^{+++}**
	[4.71]	**[6.51]**	**[13.91]**	**[13.74]**
LOGSIZE	-0.042^{+++}	-0.045^{+++}	-0.043^{+++}	-0.044^{+++}
	[-4.76]	[-5.32]	[-5.06]	[-5.19]
BM	-0.619^{+++}	-0.547^{+++}	-0.446^{+++}	-0.417^{+++}
	[-13.77]	[-14.85]	[-11.71]	[-11.04]
LEVERAGE	-0.106^{+++}	-0.099^{+++}	-0.045^{++}	-0.133^{+++}
	[-3.35]	[-3.96]	[-1.77]	[-6.57]
STK_ISSUANCE	0.610^{+++}	0.628^{+++}	0.550^{+++}	0.442^{+++}
	[7.24]	[9.59]	[8.26]	[6.94]
Adjusted R^2	0.007	0.005	0.007	N/A
System-weighted	N/A	N/A	N/A	0.052

Panel B – Dependent variable: *ISELLING* (model 2)

	Fama-MacBeth (OLS) (N = 60)	Pooled OLS (N = 93,258)	Pooled 2SLS (N = 93,258)	Pooled 3SLS (N = 93,258)
INTERCEPT	0.082***	0.070***	0.026	0.040***
	[5.03]	[9.47]	[2.04]	[3.17]
EI	0.001^{++}	0.001^{+++}	0.084^{+++}	0.078^{+++}
	[2.26]	[3.03]	[4.96]	[4.59]
LISELLING	0.435^{+++}	0.387^{+++}	0.380^{+++}	0.334^{+++}
	[23.24]	[71.11]	[56.06]	[52.02]
LOGSIZE	-0.004^{++}	-0.002^{++}	0.003	0.001
	[-2.10]	[-2.37]	[1.65]	[0.65]

BM	-0.048^{+++}	-0.040^{+++}	-0.003	0.003
	[-7.37]	[-9.16]	[-0.30]	[0.33]
ABR1_12M	0.118^{+++}	0.107^{+++}	0.040^{+++}	0.109^{+++}
	[12.65]	[28.38]	[2.80]	[7.81]
IO	0.069^{+++}	0.070^{+++}	0.062^{+++}	0.063^{+++}
	[10.46]	[18.98]	[12.97]	[16.89]
HIGHTEC	0.026^{+++}	0.024^{+++}	0.044^{+++}	0.011^{++}
	[5.16]	[5.75]	[6.75]	[1.93]
Adjusted R^2	0.103	0.078	0.056	N/A
System-weighted	N/A	N/A	N/A	0.052

Notes to Table 3:

EI, earnings inflation as a percentage of total assets, is proxied by the residual of a modified Jones model adjusted for performance according to the procedure suggested by Kothari, Leone, and Wasley (2005).

ISELLING, net insider selling, is shares sold minus shares bought over the three months (91 days) following the quarterly earnings announcement date. It is expressed as a percentage of shares outstanding.

LISELLING is the lag of net insider selling (*ISELLING*).

LOGSIZE is the log of total market capitalization of common stock in millions of dollars at the beginning of quarter *t*.

BM is the ratio of common book equity to total market capitalization at the beginning of quarter *t*.

LEVERAGE is the ratio of long-term debt to market capitalization at the beginning of quarter *t*.

STK_ISSUANCE is a binary variable taking the value one if the value of stock issued by the firm (quarterly Compustat data #84) in the fiscal quarter immediately after the calendar quarter of the earnings announcement scaled by beginning market value exceeds 0.05, and zero otherwise.

ABR1_12M is the abnormal return over the year before the beginning of the calendar quarter of the fiscal quarter-end date.

IO is an indicator variable that takes the value one if the proportion of the outstanding shares traded by institutional investors during the calendar quarter after the calendar quarter of the fiscal quarter-end date is above the median, and zero otherwise.

HIGHTEC is an indicator variable that takes the value one for technology firms—SIC codes: 2833–2836 (drugs), 3570–3577 (computer and office equipment), 3600–3674 (electronic and other electrical equipment and components, except computer equipment), 3812–3845

(measuring, analyzing, and controlling instruments), 7371–7379 (computer programming and data processing), and 8731–8734 (research, development, and testing services)—and zero otherwise.

We winsorize the top and bottom one-percentiles of all the continuous variables.

The Fama-McBeth statistics are computed using the mean and standard deviation of the regression statistics for each of the 60 quarters in the sample.

T-values are reported in parentheses. $^{+++}$ and $^{++}$ indicate significance at the 1 and 5 percent levels in a one-tail test. *** indicates significance at the 1 percent level in a two-tail test.

Table 4
Daily average percentage portfolio abnormal return: High versus low earnings management firms.

	(1) Low earnings management	(2) High earnings management	(2) – (1) Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series	(2) – (1) One sample test: Time-series differences in the abnormal returns of the low and high earnings management portfolios
Panel A: Bubble - March 25, 1997 to March 24, 2000 (758 trading days)				
Mean	-0.010 [0.087]	0.019 [0.019]	0.029 [0.007]	0.028 [0.022]
Median	-0.015 [0.055]	0.016 [0.029]	0.031 [0.008]	0.026 [0.012]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 trading days)				
Mean	0.023 [0.036]	-0.038 [0.001]	-0.061 [0.001]	-0.061 [0.006]
Median	0.021 [0.012]	-0.054 [0.000]	-0.075 [0.000]	-0.076 [0.001]

Notes to Table 4:

Each day, we compute the abnormal return for each firm. The daily abnormal return for a firm is its raw return for the day minus the return of an equally-weighted control portfolio. Control portfolios are formed at the beginning of the fiscal quarter that ends in the same calendar quarter as the return measurement day by sorting sample firms into book-to-market quintiles within size quintiles to form 25 portfolios. Each firm is matched with its corresponding size/book-to-market control portfolio.

We measure earnings management over the fiscal periods from October 1, 1996 to September 30, 1999. We group the sample into low earnings management firms and high earnings management firms. Earnings management is proxied by the mean absolute value of the residual of the modified Jones model adjusted for performance according to the procedure suggested by Kothari, Leone, and Wasley (2005). Earnings management is deemed low if it is in the bottom quintile of the earnings management distribution and high if it is in the top quintile. The mean and median of the daily average abnormal returns are reported in column (1) for the low earnings management firm-days and in column (2) for the high earnings management firm-days. In Panel A, the daily returns are computed from March 25, 1997 to March 24, 2000. In Panel B, the daily returns are computed from March 25, 2000 to October 9, 2002.

One-tail *p*-values are reported in brackets beneath the coefficient estimates. The *p*-values are based on the *t*-tests for the mean and the Wilcoxon signed rank and two-sample tests for the median. The *t*-test for mean difference assumes unequal variances. $^{+++}$, $^{++}$, and $^{+}$ indicate that the difference between the pre- and the post-September 11 period is significant at the 1, 5, and 10 percent levels, respectively, in a one-tail test using the *t*-test for the mean (assuming unequal variances) and the Wilcoxon two-sample tests for the median.

Table 5
Daily average percentage portfolio abnormal return: High versus low earnings management firms conditional on the likelihood of earnings smoothing.

	High probability of earnings smoothing			Low probability of earnings smoothing		
	(1) Low earnings management	(2) High earnings management	(2) – (1) Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series	(1) Low earnings management	(2) High earnings management	(2) – (1) Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series
Panel A: Bubble - March 25, 1997 to March 24, 2000 (758 trading days)						
Mean	-0.006 [0.202]	0.020 [0.021]	0.026 [0.016]	-0.016 [0.068]	0.028 [0.019]	0.044 [0.005]
Median	-0.008 [0.172]	0.016 [0.024]	0.024 [0.016]	-0.010 [0.117]	-0.007 [0.873]	0.003 [0.074]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 trading days)						
	High probability of earnings smoothing			Low probability of earnings smoothing		
Mean	0.018 [0.051]	-0.041 [0.002]	-0.060 [0.001]	0.031 [0.036]	-0.050 [0.007]	-0.080 [0.001]
Median	0.021 [0.024]	-0.059 [0.000]	-0.080 [0.000]	0.042 [0.015]	-0.065 [0.002]	-0.107 [0.000]

Notes to Table 5:

Firm-day abnormal returns and earnings management are computed as in Table 4.

We group the sample into low earnings management firms and high earnings management firms. Earnings management is deemed low if it is in the bottom quintile of the earnings management distribution and high if it is in the top quintile. The mean and median of the daily average abnormal returns across firm-days in the period are reported in column (1) for the low earnings management firms and in column (2) for the high earnings management firms. The probability that a firm is engaging in earnings smoothing is deemed high (low) when the correlation between the component of earnings that is estimated to be managed and the unmanaged component is below (above) the median correlation for the sample. We assume that, for firms using discretionary accruals to smooth earnings, the managed and the unmanaged components of earnings should be negatively correlated.

One-tail *p*-values are reported in brackets. The *p*-values are based on the *t*-tests for the mean and the Wilcoxon signed rank and two-sample tests for the median. The *t*-test for mean difference assumes unequal variances.

Table 6
Daily average percentage portfolio abnormal return: High versus low insider trading firms.

	(1) Low insider selling	(2) High insider selling	(2) – (1) Two-sample test: Difference in the low and high insider selling portfolios' abnormal return time-series	(2) – (1) One sample test: Time-series differences in the abnormal returns of the low and high insider selling portfolios
Panel A: Bubble - March 25, 1997 to March 24, 2000 (758 trading days)				
Mean	-0.026 [0.000]	0.052 [0.000]	0.078 [0.000]	0.078 [0.000]
Median	-0.025 [0.000]	0.053 [0.000]	0.078 [0.000]	0.078 [0.000]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 trading days)				
Mean	0.012 [0.118]	-0.025 [0.046]	-0.037 [0.020]	-0.037 [0.053]
Median	0.024 [0.035]	-0.036 [0.003]	-0.060 [0.001]	-0.050 [0.003]

Notes to Table 6:

Firm-day abnormal returns are computed as in Table 4.

We group the sample into low-insider-selling firms and high-insider-selling firms. Insider selling is deemed low if it is in the bottom quintile of the net insider selling distribution and high if it is in the top quintile for the period January 1, 1997 to December 31, 1999. The net number of shares traded by the insiders is scaled by the number of common shares outstanding on the day of the transaction. The mean and median of the daily average abnormal returns are reported in column (1) for the low insider selling firms and in column (2) for the high insider selling firms.

One-tail *p*-values are reported in brackets. The *p*-values are based on the *t*-tests for the mean and the Wilcoxon signed rank and two-sample tests for the median. The *t*-test for mean difference assumes unequal variances.

Table 7
Replication of the analysis in Tables 4 and 6 on an earlier period: Daily average percentage portfolio abnormal return

Panel A: Returns are measured from March 25, 1992 to March 24, 1995 (759 trading days)

	High versus low earnings management firms			High versus low insider selling firms		
	(1) Low earnings management	(2) High earnings management	(2) – (1) Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series	(3) Low insider selling	(4) High insider selling	(4) – (3) Two-sample test: Difference in the low and high insider selling portfolios' abnormal return time-series
Mean	-0.004	-0.002	0.002	0.001	0.031	0.030
	[0.227]	[0.580]	[0.394]	[0.565]	[0.000	[0.002]
Median	-0.003	-0.006	-0.003	-0.004	0.037	0.041
	[0.119]	[0.672]	[0.577]	[0.439]	[0.000]	[0.004]

Panel B: Returns are measured from March 25, 1995 to October 9, 1997, 1997 (644 trading days)

	High versus low earnings management firms			High versus low insider selling firms		
	(1) Low earnings management	(2) High earnings management	(2) – (1) Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series	(3) Low insider selling	(4) High insider selling	(4) – (3) Two-sample test: Difference in the low and high insider selling portfolios' abnormal return time-series
Mean	-0.007	-0.004	0.003	0.005	0.003	-0.002
	[0.869]	[0.318]	[0.616]	[0.237]	[0.642]	[0.441]
Median	-0.013	-0.015	-0.002	0.008	0.001	-0.007
	[0.928]	[0.106]	[0.384]	[0.252]	[0.718]	[0.478]

Notes to Table 7:

In this table, the analyses reported in Tables 4 and 6 for the bubble period (March 25, 1997 to March 24, 2000) and the correction period (March 25, 2000 to October 9, 2002) are repeated using data from 5 years earlier: March 25, 1992 to March 24, 1995 and March 25, 1995 to October 9, 1997, respectively.

Firm-day abnormal returns are computed as in Table 4.

Corresponding to the method used in Table 4, we measure earnings management over the fiscal periods from October 1, 1991 to September 30, 1994. We group the sample into low earnings management firms and high earnings management firms. Earnings management is proxied by the mean absolute value of the residual of the modified Jones model adjusted for performance

according to the procedure suggested by Kothari, Leone, and Wasley (2005). Earnings management is deemed low if it is in the bottom quintile of the earnings management distribution and high if it is in the top quintile. The mean and median of the daily average abnormal returns are reported in column (1) for the low earnings management firm-days and in column (2) for the high earnings management firm-days.

We group the sample into low-insider-selling firms and high-insider-selling firms. Corresponding to the method used in Table 6, insider selling is deemed low if it is in the bottom quintile of the net insider selling distribution and high if it is in the top quintile for the period January 1, 1992 to December 31, 1994. The net number of shares traded by the insiders is scaled by the number of common shares outstanding on the day of the transaction. The mean and median of the daily average abnormal returns are reported in column (1) for the low insider selling firms and in column (2) for the high insider selling firms.

One-tail *p*-values are reported in brackets. The *p*-values are based on the *t*-tests for the mean and the Wilcoxon signed rank and two-sample tests for the median. The *t*-test for mean difference assumes unequal variances.