

Managerial stock sales and earnings management during the 1990s stock market bubble

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Abstract

Stock-based compensation puts managers in the position of having, at some point, to sell stock. The prevalence of stock-based compensation in the 1990s allegedly created incentives for managers to hype their companies' stock price by manipulating earnings before selling stock. Consistent with this conjecture, we find that managers tended to inflate earnings prior to selling stock. Moreover, the corrections individual stocks experienced after the 1990s market bubble burst are strongly negatively associated with the estimated levels of earnings management and insider selling during the bubble. On average, during the last years of the bubble, (i) the returns of firms that managed earnings the most are 24 percent higher than the returns of firms that managed earnings the least and (ii) the returns of firms where insiders sold the most stock are 88 percent higher than the returns of firms where insiders sold the least stock. Conversely, during the correction, (i) the returns of firms that managed earnings the most are 51 percent lower than the returns of firms that managed earnings the least and (ii) the returns of firms where insiders sold the most stock are 32 percent lower than the returns of firms where insiders sold the least stock. Overall, the evidence is consistent with the conjecture that high levels of stock-based compensation exacerbated stock price run-ups and subsequent corrections during the 1990s market bubble.

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1. Introduction

The latter years of the 1990s saw a tremendous increase in stock-based compensation.¹ Coffee (2003), Fuller and Jensen (2002), and Greenspan (2002), among others, assert that stock-based compensation and managerial ownership increased managers' incentives to hype earnings and, consequently, stock prices, which contributed to the 1990s stock market bubble.² However, stock-based compensation and managerial ownership do not by themselves explain why managers would hype stock prices since any artificial inflation of earnings (through, e.g., accruals manipulation) in the current period implies earnings in subsequent periods must be lower by an amount that equals the inflation in the current period. That is, all earnings manipulations must reverse over time. Also, prices temporarily distorted away from fundamental value ought to revert to fundamental values over the long run. The link between stock-based compensation, on one hand, and earnings management and overpricing, on the

¹Hall 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.

²Coffee (2003) asserts that the increase in stock-based executive compensation created an environment where managers became very sensitive to short-term stock performance. 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 hype 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."

other, may be that stock-based compensation creates more managerial selling which, in turn, creates the incentive to hype stock prices shortly before the stock sales occur. Earnings manipulation is an important candidate mechanism that managers could use to inflate stock price. Therefore, we analyze whether earnings inflation is more pronounced 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.

Our objective is essentially to provide empirical evidence on the assertions made by Coffee (2003), Fuller and Jensen (2002), and Greenspan (2002) that the increase in stock-based compensation created incentives to inflate stock prices. To conduct our analysis, we need to establish 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 operationalize overpricing in two ways: The first measure of overpricing is the stock return 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 second measure is the stock return 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 at 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.

The 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, 0.516 percent of total assets per quarter or 2.064 percent 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. 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:

- (i) an average daily difference in the returns of high and low earnings management firms of 0.028 percent during the last years of the bubble (or 24 percent when compounded over the 758 trading days from March 25, 1997 to March 24, 2000);
- (ii) an average daily difference in the abnormal returns of high and low insider selling firms of 0.084 percent during the last years of the bubble (or 88 percent when compounded over the 758 trading days from March 25, 1997 to March 24, 2000);
- (iii) an average daily difference in the returns of low and high earnings management firms of 0.065 percent during the correction period (or 51 percent when

compounded over the 637 trading days from March 25, 2000 to October 9, 2002);
and

- (iv) an average daily difference in the abnormal returns of low and high insider selling firms of 0.043 percent during the correction period (or 32 percent when compounded over the 637 trading days from March 27, 2000 to October 9, 2002).

The 88 percent spread in returns between high and low insider-selling firms during the bubble is larger than the 24 percent spread in returns between high and low earnings management firms. Conversely, the 32 percent spread in returns between high and low insider-selling firms during the correction is smaller than the 51 percent spread in returns between high and low earnings management firms. Plausible explanations for this are that insider selling is one among several reasons why managers manipulate earnings and earnings manipulation is one of many mechanisms managers may use to hype the stock. 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) find that executives manage earnings "primarily to influence stock prices and their own welfare *via career concerns and external reputation*" (emphasis added). 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 impact stock price.

The remainder of the study is organized as follows. The following section analyzes the association between earnings inflation and managerial selling. Section 3 analyzes the association between earnings management and stock performance during and after the stock

market bubble. Section 4 examines the association between insider selling and stock performance during and after the stock market bubble. Section 5 concludes.

2. The association between earnings inflation and managerial selling

Managers allegedly inflate their firms' stock prices through earnings inflation. Hence, we expect earnings inflation to be positively associated with subsequent managerial selling during the last years of the 1990s market bubble. Earnings manipulation is possible because accounting requires estimates, which determine various components of earnings. 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 is 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 earnings. Notice that these manipulations do not alter the cash flows a firm receives. Instead, they affect the accrual element of 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 1996 although 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).³ 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 , $\Delta SALES_i - \Delta AR_i$, 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 are likely to be correlated with performance, we adjust them for performance using the procedure suggested by Kothari, Leone, and Wasley (2005). For each calendar quarter and for each two-digit SIC code industry, we create five portfolios of at least four firms each by sorting the data into quintiles of ROA measured four quarters prior to the quarter of the portfolio formation. The discretionary accrual for a given

³We obtain qualitatively the same results when we define total accruals as net income before extraordinary items (Compustat quarterly data item 8) minus operating cash flows (Compustat quarterly data item 108) plus extraordinary items/discontinued operations that affect cash flows (Compustat quarterly data item 78).

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 “abnormal accruals.”

We then compare the level of earnings inflation by low (bottom quintile) versus high (top quintile) insider selling firms over the period 1997-1999.⁴ We sort total net insider selling into quintiles in each of the 12 quarters subsequent to the earnings announcement dates. We measure short-term insider selling by the percentage of shares outstanding sold minus the percentage of shares outstanding bought in the three months (91 days) following the earnings announcement dates. The earnings announcement dates correspond to the fiscal quarters ending over the period from October 1996 to September 1999. We obtain insider-trading data from Thompson Insider Filing Feed database. Because insiders who are not officers or directors are unlikely to be involved in or be 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]

The results are reported in Table 1. There are 4,647 and 4,649 firm-quarters in the low and high insider selling groups, respectively. Consistent with the conjecture that short-term

⁴We start the sample period in 1997; however, we obtain qualitatively similar results when we start the period in 1995 or 1996.

managerial selling creates managerial incentives to inflate earnings, the high insider selling firms report significantly higher abnormal accruals in the preceding quarter than the low insider selling firms. 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 0.516 percent of total assets per quarter or 2.064 percent 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 12 average quarterly earnings inflations for each of the two groups over the period 1997-1999. We then use the time series of 12 average quarterly earnings inflations to make inferences. The estimates in Panel B are quite similar to those reported in Panel A and, even though there are only 12 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.

We also control for firm attributes that may be correlated with insider trade or earnings management. Book-to-market is likely to 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, 1990, and Klein 2002). Also, 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. We estimate the association between earnings inflation and managerial selling using the following regression model for the period 1997-1999:

$$EI_{i,t} = \alpha_0 + \alpha_1 ISELLING_{i,t-1} + \alpha_2 ISELLING_{i,t} + \alpha_3 ISELLING_{i,t+1} + \alpha_4 LOGSIZE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 LEVERAGE_{i,t} + \varepsilon_i, \quad (2)$$

where variables are defined as follows:

EI is earnings inflation, proxied by the abnormal accruals.

ISELLING_t is net insider selling deciles at time *t*. Net insider selling is the percentage of shares outstanding sold minus percentage of shares outstanding bought. Time *t-1* corresponds to the three months (91 days) prior to the quarterly earnings announcement date. Time *t* corresponds to the three months (91 days) following the quarterly earnings announcement date. Time *t+1* corresponds to month 4 to month 6 (day 92 to day 182) after 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.

[TABLE 2]

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 our specification.

Because of potential cross-correlation problems, we estimate model (2) both as a pooled regression and year-by-year using the Fama-McBeth (1973) approach to make inferences. The results of the analysis are reported in Table 2. 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. 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. Interestingly, while earnings inflation is strongly associated with the subsequent quarter insider selling (quarter t), 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.

3. The effect of earnings management on the bubble and the correction

Table 2 suggests that insiders manage earnings up when they have stock sales pending. We now consider how the extent of earnings management at a firm relates to the firm's stock price movements during the bubble and the correction.⁵ 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 whether earnings management contributed to the stock market bubble by analyzing the association between the individual firms' overpricing and the level of earnings management during the market 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 the potential stock price decline that would be associated with the

⁵We do not assume that increased managerial trading is 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 will eventually burst even if some of the conditions that generated it in the first place still exist. For instance, increased managerial trading activities may heighten managers' incentives to mislead investors. However, investors are not likely to be fooled forever even if managerial incentives to mislead them remain high. Jensen (2004, p. 562), for instance, argues that if your firm's stock price is inflated, "the market *will* [eventually] 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."

reversal of earnings inflation by hiding the nature of the reversal to investors through “big baths” or some reorganization or restructuring changes.

Along these lines, Jensen (2004, p. 557) reports the case of a Fortune 500 firm which board he sat on. The managers informed the board that they were struggling to meet their earnings target. They also informed the board in the same meeting that they had announced a 10% price increase effective January 2. One likely result of such an announcement (made in October) is that consumers would buy the firm’s (durable) products before the end of the year. In spite of this channel stuffing, the firm fell short of its earnings target. When the managers discovered that they would not meet the earnings target, they took a “big bath.” They “went from almost meeting the 4% return on assets to reporting the largest quarterly loss in the history of the company.” Though Jensen’s anecdote does not include a description of accrual inflation, this firm may have been inflating accruals in prior periods then resorted to channel stuffing (and eventually taken a “big bath”) because past accrual inflation had exhausted all hidden reserves on the balance sheet.

To maintain reported earnings at inflated levels and avoid the price effect of the reversal of prior earnings inflation, managers may also resort to fraudulent transactions as in the cases of Enron, Worldcom, and Global Crossing. 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.”

As we explain above, because the component of earnings inflation that is due to manipulation of accruals (within the framework of the Generally Accepted Accounting Principles (GAAP)) 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). We average the absolute abnormal accruals over the fiscal period from October 1, 1996 to September 30, 1999. Note that the average signed abnormal accrual is not a good proxy for earnings inflation over a twelve-quarter period because the positive accruals and the negative accruals will tend to cancel out as all accrual inflation must reverse over a long horizon.

We group sample firms according to the total absolute value of abnormal accruals. Earnings management is deemed low if the total absolute value of abnormal accruals is in the bottom quintile of the distribution and high if it is in 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.⁶ 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. Then, every day,

⁶In 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.

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 3]

The results are reported in Table 3. 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 percent. 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 earnings management firms is approximately 24 percent. Correspondingly, in Panel B, the mean of the difference in the average daily returns during the correction is 0.065 percent. Compounded 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 51 percent.

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 reported in Panels B1 and B2 of Table 3. We find that the stock price reversal associated with the prior earnings management activities occurred before September 11, 2001. The average daily difference in the abnormal returns of low and high earnings management firms in the pre-September 11, 2001 period is 0.113 percent (or 51 percent when compounded over the 368 trading days from March 25, 2000 to September 10, 2001). The compounded daily difference of 51 percent for the pre-September 11 period is, coincidentally, the same as the 51 percent compounded daily difference that we obtain for the full post-bubble period (March 27, 2000 to October 9, 2002).

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 cumulated 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 prior to insiders stock sales in Table 2 suggests that the association between the cumulated unsigned abnormal accruals and abnormal return in Table 3 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 management and abnormal stock returns that we report in Table 3 is due solely to earnings smoothing (and not at all to earnings inflation) then the association in Table 3 should be driven by for firms that were engaging in earnings smoothing. On the other hand, if the association in Table 3 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 is 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, at least, the association should be stronger when the correlation between managed and unmanaged earnings is most negative.

[TABLE 4]

The results are reported in Table 4. During the last seven years of the bubble, the mean difference in the average daily returns of high and low earnings management firms is 0.023 percent 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 0.043 percent 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 percent 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 percent 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' cumulative absolute observed 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.

4. The association between managers' stock sales and price run-ups and corrections

If earnings manipulation is prompted by the incentive managers face to hype 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 insiders from January 1, 1997 to December 31, 1999. The number of shares traded by the insiders 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 5]

The results are reported in Table 5. There is a significant association between insider selling and stock returns during the bubble. There is also a significant association between previous insider selling 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 0.084 percent. 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 88 percent. 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 0.043 percent. 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 32 percent.

5. 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.

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 the 1997-1999 period, 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

Unconditional association of earnings inflation and subsequent insider trading: High versus low net insider selling (1997-1999)

Panel A: Pooled sample

	Low Net Insider Selling (<i>N</i> = 4,647)	High Net Insider Selling (<i>N</i> = 4,649)	Difference
Mean earnings inflation	-0.189 [0.016]	0.327 [0.002]	0.516 [0.000]
Median earnings inflation	-0.044 [0.119]	0.326 [0.000]	0.370 [0.000]

Panel B: Fama-McBeth procedure

	Low Net Insider Selling (<i>N</i> = 12)	High Net Insider Selling (<i>N</i> = 12)	Difference
Mean earnings inflation	-0.189 [0.016]	0.322 [0.001]	0.503 [0.000]
Median earnings inflation	-0.044 [0.119]	0.354 [0.002]	0.524 [0.000]

Notes to Table 1:

Earnings inflation, expressed 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 (2004).

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 1996 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 1996 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 2

Association between earnings inflation and subsequent insider trading conditioned on firm attributes (1997-1999)

$$EI_{i,t} = \alpha_0 + \alpha_1 ISELLING_{i,t-1} + \alpha_2 ISELLING_{i,t} + \alpha_3 ISELLING_{i,t+1} + \alpha_4 LOGSIZE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 LEVERAGE_{i,t} + \varepsilon_i$$

	Predicted Sign	Pooled Regression ($N = 23,259$)	Fama-McBeth Procedure ($N = 12$)
α_0		0.232* [1.85]	0.607** [2.48]
α_1		-0.003 [-0.28]	-0.006 [-0.37]
α_2	+	0.073+++ [5.57]	0.064+++ [5.96]
α_3		-0.016 [-1.33]	-0.024 [-1.60]
α_4	-	-0.060+++ [-3.37]	-0.079++ [-2.56]
α_5	-	-0.013++ [-2.10]	-0.310+++ [-2.88]
α_6		-0.119*** [-4.21]	-0.171*** [-6.45]
<i>Adjusted R</i> ²		0.002	0.004

Notes to Table 2:

EI, is earnings inflation expressed as a percentage of total assets, and is proxied by the residual of a modified Jones model adjusted for performance according to the procedure suggested by Kothari, Leone, and Wasley (2004). We delete observations below the 1st and above the 99th percentile of the distribution of *EI*.

*ISELLING*_{*t*} is net insider selling deciles at time *t*. Net insider selling is shares sold minus of shares bought as a percentage of shares outstanding. Time *t-1* corresponds to the three months (91 days) prior to the quarterly earnings announcement date. Time *t* corresponds to the three months (91 days) following the quarterly earnings announcement date. Time *t+1* corresponds to month 4 to month 6 (day 92 to day 182) after the quarterly earnings announcement date.

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*.

The Fama-McBeth statistics are computed using the mean and standard deviation of the regression statistics for each of the 12 quarters in the sample.

T-values are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels in a two-tail test and +++, ++, and + indicate significance at the 1, 5, and 10 percent levels in a one-tail test.

Table 3

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 days)				
Mean	-0.009 [0.097]	0.019 [0.015]	0.028 [0.006]	0.028 [0.020]
Median	-0.011 [0.055]	0.015 [0.028]	0.026 [0.007]	0.017 [0.016]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 days)				
Mean	0.023 [0.033]	-0.042 [0.001]	0.065 [0.000]	0.065 [0.004]
Median	0.023 [0.012]	-0.065 [0.000]	0.088 [0.000]	0.065 [0.003]
Panel B1: Correction - March 25, 2000 to September 10, 2001 (368 days)				
Mean	0.040 ⁺ [0.018]	-0.073 ⁺⁺⁺ [0.000]	0.113 [0.000]	0.113 ⁺⁺ [0.001]
Median	0.041 ⁺ [0.004]	-0.110 ⁺⁺⁺ [0.000]	0.151 [0.000]	0.144 ⁺⁺⁺ [0.000]
Panel B2: Correction - September 12, 2001 to October 9, 2002 (269 days)				
Mean	0.001 [0.478]	0.001 [0.474]	0.000 [0.496]	0.000 [0.497]
Median	0.012 [0.313]	-0.019 [0.432]	0.031 [0.324]	0.016 [0.313]

Notes to Table 3:

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 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 (2004). 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. In Panel B1, the daily returns are computed from March 25, 2000 to September 10, 2001. In Panel B2, the daily returns are computed from September 12, 2001 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 4

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)	(2)	(2) - (1)	(1)	(2)	(2) - (1)
	Low earnings management	High earnings management	Two-sample test: Difference in the low and high earnings management portfolios' abnormal return time-series	Low earnings management	High earnings management	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 days)						
Mean	-0.006 [0.193]	0.017 [0.043]	0.023 [0.033]	-0.014 [0.082]	0.029 [0.015]	0.043 [0.005]
Median	-0.006 [0.147]	0.014 [0.071]	0.020 [0.029]	-0.006 [0.127]	0.007 [0.080]	0.013 [0.042]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 days)						
	High probability of earnings smoothing			Low probability of earnings smoothing		
Mean	0.018 [0.051]	-0.041 [0.002]	0.060 [0.001]	0.030 [0.036]	-0.050 [0.001]	0.080 [0.001]
Median	0.021 [0.024]	-0.059 [0.000]	0.080 [0.000]	0.042 [0.015]	-0.065 [0.000]	0.107 [0.000]

Notes to Table 4:

Firm-day abnormal returns and earnings management are computed as in Table 3.

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.

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 5

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

	(1) Low insider trading	(2) High insider trading	(2) - (1) Two-sample test: Difference in the low and high insider trading portfolios' abnormal return time-series	(2) - (1) One sample test: Time- series differences in the abnormal returns of the low and high insider trading portfolios
Panel A: Bubble - March 25, 1997 to March 24, 2000 (758 days)				
Mean	-0.027 [0.000]	0.057 [0.000]	0.084 [0.000]	0.084 [0.000]
Median	-0.020 [0.000]	0.057 [0.000]	0.077 [0.000]	0.068 [0.000]
Panel B: Correction - March 25, 2000 to October 9, 2002 (637 days)				
Mean	0.017 [0.048]	-0.027 [0.046]	0.043 [0.010]	0.043 [0.034]
Median	0.024 [0.014]	-0.042 [0.004]	0.066 [0.000]	0.060 [0.002]
Panel B1: Correction - March 25, 2000 to September 10, 2001 (368 days)				
Mean	0.014 [0.139]	-0.033 [0.069]	0.047 [0.033]	0.047 [0.073]
Median	0.023 [0.046]	-0.051 [0.006]	0.054 [0.000]	0.054 [0.006]
Panel B2: Correction - September 12, 2001 to October 9, 2002 (269 days)				
Mean	0.020 [0.099]	-0.018 [0.208]	0.038 [0.080]	0.038 [0.135]
Median	0.027 [0.078]	-0.034 [0.122]	0.061 [0.041]	0.068 [0.072]

Notes to Table 5:

Firm-day abnormal returns are computed as in Table 3.

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.